# Risk Factors in the Development of Postnatal Anxiety Symptomatology

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# ABSTRACT

**Objectives:** Research into postpartum psychopathology has focused largely on depression and only more recently has it been recognised that postnatal anxiety requires its own systematic research. As yet, only a limited number of studies have investigated interpersonal risk factors in relation to postnatal anxiety. This study aimed to further investigate the role of these factors by using a prospective design and standardised measures. Attachment theory is presented as a theoretical framework. It has been debated whether anxiety symptoms in the postpartum should be understood as a feature of postnatal depression, or as a separate clinical entity. This study used the DASS-21, a measure with good discriminant validity, to enable comparison of the risk factors in relation to depression and anxiety symptomatology.

**Design:** Using a prospective design, 81 women were assessed in the third trimester of pregnancy and at approximately 12 weeks postpartum. At Time 1 participants completed measures of social support, relationship satisfaction, adult attachment anxiety, and experiences of parents in childhood. At Time 2 postnatal anxiety and depression symptomatology was assessed.

**Results:** Significant associations were found between postnatal anxiety symptomatology and the majority of the interpersonal variables. In regression analyses these explained 12% of the variance in postnatal anxiety symptomatology. A similar pattern of associations was found for postnatal depression symptomatology, but only 6% of the variance in scores was explained.

**Conclusions:** Despite limitations, this study provides preliminary evidence of the contribution of interpersonal risk factors to the development of postnatal anxiety symptomatology, and support for the attachment theory perspective. This indicates the potential importance of interventions that focus on interpersonal relationships. A low rate of comorbidity with depression symptomatology, and differences in the regression models, appear to support the view of postnatal anxiety and depression as being distinct but closely related. Further research is needed with more representative samples.

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# CHAPTER 1: Introduction

## 1.1 General Introduction and Chapter Overview

This study is an investigation of risk factors in the development of postnatal anxiety symptomatology (that is, symptoms of anxiety as measured dimensionally, as opposed to a categorical diagnosis of anxiety). Although studies since the 1990s have shown that symptoms of anxiety are a common experience for women in the postnatal period (e.g. Ballard, Davis, Handy, & Mohan, 1993; Stuart, Couser, Schilder, O'Hara, & Gorman, 1998), research into psychological problems experienced by women following childbirth has historically focused largely on postnatal depression. It is only in the last decade that there has been an emphasis on the need to look beyond postnatal depression, and a recognition that postnatal anxiety in particular is worthy of its own systematic research (Wenzel, Haugen, Jackson, & Brendle, 2005; Ross & McLean, 2006).

Research into postnatal anxiety is therefore at an early stage in comparison to research into postnatal depression. Studies to date have focused on identifying prevalence rates, the course of postnatal anxiety, and the stability of symptoms over time (Matthey, Barnett, Howie, & Kavanagh, 2003; Reck et al., 2008). Only a limited number of studies have investigated risk factors in the development of postnatal anxiety. Most of these have focused on sociodemographic, obstetric, and mental health risk factors (e.g. Britton, 2005; Skouteris, Wertheim, Rallis, Milgrom, & Paxton, 2009), although more recently studies have begun to investigate interpersonal risk factors such as relationship satisfaction, social support, and attachment style (e.g. Britton, 2008; van Bussel, Spitz, & Demyttenaere, 2009). Some of these studies have methodological limitations such as the use of non-

standardized measures, a cross-sectional design, or short follow-up periods. It is the aim of this study to further investigate the role of interpersonal factors in the development of postnatal anxiety symptomatology, by using a prospective design and standardized measures.

Further research into interpersonal risk factors is not only indicated by the preliminary studies of postnatal anxiety, but is also indicated from a theoretical perspective. Several researchers have noted the unique suitability of attachment theory (Bowlby, 1969, 1973, 1980) as a framework for understanding psychological adjustment during the transition to parenthood; the theory provides a rich explanation of vulnerability to interpersonal difficulties and the psychological consequences of these, which is particularly relevant as the birth of a child inevitably impacts upon the existing attachment bond between the mother and father (Alexander, Feeney, Hohaus, & Noller, 2001; Whiffen, 2003).

This study will therefore present attachment theory as the theoretical framework for investigating interpersonal risk factors in the development of postnatal anxiety symptomatology. The study focuses on the interpersonal risk factors of social support, relationship satisfaction, adult attachment style, and parental care and overprotection. These risk factors were selected on the basis of their link with attachment theory, and because they are factors which have been found to be implicated in the development of psychopathology. In the section 1.6, each of the interpersonal concepts will be described in detail.

This chapter begins by presenting the evidence regarding prevalence rates, course, and prognosis of postnatal anxiety, followed by a summary of the research relating to the impact of postnatal anxiety on both mothers and children. Psychological models of anxiety are discussed and the attachment model of postnatal

anxiety set out. The concepts of social support, relationship satisfaction, attachment style and parental care and overprotection are introduced. A literature review of the research to date into risk factors in the development of postnatal anxiety is presented. The risk factors which have been established for postnatal depression are also presented. The debate as to how postnatal anxiety may be understood in relation to postnatal depression is then discussed. The section concludes with a summary and presentation of the research hypotheses.

### 1.2 Postnatal Anxiety

Studies have differed in how postnatal anxiety is defined and assessed. In much of the research to date, the term postnatal anxiety is taken to mean generic anxiety symptomatology as assessed by non-specific self-report inventories such as the State Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983), and the DASS-21. The findings of these studies therefore do not relate to specific anxiety diagnoses.

Other research has used diagnostic interview schedules to investigate specific anxiety disorders as defined by the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders 4$^{th}$ Edition (DSM-IV; American Psychiatric Association, 1994). These are as follows: generalized anxiety disorder (GAD), panic disorder, obsessive compulsive disorder, posttraumatic stress disorder, social phobia and specific phobia. According to DSM-IV criteria, GAD can only be diagnosed when symptoms have been present for at least 6 months. Hence, when it occurs prior to 6 months postpartum it must be defined as acute adjustment disorder with anxiety (AADA), although the symptoms specified are the same as those experienced in GAD. In the literature both GAD and AADA are used interchangeably to denote postnatal GAD. Unlike postnatal depression, which is diagnosed when the DSM-IV

criteria for major depressive episode are met in conjunction with a postnatal onset specifier, none of the anxiety disorders have a postnatal onset specifier, and are considered to be no different to anxiety disorders occurring at other times.

In summary, postnatal anxiety can refer to non-specific self-report symptoms or to specific anxiety disorders as diagnosed in the postpartum. Studies investigating risk factors of postnatal anxiety have by and large done so in relation to non-specific self-report symptoms rather than specific diagnoses. Although this has associated drawbacks due to differing measures being used by studies, and results being necessarily preliminary, non-specific research gives an indication of areas important for further large scale research.

### 1.3 Prevalence Rates, Course and Prognosis

This section will present research findings relating to prevalence rates for Generalized Anxiety Disorder and to non-specific anxiety symptomatology. Evidence regarding the course and prognosis of anxiety symptoms in the postpartum period is also presented.

**1.3.1 Prevalence of Generalized Anxiety Disorder in the postpartum.** In studies using either the Structured Clinical Interview for DSM-IV Disorders (SCID; First, Spitzer, Gibbon, & Williams, 1997) or the Diagnostic Interview Schedule (DIS; Robins, Helzer, Croughan, & Ratcliff, 1981) to assess for postnatal GAD, prevalence rates have been reported of 1.9% and 3.1% in two samples at 6 to 8 weeks postpartum (Matthey et al., 2003), 2.3% at 3 months postpartum (Reck et al., 2008), 4.4% at 8 weeks postpartum (Wenzel, Haugen, Jackson, & Robinson, 2003) and 8.2% at 8 weeks postpartum (Wenzel et al., 2005). Some of these rates are within the range of prevalence rates for GAD of 1.2 to 3.6% estimated for the

general population (Wittchen & Hoyer, 2001), whilst the studies by Wenzel et al. (2003) and Wenzel et al. (2005) found rates which were higher than the general population. These two studies also reported rates of subsyndromal GAD of 29.7% and 19.7% respectively.

**1.3.2 Prevalence of non-specific anxiety symptoms in the postpartum.** Miller, Pallant, and Negri (2006) studied the prevalence of anxiety symptoms at 6 weeks to 6 months postpartum using the DASS-21 self report measure. The prevalence of anxiety, as defined by scoring above the cut-off for normal levels as specified by Lovibond and Lovibond (1995a), was 13%. An almost identical rate of 12.7% was found in a large Australian sample of 4366 women who completed the DASS-21 at 6 months postpartum (Yelland, Sutherland, & Brown, 2010).

Other studies have used the STAI to assess postnatal anxiety, a self-report inventory which yields scores of both transient anxiety (state scale) and a personality predisposition to anxiety (trait scale). Figueiredo and Conde (2011) assessed for high state anxiety only and reported a prevalence rate of 4.7% at 3 months postpartum. Giakoumaki, Vasilaki, Lili, Skouroliakou, and Liosis (2009) reported prevalence rates of 12.6% for state anxiety and 14.3% for trait anxiety at 3 months postpartum. This rate is similar to that reported by the above studies using the DASS-21, despite the fact that, unlike the DASS-21, the STAI focuses on non-somatic symptoms of anxiety.

**1.3.3 Course and prognosis of anxiety symptoms in the perinatal period.** Studies examining the course of anxiety symptoms from pregnancy and across the postnatal period have investigated stability and change in symptoms in the same sample of women over time, as well as the presence of anxiety symptoms in different groups of women at different time points.

Heron, O'Connor, Evans, Golding, and Glover (2004) investigated the longitudinal patterns of anxiety in a sample of 8323 women across four time points: 18 and 32 weeks' gestation and 8 weeks and 8 months postpartum, using the Crown–Crisp Experiential Index (CCEI; Crisp, Jones, & Slater, 1978). Overall, the anxiety symptoms across the time points as assessed by correlations between mean scores were stable, with correlations being significant at the .001 level, but the pattern was of a mean decrease in scores over time. In relation to elevated anxiety, as defined by scoring above the CCEI cut-off, this was reported by 14.6% and 15.5% of women at 18 and 32 weeks' gestation respectively. At 8 weeks postpartum it was 8.1% and at 8 months postpartum it was 9.1%. The study further reported that of those scoring above the cut-off at 8 weeks postpartum, 2.4% had not scored above the cut-off at the antenatal time points and constituted 'new anxiety'. For the 13% of women who scored above the cut-off for at least one of the postpartum assessments, two thirds had scored above the cut-off for anxiety in the antenatal period. Thirteen percent of the total sample reported elevated anxiety in the antenatal period only.

DiPietro, Costigan, and Sipsma (2008) measured anxiety symptoms at 28 weeks' gestation, 6 weeks postpartum and 24 months postpartum using the STAI. The sample consisted of 137 women who were relatively well-educated, mature, employed, and already taking part in a research study on foetal neurobehavioural development. They reported significant stability in scores over time, but with mean scores showing a decline from pregnancy through the postpartum. The only exception was when results were compared according to parity, and primiparous women showed an increase in mean STAI trait anxiety scores in the period from 6 weeks to 24 months, while multiparous women showed a reduction in anxiety. The

authors hypothesize that this reflects the challenge of first-time mothers in adjusting to motherhood.

Breitkopf et al. (2006) examined group differences in anxiety symptoms as assessed by the STAI between samples of women who were 24 to 36 weeks pregnant, non-pregnant, and 2 to 8 weeks postpartum. The sample was from a population of women of lower socioeconomic status. The postpartum group reported significantly lower scores than pregnant and non-pregnant women and the authors conclude that this may be because at 2 to 8 weeks postpartum women are still focused on the new experience of motherhood and are receiving increased support from family, and therefore it would be more optimal to assess anxiety symptoms later in the postpartum. This appears to be supported by a study by Stuart et al. (1998) which found the point prevalence of anxiety, as measured by the STAI, to be 8.7% at 14 weeks postpartum and 16.8% at 30 weeks postpartum.

In summary, studies into the course of postnatal anxiety symptoms over time vary in the measures used to assess anxiety, in sample characteristics, and in the timing of anxiety assessments in the postpartum. The overall findings indicate that anxiety symptoms tend to be higher in pregnancy and to show decline over time. Regardless of overall lower levels of anxiety symptoms in the postpartum, some studies have reported an increase in anxiety levels between earlier and later postpartum periods, including the study by DiPietro et al. (2008) which controlled for parity and found evidence of an increase in anxiety levels for first-time mothers, but not for multiparous women. This indicates that, regardless of symptoms of anxiety decreasing on average in the postpartum compared to the antenatal period, women may experience an increase in symptoms of anxiety during the months after birth, and that this may particularly be the case for first time mothers.

### 1.4 Impact of Postnatal Anxiety on Mothers and Children

Recent studies have identified several potential adverse effects of postnatal anxiety, both for mothers and their children.

Barnett, Schaafsma, Guzman, and Parker (1991) found that at 5 year follow-up, mothers identified as having high levels of postnatal anxiety were more likely to have developed psychological and social pathology than mothers with moderate to low postnatal anxiety, including major depression, dysphoria, low confidence, and inadequate social integration. In a study by Teissedre and Chabol (2003) a high level of anxiety during the first few days after delivery was shown to be a risk factor for the later development of postnatal depression. High levels of anxiety have also been associated with low confidence in breast-feeding and a greater likelihood of giving up breast-feeding or supplementing with formula milk (Britton, 2007). Postnatal anxiety has also recently been linked to low maternal self-confidence at 2 weeks post delivery (Reck, Noe, Gerstenlauer, & Stehle, 2012).

Several studies have evaluated psychological outcomes in children exposed to postnatal maternal anxiety. O'Connor, Heron, Golding, Beveridge, and Glover (2002) assessed the association between postnatal maternal anxiety and psychological problems in 4-year-old children by using data from The Avon Longitudinal Study of Parents and Children (ALSPAC), a prospective population-based cohort of approximately 13,000 women. They found that exposure to maternal anxiety at 8 weeks postpartum was associated with an increased risk of emotional problems in both boys and girls, and conduct problems in girls. In a follow-up study when the children were 6.5 years old an increased risk was again found of emotional problems in boys and conduct problems in girls (O'Connor, Heron, Golding & Glover, 2003). In the study by Barnett et al. (1991), referred to above in relation to

maternal outcomes, children exposed to postnatal maternal anxiety were followed up at age 5 and were found to be less active and have less social competence than children in the control group. Boys exposed to postnatal maternal anxiety were also found to have higher scores on items rating immaturity, delinquency and schizoid traits. More recently, Barker, Jaffee, Uher, and Maughan (2011) investigated the contribution of prenatal and postnatal anxiety to child maladjustment. Maternal anxiety at 1.5 years postpartum was found to predict later internalizing difficulties in the children at age 7 to 8.

Other studies have evaluated associations between postnatal maternal anxiety and cognitive development in children (e.g. Galler, Harrison, Ramsey, Forde, & Butler, 2000), and infant temperament (e.g. Coplan, Neil, & Arbeau, 2005; Davis et al. 2004; Diener, Goldstein, & Mangelsdorf, 1995). These studies show some indication that there could be links between postnatal maternal anxiety and adverse outcome in these areas, but the results are inconclusive and require further research.

In summary, numerous studies have investigated the consequences of postnatal anxiety for mothers and their children. Some of these report the effects of postnatal anxiety in the period immediately after delivery, whilst others have focused on later measures of anxiety, even up to 1.5 years postpartum. Not all the results are conclusive, and it is clear that further replication is required to support some of the findings. Nevertheless, a number of different adverse outcomes are indicated, thereby highlighting the importance of furthering the understanding of risk factors in the development of postnatal anxiety.

## 1.5 Psychological Models of Anxiety

In the following sections the main psychological models of anxiety will be described and the rationale presented for the use of the attachment model as the theoretical framework in the present study. Attachment theory will be introduced and an understanding of postnatal anxiety from an attachment theory perspective is presented.

**1.5.1 Cognitive model of anxiety.** The most widely known psychological model of anxiety is the cognitive model (Beck, Emery, & Greenberg, 1985; Clark, 1991). Cognitive models of emotional disorders propose that emotions arise primarily from how we perceive, interpret and think about ourselves and the world around us. Anxiety symptoms are thought to develop when a person perceives physical or psychosocial danger in their current circumstances, and interprets certain events as threatening. In response to this, physiological anxiety symptoms can occur, such as muscle tension, restlessness, breathlessness, and dryness of the mouth. When these symptoms in turn are interpreted as signs of losing control, not being able to cope, or as likely to cause negative evaluation by others, a vicious circle is established, whereby the thoughts and subsequent behaviours such as escaping from or avoiding situations maintain anxiety over time (Clark, 1991).

The cognitive model theorizes that there are different levels of thinking which influence and maintain emotional disorders. Everyday thoughts which arise in specific situations are termed ‘negative automatic thoughts’, whereas a person’s core beliefs about themselves and the world, and subsequent ‘dysfunctional assumptions’, are what predisposes them to negative thinking and biased interpretations. Other cognitive processes such as rumination or over-generalisation are also theorized to be implicated in maintaining the disorder. As a result, the primary focus of cognitive

behavioural therapy is to help a person to become aware of and evaluate their thoughts and beliefs, and the way in which these shape their behaviours, so that they may learn to challenge and modify them (Clark, 1991).

The main focus of the cognitive model is therefore on intrapersonal factors, i.e. an individual's beliefs, thoughts, and behaviours which maintain anxiety symptoms. It is concerned with the mechanism of anxiety in the present, rather than with uncovering developmental processes.

**1.5.2 Biopsychosocial model of anxiety.** The biopsychosocial model was first described by the physician Engel (1977) and has since been widely adopted as the dominant model in the field of psychiatry (Ghaemi, 2009, Slade, 2002). It conceptualises any health disorder, whether physical or emotional, as being due to the interaction of biological, psychological and social factors. Physiological systems of the body, such as genetic, hormonal and neurological systems are not seen as autonomous but as responding in a flexible way to events throughout the lifespan such as early social interactions and emotional development, and likewise, physiology is understood to influence feelings, behaviours and affect regulation (Gilbert, 2002).

Perinatal anxiety has been described using a biopsychosocial model to explain how genetic, neurochemical, and sociodemographic factors as well as psychological vulnerability and life stress might interact and be implicated in the development or exacerbation of anxiety in the postpartum period (Ross, Sellers, Gilbert Evans, & Romach, 2004; Wenzel, 2011). Specifically, Wenzel's (2011) model states that postnatal anxiety is most likely to develop where there is genetic vulnerability (i.e. a personal or family history of anxiety and/or depression); a particular sensitivity to the marked drop in estrogen and progesterone following

birth, as well as increased cortisol levels impacting on mood-regulatory neurochemicals; and the presence of cognitive styles characteristic of those with anxiety disorders, such as negative self-talk, self-focused attention, scanning the environment, and post-event processing. The effect of these vulnerabilities on the development of anxiety may be mediated by the experience of life stress such as low socio-economic status, childcare stress, or other factors (Wenzel, 2011).

Whilst such a biopsychosocial model includes the full range of physiological, neurological, psychological and social factors, this may also pose potential difficulties. Firstly, as Wenzel (2011) points out, "it is likely that most of these variables interact with one another in a unique and complex way that is not fully understood" (p. 135). The model has been criticised for being too generic and eclectic (Ghaemi, 2009), and for not providing a theory of the mechanisms of action between the risk factors and the disorder (McLaren, 1998). It has also been argued that "the biopsychosocial model leads to emotional disorders being understood primarily in biological terms, with psychological and social aspects considered in so far as biological factors fail to account for the disorder" (Slade, 2002, p. 8).

**1.5.3 Attachment model of anxiety.** An attachment model provides a conceptualisation of anxiety which includes an account of its developmental processes, and explains how a number of vulnerabilities may develop, including cognitive, interpersonal and social vulnerabilities. As such it can be seen as an overarching model, within which other psychological models may fit. It has been described by researchers to be uniquely suited to the understanding of psychosocial adjustment in the postnatal period (Alexander et al., 2001), who point out that attachment related difficulties can be seen as developmentally prior to most of the risk factors which have been identified for postnatal psychological difficulties. The

theory and its application to the understanding of postnatal anxiety is described below.

***1.5.3.1 Anxiety from an attachment theory perspective.*** Bowlby's (1969, 1973, 1980) theory of attachment is based on the notion that the attachment system evolved in humans in order to promote survival (Simpson & Belsky, 2008). At times of threat, the fear system is activated and attachment behaviours such as seeking proximity to and protection by the primary caregiver and attachment figure are activated in order to increase chances of survival. The goal of the attachment system is to attain a sense of protection or security which can result in the deactivation of the system (Bowlby, 1969).

Experiences in childhood which leave the child uncertain as to whether their caregiver is available, or where a child's attachment figure is experienced as not being responsive at times of perceived threat and fear, may lead to the development of internal models of the world as a frightening place and the self as being unable to recruit help.

The degree of ability to tolerate and regulate difficult emotions can also be seen as stemming from a child's attachment relationships (Guttmann-Steinmetz & Crowell, 2006). Children learn from secure attachment relationships that difficult emotions are tolerable and do not have to be denied or avoided. Through experiences of being soothed by the attachment figure, the child is thought to learn self-soothing. Conversely, the experience of insecure attachment relationships may lead to an avoidant pattern of dealing with emotions, or an anxious pattern characterised by ruminating (Mikulincer & Shaver, 2007). Thus, both internal working models and emotion regulation are affected by early attachment experiences, and these in turn can be understood as the basis for vulnerability to psychopathology.

Although he focused on attachment in childhood, Bowlby believed the attachment system to be active throughout the lifespan, and that attachment behaviours such as seeking proximity to and comfort from attachment figures at times of need is a normal process in mature adults (Mikulincer & Shaver, 2007). Based on Bowlby's theory and the patterns of attachment in children described by Ainsworth and her colleagues (Ainsworth, Blehar, Waters, & Wall, 1978), Hazan and Shaver (1987) proposed that secure, anxious and avoidant patterns of attachment are present in adult romantic relationships. They described three categories of attachment style: those with a secure attachment style find it relatively easy to get close to, trust, and depend on others within intimate relationships; those with an anxious attachment style worry that partners do not want to get as close as they would like, and worry they will be abandoned or not loved; and those with an avoidant attachment style tend to be uncomfortable being close to others, and find it difficult to trust and depend on partners (Hazan & Shaver, 1987). These styles influence the way in which individuals process information about threats to attachment security, and about the physical and emotional availability of the attachment figure.

Studies have demonstrated that adult attachment patterns are often stable over time, with test-retest correlations ranging from .47 to .70 across periods of between 1 week and 25 years (Fraley & Brumbaugh, 2004). However, these findings also indicate that some people do show changes in attachment styles over time, and can therefore be understood as a dynamic process rather than a static trait. Researchers have examined the possibility that attachment-relevant experiences and life events may impact on and affect existing working models of attachment. Davila, Karney, and Bradbury (1999) found that newly married husbands and wives on average

experienced increased attachment security over time, but only in the case of those with positive appraisals of their relationship, therefore indicating that the effects of attachment-related life events are mediated by cognitive factors. However, other studies have found no association between attachment-relevant life events and changes in attachment patterns (e.g. Cozzarelli, Karafa, Collins, & Tagler, 2003; Davila & Cobb, 2003). Changes in adult attachment style may also be due to unstable attachment patterns resulting from individual vulnerability factors such as parental divorce, a history of psychopathology, and personality disorders (Cozzarelli et al., 2003; Davila, Burge, & Hammen, 1997).

***1.5.3.2 Postnatal anxiety from an attachment theory perspective.*** Bowlby's attachment theory included the idea that attachment processes are central to the understanding of anxiety, and that anxiety disorders can be explained in terms of anxiety regarding the availability of the attachment figure (Cassidy, Lichtenstein-Phelps, Sibrava, Thomas, & Borkovec, 2009; Dozier, Stovall-McClough, & Albus, 2008). At times of threat or stress, the fear system is activated, leading to attachment behaviours such as seeking reassurance and proximity to the attachment figure for protection. The purpose of this is to regulate the distress and thereby allow the fear system to once again be deactivated so that normal activity can be resumed (Bowlby, 1973). However, as set out in the previous section, adverse early experiences of interactions with caregivers may lead to internal working models of the world, others, and self, as well as emotion regulation strategies, which interfere with the deactivation of the fear system, and prolong the presence of anxiety symptoms (Mikulincer & Shaver, 2007).

Using a diathesis-stress conceptualisation, Bowlby (1973) proposed that having an insecure attachment style could be seen as an underlying vulnerability

which, when a person experiences stressors such as a life transition that threatens or tests current attachment relationships, may lead to the development of psychopathology. The birth of a child, which signals uncertainty and change and has implications for the security of the attachment between the mother and father, can be seen as such a stressor (Whiffen, 2003). The presence of an insecure attachment style is understood as a vulnerability factor which may lead a woman to experience anxiety regarding her partner's availability and commitment, as well as anxiety about her own competence and being worthy of love. In contrast, attachment security serves as a protective factor against psychological problems and facilitates adjustment to the stressor by allowing the person to positively appraise stressful events and turn to others for support and comfort (Mikulincer & Florian, 1998; Shaver & Hazan, 1993).

In this way the vulnerability represented by attachment insecurity is linked to both relationship satisfaction and social support, and several researchers have evidenced this. Adult attachment security has been found to be a powerful predictor of couple functioning (Feeney & Noller, 1990), and has been found to promote open expression of emotions, and mutual negotiation during conflict (Feeney, 1994). Conversely, attachment insecurity is associated with less frequent compromise (Marchand, 2004), demand-withdrawal strategies (Heene, Buysse, & Van Oost, 2005), more post-conflict distress (Roberts & Noller, 1998), and poor coping (Shaver & Hazan, 1993).

In relation to social support, attachment style is thought to influence a person's ability to enlist the support of significant others. Alexander et al. (2001) investigated social support seeking as a coping behaviour in the postpartum and found that women with a secure attachment style were more likely to turn to others

for support as a coping strategy. In contrast, those with an anxious attachment style were more likely to use "affect-laden strategies such as self-blame and wishful thinking" (Alexander et al., 2001, p. 139).

In summary, Bowlby's attachment theory provides a framework for understanding the mechanisms by which the interpersonal factors of adult attachment style, experiences of parental care and overprotection, relationship satisfaction, and social support may be acting as risk factors for postnatal anxiety symptomatology. The interpersonal risk factors selected for the current study were chosen on the basis of their link with attachment theory, and because they are factors which have been found to be implicated in the development of psychopathology. In the section below, each of the interpersonal concepts will be described in detail.

## 1.6 Interpersonal Concepts

In this section, each of the interpersonal concepts is introduced, and a brief summary presented of the research evidence regarding the link between the interpersonal risk factor and the development of psychopathology both in the general population and in the perinatal period. Research findings in relation to postnatal anxiety specifically will be presented in the literature review in section 1.7.6.

**1.6.1 Social support.** Social support is a multidimensional concept, which has been defined in numerous different ways by researchers over the past decades (Veiel & Baumann, 1992; Williams, Barclay, & Schmid, 2004). Cobb's (1976) description of social support as "information belonging to one or more of the following three classes: (1) information leading the subject to believe that he is cared for and loved; (2) information leading the subject to believe that he is esteemed and valued; and (3) information leading the subject to believe that he belongs to a

network of communication and mutual obligation" (p. 300) has remained influential. Furthermore, several elements are widely recognised as being intrinsic to the understanding of social support. These include the structural aspect of social support, such as who is providing it and how much is provided, and the function of the support, in particular whether emotional or practical in nature. Research has also distinguished between objectively measured received support versus subjectively reported perceived support, and focused on the issue of the quality of support and the discrepancy between actual and ideal perceived support i.e. whether perceived support matches the expectations held by individuals (Power, Champion, & Aris, 1988).

The protective effect of social support in the development of psychopathology has been extensively examined, although mainly in relation to depression. In a review of 35 studies, Henderson (1992) reported that all but four found that the probability of developing depression is higher in those with less social support. In relation to postnatal depression, the association between poor social support and the development of depressive symptoms has also been consistently reported (Brugha et al., 1998; Collins, Dunkel Schetter, Lobel, & Scrimshaw, 1993; Robertson, Grace, Wallington, & Stewart, 2004).

**1.6.2 Relationship satisfaction.** Relationship satisfaction is defined as the perception of one's relationship along a continuum of greater or lesser favourability at a given point in time (Roach, Frazier, & Bowden, 1981). In the research literature, a distinction has been made between the concept of relationship satisfaction, which can be understood as an individual's attitude or perception, and other related concepts such as relationship adjustment which denotes a dyadic process of partners accommodating to each other, and relationship quality, a concept which suggests a

static property of the relationship (Roach et al., 1981). Relationship satisfaction has tended to be measured and defined as a single continuum, with the presence of negative features and absence of positive features at one end, and the reverse at the other end (Bradbury, Fincham, & Beach, 2000).

Relationship satisfaction and its effects on individual well-being have been widely researched. Poor relationship functioning has been found to be associated with an increased likelihood of developing depression and anxiety (e.g. Overbeek et al., 2006; Whisman & Bruce, 1999), and has been found to lead to more life stress and more maladaptive coping (Whiffen & Gotlib, 1989), whilst relationship satisfaction has been found to have a buffering effect on emotional distress in couples (Røsand, Slinning, Eberhard-Gran, Røysamb, & Tambs, 2012). Many studies have also highlighted the relevance of the partner relationship for the wellbeing and the psychological adjustment of the mother in the transition to parenthood (see Figueiredo et al., 2008 for a review), and numerous studies have shown that lesser relationship satisfaction prior to birth is associated with a greater likelihood of developing postnatal depression (e.g. Gotlib, Whiffen, Wallace, & Mount, 1991).

**1.6.3 Adult attachment style.** As an extension of Bowlby's (1969, 1973, 1980) theory of patterns of attachment in children, Hazan and Shaver (1987) described corresponding secure, anxious and avoidant patterns of attachment in adult romantic relationships. As described in section 1.5.3.1, these different attachment styles are understood as representing different ways in which information about threats to attachment security are processed. An anxious attachment style is characterised by concern about being abandoned or not loved, whilst an avoidant

attachment style is characterised by discomfort with closeness to others, and a difficulty in trusting and depending others.

Numerous studies, including some that are longitudinal, have investigated the association between adult attachment style and the severity of anxiety symptoms in non-clinical samples outside of the postnatal period (see Mikulincer & Shaver, 2007 for a review). Without exception, these studies have shown adult attachment anxiety to be associated with anxiety symptoms, and around half have shown that an avoidant attachment style is also associated with anxiety. These findings are by and large similar in relation to depression symptoms, and studies have also demonstrated the association between insecure (both anxious and avoidant) adult attachment styles and the development of postnatal depression (e.g. Feeney, Alexander, Noller, & Hohaus, 2003; McMahon, Barnett, Kowalenko, & Tennant, 2005; Meredith & Noller, 2003).

**1.6.4 Parental care and overprotection.** The quality of early parent-child relationships has been widely studied in relation to the development of clinical outcomes (Heider et al., 2008; Rapee, 1997). Research into childrearing has identified a wide range of parental attitudes and behaviours which characterize the nature of early relationships between parents and children. Factor analyses have consistently indicated that that these make up two main factors: one that describes the dimension of care, acceptance and warmth versus rejection, and one that refers to autonomy versus parental overprotection, control, and reduction in individuality (Rapee, 1997).

These two factors are closely related to Bowlby's (1973, 1980) description of the childhood experiences of interactions with caregivers which are thought to underlie the development of sub-optimal attachment processes. Firstly, he proposed

that those who experience a negative relationship with attachment figures, characterised by absence of love, rejection, and neglect, develop an internal working model of the self as unlovable, and of others as potentially rejecting. Secondly, those who experience intrusive caregiving that discourages the acquisition of self-regulation skills and development of autonomy, may develop an internal working model of the self as vulnerable and not competent in dealing with stress, but dependent on attachment figures for stress regulation (Mikulincer & Shaver, 2007).

Studies investigating anxiety outside the postnatal period, have demonstrated adverse parenting and insecure childhood attachment patterns as being risk factors in the development of anxiety in both children (Warren, Huston, Egeland, & Sroufe, 1997) and adults (Cassidy et al., 2009; Fonagy et al., 1996; Heider et al., 2008). This link has also been found with postnatal depression (McMahon et al., 2005).

## 1.7 Literature Review: Risk Factors in the Development of Postnatal Anxiety

The aim of the literature review was to establish which risk factors for postnatal anxiety have been identified to date, as well as the quantity and quality of the studies which have examined these risk factors.

### 1.7.1 Method for literature review

MEDLINE (1950 to present), and PsycINFO (1806 to present) were searched in January 2012. The search term '(postnatal OR postpartum OR parenthood) AND anxiety' was applied to journal article title and subject heading keywords. Four hundred and forty eight articles were found. Duplicates were removed and titles and abstracts screened for relevance. Exclusion criteria included: Non-English language and not peer-reviewed; animal studies; studies relating to fear of childbirth or birth related post-traumatic stress disorder; studies examining postnatal anxiety in fathers, and studies examining composite emotional distress. This left a total of 78 articles.

Of these, 62 pertained to the measurement of anxiety in the postnatal period, the relationship between postnatal anxiety and postnatal depression, or the impact and treatment of postnatal anxiety. A total of 16 articles examined risk factors. Further database searches were carried out including the search terms '(relationship OR marital) AND satisfaction', 'social support', and 'attachment' in title, abstract, and subject heading keyword fields, and a further three studies of these risk factors were identified. Finally, the reference lists of the retrieved articles were examined and one further relevant article was found. The resulting 20 studies are critically appraised below, presented according to risk factors.

**1.7.2 Biological risk factors.** Hormonal and neuroendocrine factors contributing to the onset of postnatal anxiety have been studied. In a recent review, Lonstein (2007) has proposed that reduced levels of prolactine and oxytocin, or withdrawal of ovarian, placental and neural steroids following birth, could make mothers susceptible to anxiety. It has also been proposed that hormonal mechanisms potentially underlie postnatal anxiety symptoms, since steroids with anxiolytic actions have been found to be implicated (Nappi et al., 2001). O'Hara, Schlechte, Lewis, and Varner (1991) found increased levels of cortisol during pregnancy and the beginning of the postpartum period, and as anxiety symptoms are associated with increased cortisol levels it has been hypothesized that these could be implicated in the development of postnatal anxiety (Wenzel, Gorman, O'Hara, & Stuart, 2001). However, Lonstein (2007) has noted that the large number of neurochemical changes occurring in the perinatal period has so far prevented the development of an overarching biological model for the onset of postnatal anxiety.

**1.7.3 Sociodemographic risk factors.** Numerous sociodemographic variables have been investigated in relation to postnatal anxiety. Low household

income or low socioeconomic status has consistently been found to be associated with higher anxiety scores in the postpartum, although correlation sizes were small (Britton, 2005; Wenzel et al., 2005; Britton, 2008). Negative social life events, lack of pregnancy planning, and not attending pre-natal classes have also been found to be significantly associated with higher anxiety scores in the immediate postpartum (Britton, 2005), and at 1 month postpartum (Britton, 2008).

There is some evidence that additional sociodemographic factors such as low levels of education (Britton, 2005; Britton, 2008), being unmarried, and primiparous (Britton, 2005; Giakoumaki et al., 2009) may also present risk factors for developing postnatal anxiety symptoms. However, these findings are not consistent across all of the studies. Sociodemographic factors which have been found not to be associated with higher postnatal anxiety scores include employment status (Giakoumaki et al., 2009; van Bussel et al., 2009), length of relationship (Wenzel et al., 2005), and age (Britton, 2008; van Bussell et al., 2009).

**1.7.4 Obstetric and infant risk factors.** Small correlations have been found between longer duration of postpartum stay and increased postnatal anxiety in the immediate postpartum and at 1 month postpartum (Britton, 2005; Britton, 2008). In the Greek study by Giakoumaki et al. (2009), women who scored above the threshold for state anxiety at 3 months postpartum were significantly more likely to report a negative experience of labour and to have had their infant admitted to intensive care than those who scored below the threshold for state anxiety.

In terms of infant factors, results from some studies appear to indicate that a difficult infant temperament (individual differences in an infant's expression of arousal and emotion, reactivity, and ability to self-regulate) could be a risk factor for postnatal anxiety. Miller, Barr, & Eaton (1993) investigated infant temperament in

relation to emotional distress (combined anxiety and depressive symptoms) and found that postnatal emotional distress was significantly related to crying/fussing duration and the frequency of these bouts. This would suggest a role for infant temperament as a risk factor in the development of emotional distress. In a recent study by Britton (2011) infant temperament in the first month after birth accounted for 3% of the variance in anxiety scores, after controlling for factors such as trait anxiety and a history of depression.

In summary, evidence suggests that both obstetric and infant factors may be implicated in the development of postnatal anxiety. These factors will therefore be included in the current study among the risk factors which will be controlled for in the analyses. This will enable a more accurate assessment of the contribution of the interpersonal variables over and above the control variables.

**1.7.5 Antenatal depression and anxiety, and previous mental health problems.** Two studies have investigated the role of antenatal depression and anxiety in the development of postnatal anxiety. In a large-scale prospective study of 600 Chinese women, symptoms of anxiety and depression in pregnancy were found to be major risk factors for anxiety and depressive symptoms up to 3 months after delivery (Shi, Tang, & Cheng, 2007). Skouteris et al. (2009) analysed the prospective relationship between depressive symptoms and anxiety across pregnancy up to 7 weeks postpartum, and found that postnatal anxiety was highly correlated with antenatal anxiety at around 18 weeks ($r$ = .53) and 35 weeks ($r$ = .63) of pregnancy. There was no significant correlation between antenatal depressive symptoms and postnatal anxiety.

A history of previous mental health problems has also been found to be a risk factor for developing postnatal anxiety. Women with a history of an anxiety disorder

were significantly more likely to develop either postnatal depression or anxiety by 6 weeks postpartum than women who reported a history of a depressive disorder (Matthey et al., 2003), and in the immediate postpartum, anxiety has been found to be higher among women with a history of depression either for 2 or more weeks in the year preceding birth, or for 2 or more years of predominant depression (Britton, 2005). Other studies have investigated a history of psychiatric problems in general, all of which have found significant associations with postnatal anxiety (Andersson, Sundstrom-Poromaa, Wulff, Astrom, & Bixo, 2006; Breitkopf et al., 2006; Britton, 2008; Wenzel et al., 2005).

In summary, a woman's mental health in the antenatal period, as well as having a history of previous mental health problems have been shown to be significantly associated with having higher anxiety symptoms in the postpartum. Both factors will therefore be included in the current study in order that their effects can be controlled for when analysing the role of interpersonal factors in the development of postnatal anxiety symptomatology.

### 1.7.6 Interpersonal risk factors.

***1.7.6.1 Social support.*** Studies investigating the role of social support in the development of postnatal anxiety have reported significant relationships between low levels of social support and higher scores of postnatal anxiety, with correlations ranging between .24 and -.50 (Aktan, 2012; Britton, 2008; Castle, Slade, Barranco-Wadlow, & Rogers, 2008). However, in these studies, low social support was either not found to be a predictor of postnatal anxiety in regression analyses which controlled for antenatal anxiety, or regression analysis was not used to investigate social support as a predictor of postnatal anxiety.

However, these studies are marked by a number of limitations. The study by Castle et al. (2008) used the 'confidant' subscale of the Functional Social Support Questionnaire (FSSQ; Broadhead, Gehlbach, De Gruy, & Kaplan, 1988) as a measure of perceived social support. The FSSQ is a measure originally developed to identify people at risk of isolation, and the 'confidant' subscale consists of questions relating to whether the person receives help when sick in bed, has invitations to go out, and knows people who care what happens to them. Comparisons with other social support indicators have found the measure to have low convergent validity (McDowell, 1996). It is therefore questionable whether this measure reflects the aspects of social support which are of relevance to women in the postnatal period.

The study by Britton (2008) measured social support using the 5-item Family Adaptation, Partnership, Growth, Affection, Resolve (Family APGAR; Smilkstein, 1978) scale. This is a measure of family functioning, which includes items such as "you are satisfied with the way your family talks over things with and shares problems with you". It has not tended to be used in research relating to the role of social support for postpartum mental health.

Another limitation of these studies was the short follow-up periods. Since postnatal anxiety may develop several months after delivery, results relating to the association with social support at just 4 or 6 weeks post partum may not accurately reflect the role of this factor in the development of postnatal anxiety.

In summary, there is some preliminary evidence for the role of low social support as a risk factor in the development of postnatal anxiety. However, the measures used in the studies by Castle et al. (2008) and Britton (2008) may not be suited to measuring the construct of social support in the postnatal period, and using short follow-up periods may have resulted in an underestimation of the significance

of social support as a risk factor. The role of social support in the development of postnatal anxiety needs further research in prospective studies using suitable questionnaires and data analysis which tests the ability of scores of social support to predict scores of postnatal anxiety whilst controlling for other risk factors, in particular antenatal mood.

#### *1.7.6.2 Relationship satisfaction.*

Studies examined relationship satisfaction as a risk factor for postnatal anxiety symptomatology have found significant relationships between lower scores of relationship satisfaction and higher scores of postnatal anxiety, with findings including correlations of -.15 and -.25, and significantly higher levels of postnatal anxiety among those reporting less relationship satisfaction compared to those reporting higher satisfaction (Britton, 2008; Figueiredo et al., 2008, Tanner Stapleton et al., 2012; Whisman, Davila, & Goodman, 2011). However, there are discrepancies between the results of regression analyses as to whether a low level of relationship satisfaction is a predictor of postnatal anxiety.

These studies have several limitations regarding measurement and design. Both studies by Britton (2008) and Figueiredo et al. (2008) used non-standardized and unvalidated questionnaires to measure relationship satisfaction, and both had short follow-up periods of 4 weeks and 14 days respectively. It is therefore possible that this affected the study outcomes; in particular, the small correlation and lack of predictive relationship found by Britton (2008) may be an underestimation of the role of relationship satisfaction. In addition, the study measured relationship satisfaction in the immediate postpartum, which may have resulted in different responses compared to how participants may have responded if data collection had been prior to the very significant life event of giving birth. The study by Figueiredo

et al. (2008) used a between groups design which had the limitation that the findings cannot easily be compared to other research in the field which is predominantly of correlational design, and does not allow any conclusions regarding the potential predictive relationship between relationship satisfaction and the development of postnatal anxiety.

The strongest finding for relationship satisfaction was the study by Whisman et al. (2011) which found that lower relationship adjustment predicted increases in state anxiety over time, up to 6 months postpartum. However, the sample used in this study consisted of women who were at risk of postnatal depression due to a history of major depression, and it is possible that the findings were specific to this group of women. Tanner Stapleton et al., (2012) did not find relationship satisfaction to be a direct predictor of postnatal anxiety, although there was a significant negative correlation. However, a notable limitation of this study was that a total of 42% participants were excluded from the study because of missing data, and these reported significantly lower relationship satisfaction than those who went on to complete the study. The findings relating to relationship satisfaction are therefore unlikely to be representative of the general population.

In summary, several studies provide preliminary evidence of the association between relationship satisfaction and the development of postnatal anxiety symptomatology. However, given the limitations of some of these studies, further investigation of the role of relationship satisfaction is warranted.

***1.7.6.3 Adult attachment style.*** In relation to postnatal anxiety, only two studies have investigated adult attachment style as a risk factor. In a large longitudinal study, having a preoccupied (anxious) adult attachment pattern was found to predict lower levels of postnatal anxiety at 8 to 12 weeks postpartum in the

first step of the regression model, but was not a significant predictor when all sociodemographic and psychological variables were included in the regression model (van Bussel et al., 2009). A potential limitation was the use of the Relationship Questionnaire (Bartholomew & Horowitz, 1991) to determine participants' attachment pattern, as this is a categorical measure which asks participants to indicate which of four attachment patterns best describes them. Continuous rating scales are preferable as they take account of the variation among people within the categories (Mikulincer & Shaver, 2007). A further limitation was that by the second postnatal follow-up time point, 49% of participants had dropped out, and these had significantly higher scores of both anxiety, and pregnancy related anxiety than those who did not drop out.

In the study by Tanner Stapleton et al. (2012), the Adult Attachment Scale (Collins & Read, 1990) was used to assess attachment style, a dimensional measure with three subscales. Medium sized significant inverse correlations were found between levels of postnatal state anxiety at 6 to 8 weeks postpartum and each of the subscales of 'comfort with closeness', 'comfort depending on others', and 'low fear of rejection'. However, this study was limited by the fact that regression analysis was not used to determine whether adult attachment style is a predictor of postnatal anxiety. Again, the short follow-up period and the high attrition rate in this study were significant limitations.

In summary, preliminary evidence indicates that adult attachment anxiety is a risk factor in the development of postnatal anxiety, and further research is needed to replicate this finding.

***1.7.6.4 Parental care and overprotection.*** To date only the study by van Bussel et al. (2009) has investigated experiences of parents in childhood in relation

to postnatal anxiety. The study used the Parental Bonding Instrument (PBI; Parker, Tupling, & Brown, 1979) to assess participants' memories of parental attachment on the dimensions of care and overprotection, and found there was no significant association with levels of maternal anxiety at 8 to 12 weeks postpartum or 20 to 25 weeks postpartum. As noted above, this study was marked by the limitation of having a high attrition rate, with significantly higher rates of anxiety among those who dropped out.

Given the consistent research finding that parental lack of care and overprotection as measured by the PBI represents a vulnerability factor in the development of anxiety disorders (see Heider et al., 2008 for a review), the potential role of a woman's early experience of interactions with parents in the development of postnatal anxiety requires further investigation.

### 1.8 Postnatal Anxiety in Relation to Postnatal Depression

There is a lack of consensus in the research literature regarding the classification of postnatal anxiety, with some researchers proposing that anxiety symptoms occurring in the postpartum can be understood primarily as a feature of postnatal depression, rather than a separate clinical entity (e.g. Marrs, Durette, Ferraro, & Cross, 2009; Matthey et al., 2003; Ross et al., 2003), whilst others have concluded that postnatal anxiety is largely distinct from postnatal depression (e.g. Muzik et al., 2000; Wenzel et al., 2003).

Among the factors suggesting that postnatal anxiety is a feature of postnatal depression is the high rate of co-morbidity reported in some studies. For example, in a large scale Australian study, Austin et al. (2010) found that 37.7% of postnatal women with a diagnosis of major depressive episode had a comorbid diagnosis of

anxiety disorder. Wenzel et al. (2005) reported comorbidity rates of 22-50% depending on whether subsyndromal depression was included as well as syndromal depression. Other findings also suggest that postnatal anxiety and depression are closely interconnected. A history of an anxiety disorder has been found to be a risk factor for both postnatal anxiety and depression (Barnett et al., 1991; Matthey et al. 2003; Teissedre & Chabol, 2003), and antenatal GAD has been shown to be an independent risk factor for postnatal depression in the postpartum (Coelho, Murray, Royal-Lawson, & Cooper, 2011). In addition, some studies have found that women with postnatal depression are more likely to present with anxious features than women with major depression occurring at other times (Hendrick, Altshuler, Strouse, & Grosser, 2000; Cooper & Murray, 1995).

In contrast to all of the above studies, other researchers have emphasised evidence of postnatal anxiety being distinct from postnatal depression. Firstly, some studies have found low comorbidity between anxiety and depression in the postpartum. For example, Matthey et al. (2003) found that 16% had pure anxiety symptoms, 6% had pure depression, and only 4% had comorbid anxiety and depression. Second, Ballard et al. (1993), and Muzik et al. (2000) found that the symptom profiles of anxious mothers were largely independent of the symptom profiles of depressed mothers in the immediate postpartum. Third, in direct contrast to Hendrick et al. (2000) and Cooper and Murray (1995), some studies have found that postpartum women diagnosed with depression experience less anxiety than non-postpartum women with depression (Augusto, Kumar, Calheiros, Matos, & Figueiredo, 1996; Whiffen & Gotlib 1993;).

This lack of consensus regarding the classification of postnatal anxiety can be seen as part of the wider debate relating to the way depressive and anxiety disorders

are currently classified in the DSM-IV, in particular whether depression and GAD should continue to be understood as two distinct disorders, or whether they can more meaningfully be conceptualised as two clinical presentations of one disorder process in which the co-occurrence of depression and GAD indicates severity (e.g. Krueger, Caspi, Moffitt, & Silva, 1998; Moffitt et al., 2007; Watson, 2005; Widiger & Clark, 2000).

One method of examining the relatedness of the disorders is the comparison of risk factors for depression and anxiety in a single cohort (Moffitt et al., 2007). There is an indication from the research to date that the risk factors for postnatal anxiety overlap with those which have been established for postnatal depression. However, no previous studies have compared risk factors for both disorders in a single cohort prospective study. Furthermore, the use of the EPDS in some studies, with its anxiety subscale, means that it may be difficult to differentiate the links with depression versus anxiety. In the current study risk factors will be examined in relation to both anxiety and depression as measured by the DASS-21, which was developed to be able to discriminate between depression and anxiety symptoms, in order to contribute evidence towards understanding how anxiety in the postnatal period may best be defined. This has importance for screening and treatment of postnatal psychological problems.

### 1.9 Risk Factors in the Development of Postnatal Depression

As the risk factors investigated in the current study will be analysed in relation to postnatal depression symptomatology as well as anxiety symptomatology, a brief overview is presented in this section of the findings regarding the risk factors associated with the development of postnatal depression, in order to provide a context for interpreting the findings of the current study.

Two meta-analyses have presented a synthesis of the literature regarding risk factors for postnatal depression (Beck, 2001; Robertson et al., 2004). In a meta-analysis of 84 studies, Beck (2001) reported the following factors to be moderately correlated with scores of postnatal depression: a history of previous depression, prenatal depression and anxiety, self-esteem, childcare stress, life stress, social support, marital relationship, infant temperament and maternity blues. There were small correlations with marital status, socioeconomic status, and unplanned/unwanted pregnancy. Very similar results were reported in the more recent meta-analysis by Robertson et al. (2004), which in addition identified neuroticism to be a medium risk factor and obstetric factors to have a small correlation with postnatal depression.

In addition, results from a number of studies indicate that an insecure adult attachment style is a risk factor for postnatal depression. For example, mothers who are clinically depressed have been found to report less security of attachment and more preoccupied and fearful attachment compared to a control group (Meredith & Noller, 2003; Wilkinson & Mulcahy, 2010). Mikulincer and Florian (1998) found that insecure attachment predicted psychological distress in childbearing women, and in a study by Simpson, Rholes, Campbell, Tran, & Wilson (2003), mothers with an anxious attachment style showed increased levels of postnatal depression, mediated by the perception of insufficient support from their partners. In a study by Feeney et al. (2003) results showed a correlation of .35 between relationship anxiety and depression symptoms in new mothers, and relationship anxiety was a significant predictor of depressive symptoms, after controlling for other risk factors. Similar results were reported by Monk, Leight, and Fang (2008). In a study of new mothers admitted to a parentcraft hospital, McMahon et al. (2005) reported positive

correlations of .41 and .44 respectively for avoidant and anxious current attachment styles and postnatal depression.

Attachment related experiences of parents in childhood as measured by the PBI dimensions of care and overprotection have also been found to be associated with the development of postnatal depression. In the study by McMahon et al. (2005) results showed a negative correlation ($r$ = -.22) between maternal care in childhood and depression scores at 4 months postpartum, and low maternal care was a significant predictor of depression. A study by Boyce, Hickey, and Parker (1991) reported that maternal care was a significant predictor of depression scores at 1 month postpartum, and that paternal overprotection was a significant predictor at 3 months postpartum. Gotlib et al. (1991) found significant inverse correlations for maternal ($r$ = -.20) and paternal ($r$ = -.14) care, and both variables were significant predictors of the onset of postnatal depression. Lastly, low maternal care has been found to be associated with a significantly higher relative risk of becoming depressed at 18 weeks postpartum (Matthey, Barnett, Ungerer, & Waters, 2000).

### 1.10 Summary and Rationale for the Study

In the last decade it has increasingly been recognised that the experience of anxiety symptoms in the postnatal period is a prevalent problem with serious consequences for both the mother and child, and one which requires systematic research. Studies to date have investigated the prevalence and course of postnatal anxiety, and risk factors such as sociodemographic, obstetric and mental health risk factors. Only a limited number of studies have investigated interpersonal risk factors in the development of postnatal anxiety, some of which have methodological limitations. This study aims to contribute to the evidence regarding the role of interpersonal factors in the development of postnatal anxiety symptomatology, by

using a prospective design and standardized measures. Bowlby's attachment theory is presented as a theoretical framework for understanding the role of these interpersonal risk factors in the development of postnatal anxiety symptomatology.

Given the debate in the literature regarding the classification of anxiety symptoms in the postpartum in relation to postnatal depression, this study will also assess participants for postnatal depression symptomatology in order to investigate the extent to which patterns of associations with the risk factors differ compared to postnatal anxiety symptomatology. To the researcher's knowledge, no previous studies have compared risk factors for both anxiety and depression symptomatology in a single cohort prospective study.

Research into risk factors for developing postnatal anxiety has potentially important clinical implications, since research findings can help inform the development of effective evidence based treatment.

## 1.11 Research Questions and Hypotheses

### 1.11.1 Question 1: Is there an association between social support and postnatal anxiety symptomatology?

Primary hypothesis 1: It is predicted that there will be a significant positive association between scores of discrepancy between actual and ideal social support scores and postnatal anxiety symptomatology, and a significant negative association between actual levels of social support and postnatal anxiety symptomatology.

Secondary hypothesis 1: It is predicted that for levels of postnatal depression symptomatology there will also be a significant positive association with scores of social support discrepancy, and a significant negative association with actual levels of social support.

### 1.11.2 Question 2: Is there an association between relationship satisfaction and postnatal anxiety symptomatology?

Primary hypothesis 2: It is predicted that there will be a significant negative association between levels of relationship satisfaction and levels of postnatal anxiety symptomatology.

Secondary hypothesis 2: It is predicted that there will also be a significant negative association between levels of relationship satisfaction and levels of postnatal depression symptomatology.

### 1.11.3 Question 3: Is there an association between adult attachment anxiety and postnatal anxiety symptomatology?

Primary hypothesis 3: It is predicted that there will be a significant positive association between levels of adult attachment anxiety and levels of postnatal anxiety symptomatology.

Secondary hypothesis 3: It is predicted that there will also be a significant positive association between levels of adult attachment anxiety and levels of postnatal depression symptomatology.

### 1.11.4 Question 4: Is there an association between the experience of parental care and overprotection in childhood and postnatal anxiety symptomatology?

Primary hypothesis 4: It is predicted that there will be a significant negative association between scores for care from parents in childhood and levels of postnatal anxiety symptomatology, and a significant positive association between scores for overprotection from parents in childhood and levels of postnatal anxiety symptomatology.

Secondary hypothesis 4: It is predicted that there will also be a significant negative association between scores for care from parents in childhood and levels of postnatal depression symptomatology; and a significant positive association between scores for overprotection from parents in childhood and levels of postnatal depression symptomatology.

### 1.11.5 Question 5: Do interpersonal factors predict the degree of postnatal anxiety symptomatology?

Primary hypothesis 5: It is hypothesised that the degree of postnatal anxiety symptomatology will be predicted by low levels of social support, high levels of discrepancy between ideal and actual social support, low levels of relationship satisfaction, adult attachment anxiety, low levels of parental care, and high levels of parental overprotection.

Secondary hypothesis 5: It is hypothesised that the above interpersonal factors will also predict the degree of postnatal depression symptomatology.

# CHAPTER 2: Method

## 2.1 Chapter Overview

In this chapter the study design, recruitment method, and participant sample are described. Followed by this, the ethical considerations relating to the current study are discussed. The measures chosen for the study are described, including evidence regarding reliability and validity. The rationale for the choice of each measure is discussed. The procedure for the study is then outlined, and the plan for the statistical analyses is described.

## 2.2 Study Design

A single group prospective design was used, with data collection at two time points. Participants in the last trimester of pregnancy (Time 1) were recruited through community midwife teams in Cambridgeshire, and were followed up 6-12 weeks after giving birth (Time 2). The data at both time points were collected using self-report measures. Risk factors in the development of postnatal anxiety symptomatology were assessed at Time 1, including the interpersonal variables as well as sociodemographic and other control variables. Levels of postnatal depression and anxiety symptomatology, as well as obstetric and infant factors, were assessed at Time 2. Using a prospective design ensured that data relating to the risk factors were not confounded by changes in perspective, mood and anxiety resulting from giving birth and caring for an infant.

## 2.3 Participants

**2.3.1 Sample size.** Statistical power analysis package G*Power 3.0.3 (Faul, Erdfelder, Lang, & Buchner, 2007) was used to calculate the sample size required for correlation analysis with a power of .80 at an alpha level of .05. Based on the range

of effect sizes reported in previous studies, the effect size for the correlation analyses in the current study was estimated at .25. The resulting required sample size was 97. However, in order to be able to use multiple regression analysis to test the ability of the interpersonal variables to predict postnatal anxiety and depression symptomatology whilst controlling for other known risk factors, a larger sample size was required. Power calculations using G* Power showed that a sample of 114 participants would provide sufficient power to test nine predictor variables, assuming a power of .80, alpha level of .05 and a medium effect size.

**2.3.2 Inclusion and exclusion criteria.** The study recruited first time mothers only to avoid the possible confounding effect of having previous experience of giving birth and adjusting to motherhood. To ensure that the research timetable could be adhered to, participants were only recruited if they were already in their third trimester of pregnancy (27+ weeks antenatal). Participants were required to be 18 years of age or older, and to be able to speak and understand English. No further selection criteria were used.

**2.3.3 Recruitment.** Participants were recruited from antenatal classes run by community midwives in eight different localities in Cambridgeshire. The community midwife teams had recently been reorganised, with each team being based in local authority children's centres and assigned to a small geographical area. This change to more locally-orientated teams was designed to improve the continuity and access to care. For the research study it meant that it was possible to approach women from a wider demographic than would have been possible when the teams were based more centrally at the Rosie Maternity Hospital in Cambridge, and when most of the parent education classes were run from there. Of the eight localities, three were in Cambridge itself and five were in surrounding towns and villages.

The way the classes were organised varied across the eight community teams. Some teams ran a longer one day class and others provided two shorter classes on two consecutive weeks. Some were run in the evening and others in the day time. The researcher arranged with the relevant midwife a convenient time to speak to the women during the class. A description of the study was given and participant information sheets handed out and explained. An opportunity was given to ask questions. After this, anyone who was interested was asked to fill out and sign a form giving consent to telephone contact. This enabled the researcher to telephone potential participants a few days later to ask whether they had any further questions and whether they would be willing to take part. This procedure ensured that participants had sufficient time to read the information sheet and consider whether they would like to take part. It also gave the opportunity for individual contact with the researcher to ask any further questions.

It was also planned that the researcher could attend clinics run by the community midwife teams at children's centres or GP surgeries. In this case, the midwives asked primiparous women who were in the third trimester of pregnancy whether they would be willing to meet with the researcher after their midwife appointment to discuss the research study. If so, the researcher met with the women to explain the study and provided an information sheet. They were asked to consent to telephone contact and arrangements were made to ring them in a few days. If they were willing to participate, the Time 1 questionnaire pack with the consent form was sent to them after the phone call. However, in practice, these clinics did not prove to be a time effective method of recruitment. They operated on a self-booking basis which meant that women at any stage from pregnancy to postnatal check up attended

the clinics. Despite several initial attempts to recruit in this way, this only resulted in one participant taking part in the study.

Where it was not possible for the researcher to be present at an antenatal class or midwife clinic, the researcher asked the community midwives if they would hand out the information sheet and ask for anyone interested in taking part to sign the consent to telephone contact form. However, in practice the midwives were too busy, and throughout the study, no participants were recruited in this way.

A total of 221 women were approached over a 5 month period. Five of these were approached during midwife clinics, and 216 were approached during community antenatal classes. Of the 221 women, 115 expressed an interest in the study, and when contacted a few days later 94 said they were willing to take part and receive the Time 1 questionnaire pack in the post. One woman had to be excluded at this stage as she was 17 years of age. A total of 86 participants completed and returned the Time 1 questionnaire pack, and 81 participants went on to complete the second part of the study at Time 2. Of these, 80 had been recruited from antenatal classes, whilst the remaining one participant had been recruited during a midwife clinic. Of the five participants who did not complete the second part of the study, four were lost to follow up and one participant was not sent the Time 2 questionnaire pack after her GP advised that there was a reason she should not be contacted. This meant there was an overall response rate of 36.7%. The retention rate was 94% across the two time points. The demographic characteristics of the sample are described in section 3.2.

## 2.4 Ethical Considerations

The study was approved by Cambridge Central Research Ethics Committee. A copy of the approval letter is provided in Appendix A. The main ethical issues considered are outlined below.

**2.4.1 Consent.** All potential participants were provided with an information sheet (Appendix B) detailing what the study was about and what participation would involve. It was ensured that each potential participant had the study explained to them, and that each was given an opportunity to ask questions about the study, so that the principles of informed consent were adhered to. This was done both face to face at the antenatal classes, and when speaking to each participant on the phone before sending out the Time 1 questionnaire pack.

Those women who were interested in taking part in the study were asked to fill out a form to consent to the researcher making telephone contact a few days later (Appendix C). This ensured that each participant had a minimum of 24 hours to consider her decision whether or not to take part. Those who were willing to take part were sent the Time 1 questionnaire pack by post, which included the participant consent form (Appendix D). Participants were required to sign the consent form to indicate that they understood what the study was about and the procedures involved. The consent form emphasised that participation in the study would not affect their medical care in any way, and that participants were free to withdraw from the study at any time.

**2.4.2 Confidentiality.** All information and data were treated as confidential. The consent forms with identifiable data on them were stored separately from the study data. Each participant's data were assigned a number to ensure anonymity. An

electronic file containing the names of participants and their matching identifier number was kept separately from the questionnaires on a password-protected memory stick, only accessible to the researcher. This ensured that the confidentiality of the participants was protected as far as possible, whilst still enabling the researcher to identify a participant by name and contact their GP if scores of anxiety or depression were above a certain level (see section 2.4.4). The fact that participants in this study did not have full anonymity was explained on the information sheet, and also reiterated by the researcher when contacting each individual potential participant.

Throughout the study, all electronic data entered from the questionnaires were stored securely on a password-protected memory stick. All the questionnaire data were stored in a locked cabinet.

**2.4.3 Contact in the postnatal period.** Prior to contacting the women in the postnatal period, each participant's GP was asked to provide written confirmation that both mother and baby were well and that there was no reason why the researcher should not make contact with the mother (see section 2.6). This was to safeguard against the researcher making contact with a participant who was either not well herself or whose infant was not well, or in the worst instance where a stillbirth or infant death had occurred. This procedure was also explained to participants on the information sheet so that they were aware that in such a situation they would not be contacted by the researcher for the second part of the study. This method of ensuring an ethical research procedure with participants being followed up after childbirth was used previously in a student study of comparable design (Hipwell, 2000), and similar wording for the GP letters was used in the present study.

**2.4.4 Reporting of low mood and/or high anxiety levels.** The consent form asked participants to agree to their GP being informed in case their questionnaires at Time 2 showed high levels of symptoms of anxiety or depression. If a participant scored above the clinical cut-off score on the EPDS measure, or above the cut-off scores for moderate depression or anxiety symptomatology on the DASS-21, therefore indicating that the participant may be experiencing either low mood, high levels of anxiety, or both, the researcher sent a letter to the participant's GP to inform them of these scores (Appendix H). This ensured that those involved in the participants' clinical care were informed in case of concern.

## 2.5 Measures

Copies of all the questionnaires are included in Appendix I.

**2.5.1 Time 1 background information questionnaire.** A brief questionnaire written by the researcher was used to obtain demographic information about the participants at Time 1. This included questions relating to age, occupation, marital status, and educational level. Participants were also asked whether they had ever experienced mental health difficulties in the past. This question was used to define the presence or absence of a previous history of mental health difficulties, so that this could be controlled for in the statistical analyses. Participants were asked to provide further details and to specify whether they received treatment or therapy for these difficulties. This more detailed information was used to characterise the sample.

**2.5.2 Depression Anxiety Stress Scale – 21 items (Lovibond & Lovibond, 1995a).** The DASS is a self-report measure provided as a 42 item version or a briefer 21-item version. The 21-item version was used in the present study, and was administered at both Time 1 and Time 2. The DASS-21 consists of three 7-item

scales, assessing depression, anxiety, and stress symptoms. A 4-point Likert scale is used to rate the extent to which each symptom has been experienced over the past week, from *never* to *most of the time*. Examples of anxiety symptoms include *I experienced trembling (e.g. in the hands)*, *I was worried about situations in which I might panic and make a fool of myself*, and *I felt scared without any good reason*. Examples of depression symptoms include *I couldn't seem to experience any positive feeling at all*, *I found it difficult to work up the initiative to do things*, and *I felt that I had nothing to look forward to*.

The internal consistencies of the DASS subscales have all been estimated to be good to excellent. Antony, Bieling, Cox, Enns, and Swinson (1998) reported Cronbach's alpha coefficients for the DASS-21 of .94 for the depression scale, .87 for the anxiety scale and .91 for the stress scale. Convergent and divergent validity for the DASS-21 has been demonstrated by Antony et al. (1998) who found that the depression scale correlated strongly ($r$ = .79) with the Beck Depression Inventory (BDI; Beck, Steer, & Brown, 1996), and the anxiety scale correlated strongly with the Beck Anxiety Inventory (BAI; Beck & Steer, 1993) ( $r$ = .85). In the present study, Cronbach's alpha coefficients at Time 1 were .75 for the depression scale, .57 for the anxiety scale, and .76 for the stress scale. At Time 2, alpha coefficients were .86 for the depression scale, .62 for the anxiety scale, and .86 for the stress scale. Thus, at both time points, the anxiety scale did not show acceptable levels of internal consistency, the implications of which is considered in Chapter 4.

Discriminant validity is a particular strength of the DASS-21, which was developed specifically in order to provide a highly discriminant measure of anxiety and depression. This was in response to concerns that the two most widely used measures of anxiety and depression, the BAI and BDI, had limited discriminant

validity due to symptom overlap (Lovibond & Lovibond, 1995b). Anthony et al., 1998 found that the DASS-21 distinguishes reliably between the symptoms of depression (dysphoric mood), anxiety (physiological arousal), and stress (psychological tension and agitation). In addition, the DASS-21 excludes items assessing depression symptoms such as sleep disturbance, loss of appetite, tiredness and poor concentration, as the use of these items in the BDI have been found to be confounding in the postpartum (Miller et al., 2006).

The DASS-21 was chosen primarily due to its ability to distinguish depression and anxiety symptoms, since the research questions in this study were based on being able to measure postnatal anxiety symptomatology as a separate construct to postnatal depression symptomatology. The DASS-21 has been previously used in studies of postnatal distress and has been found to be able to disentangle classifications of depression from anxiety and stress, to identify comorbid classifications, and to be able to detect cases of mild depression (Miller et al., 2006). The DASS-21 also has the advantage of being short, thereby minimising the amount of time participants would need to spend on completing the measure.

Many studies of postnatal anxiety symptomatology have used the STAI and the BAI. However, the trait scale of the STAI has been found to be sensitive to the symptoms of depression as well as the symptoms of anxiety (Bieling, Antony, & Swinson, 1998), and the items of the BAI have been argued to be closely linked to those of panic disorder, rather than capturing symptoms such as worry, agitation and muscle tension which are associated with anxiety (Antony et al., 1998). The DASS-21 was therefore preferred for the present study.

**2.5.3 Edinburgh Postnatal Depression Scale (Cox, Holden, & Sagovsky, 1987).** The EPDS is a 10-item self-report measure developed as a screen for

postpartum depression. It has been shown to have good internal consistency (Cronbach's α = .87) and to have a sensitivity of 86% and specificity of 78% (Cox et al., 1987). In the present study, the EPDS also demonstrated good internal consistency (α = .86). Another study reported a sensitivity of the EPDS of 91% compared to that of 68% for the BDI, confirming its suitability as a screening measure for postnatal depression (Harris, Huckle, Thomas, Johns, & Fung, 1989). A clinical cut-off of over 12 is most commonly used by researchers and clinicians. However, Dennis (2004) has suggested that a lower cut-off score of over 9 more sensitively identifies the presence of postnatal depression.

The EPDS is the most commonly-used validated measure of postnatal depression symptomatology both within research and clinical settings. However, it has been found in many studies to have a 3-item anxiety subscale (Brouwers, van Baar, & Pop, 2001; Ross, Gilbert Evans, Sellers, & Romach, 2003; Stuart et al., 1998). As a result it was not suitable for use as the main outcome measure of depression symptomatology in the present study. However, as the DASS-21 has not been validated for use as a measure of postnatal depression, it was included in the current study at Time 2 to enable a comparison with scores on the Time 2 DASS-21 depression subscale.

**2.5.4 Significant Others Scale (Power et al., 1988).** The Significant Others Scale (SOS) was developed to measure the perceived social support provided by a range of people. The individuals included in the measure can be varied. In the present study, the individuals specified were husband or partner, mother, and two other people of the participants' choice, such as a friends or siblings. At Time 1 participants were asked to rate each individual on levels of both actual and ideal support. The short form of the SOS was used, in which four questions are asked for

each person: *Can you trust, talk to frankly and share your feelings with this person?*, *Can you lean on and turn to this person in times of difficulty?*, *Do they give you practical help?*, and *Can you spend time with them socially?* These questions assess both emotional and practical support. For each question, both actual and ideal support is rated, resulting in a discrepancy score which reflects a participant's satisfaction with support.

The intercorrelations of each of the four summary support scores formed from the combinations of actual and ideal with emotional and practical support have been reported by Power et al. (1988) to range from .42 to .76. In the current study, high alpha levels of .82 and .87 were found respectively for the total actual support and total ideal support scales which were used in the final analyses, indicating good internal consistencies. Test-retest correlations over six months ranged from .73 to .83 on the four support scores, demonstrating good reliability (Power et al., 1988). Power et al. (1988) also demonstrated the concurrent validity of the measure by analysing scores on the SOS in a clinical sample divided into three groups (symptom free, depressed and not depressed) using the General Health Questionnaire–28 (Goldberg & Hillier, 1979). The depressed cases had significantly higher ratings for ideal levels of emotional and practical support, and significantly higher discrepancy scores, than either the non-depressed or symptom-free cases. The SOS was therefore able to discriminate between the groups.

The scale was chosen as it is designed to examine the quality of an individual's most significant relationships, an aspect of social support that is particularly relevant to women in the postnatal period. In addition, the SOS was selected as it is a brief, reliable and valid measure which is also flexible and allows participants to specify the individuals they are rating.

**2.5.5 Relationship Assessment Scale (Hendrick, 1988).** The Relationship Assessment Scale (RAS) was completed by participants at Time 1. It is a 7-item Likert scale measure of global relationship satisfaction, applicable to anyone in an intimate relationship, including dating and cohabiting couples. Each item has five possible responses, with responses differing according to the question. For example the possible answers to the question *In general, how satisfied are you with your relationship?* range from *unsatisfied* to *extremely satisfied*, and possible answers to the question *To what extent has your relationship met your original expectations?* range from *hardly at all* to *completely*.

The RAS has been shown to correlate highly (.80) with Spanier's (1976) Dyadic Adjustment Scale, a widely used measure of marital satisfaction, thereby demonstrating good construct validity (Hendrick, 1988). Hendrick (1988) also reported a high mean inter-item correlation of .49, indicating that the RAS measures a single construct, and found the measure to have high internal consistency ($\alpha = .86$). Hendrick, Dicke, and Hendrick (1998) demonstrated that the RAS has good test-retest reliability ($\alpha = .85$) across a 6 to 7 week period. Cronbach's alpha for the measure in the present study was .85, indicating good internal consistency.

The RAS was chosen for the present study as it is a short questionnaire compared to other measures of marital or relationship satisfaction, thereby reducing the burden on participants. It correlates highly with the Dyadic Adjustment Scale, but unlike the latter it is not copyrighted and therefore suitable given the limited financial resources of the study.

**2.5.6 Experiences of Close Relationships Questionnaire – Revised (Fraley, Waller, & Brennan, 2000).** This measure was completed by participants at Time 1. The Experiences of Close Relationships Questionnaire-Revised (ECR-R)

assesses two dimensions of adult attachment insecurity in relation to romantic relationships: anxiety and avoidance. Each subscale consists of 18 items. The original Experiences in Close Relationships scale (Brennan, Clark, & Shaver, 1998) was derived from a factor analysis of 60 constructs represented by 482 items extracted from a literature search of previous attachment measure research. The ECR-R was developed following the use of item response theory analysis of the ECR to select the items with the most desirable psychometric properties (Fraley et al., 2000).

The psychometric properties of the ECR-R have been analysed in a paper by Sibley, Fischer, and Liu (2005). Using exploratory factor analysis it was found that the ECR-R accurately fits a two-factor solution representing dimensions of attachment anxiety and avoidance. It was also found that the ECR-R assesses the same two attachment dimensions of anxiety and avoidance as the Relationship Questionnaire (Bartholomew & Horowitz, 1991), a categorical measure which has been extensively used in attachment research. Both the anxiety and avoidance subscales were found to have excellent test-retest reliability ($r$ = .90 to .92).

Sibley et al. (2005) also assessed convergent and discriminant validity by analysing the extent to which scores of the ECR-R predicted the variance in diary ratings of anxiety and avoidance experienced during interactions with a romantic partner, compared to family and friends. The ECR-R was found to explain 30% to 40% of variance in partner-related avoidance and anxiety, but only 5% to 15% of avoidance and anxiety related to interactions with family and friends. In the current study, the internal consistency was good for both the anxiety subscale ($\alpha$ = .93) and the avoidance subscale ($\alpha$ = .88).

This measure was chosen because an analysis of adult attachment self-report measures found it to have the best psychometric properties compared to three other commonly used inventories (Fraley et al., 2000). The questionnaire is widely used in research to measure attachment styles in adult romantic relationships (Ravitz, Maunder, Hunter, Sthankiya, & Lancee, 2010). As opposed to categorical measures of attachment styles such as the RQ, the ECR-R is dimensional and is therefore able to assess varying degrees of attachment anxiety and avoidance.

**2.5.7 Parental Bonding Instrument (Parker et al., 1979).** This measure was completed by participants at Time 1. The PBI assesses adult recollections of their experience of their parents in childhood in relation to the two dimensions of care and overprotection. It consists of 25 items which are completed for each parent in turn. The measure was developed in order to be able to assess the potential contribution of parental behaviours to the later development of psychopathology (Parker, 1990). It is has been widely used in research as a self-report measure of recollected parent-child attachment (Manassis, Owens, Adam, West, & Sheldon-Keller, 1999).

The measure has been shown to have good internal consistency, with coefficient alphas ranging between .74 and .94 across the subscales in four separate studies (Parker, 1989). Alpha levels in the current study were .95 for maternal care, .87 for maternal overprotection, .95 for paternal care, and .86 for paternal overprotection. Wilhelm & Parker (1990) have presented a review of test-retest reliability findings for the PBI. In the short term (between 3 and 9 weeks) correlations across the subscales range from .63 to .92; in the medium term (7 months) correlations of .79 to .81 have been found, and over a decade Wilhelm and

Parker (1990) found correlations of .56 to .72, thereby demonstrating that the measure is highly reliable.

Manassis et al. (1999) investigated the convergent validity of the PBI by comparing it to the Adult Attachment Interview (AAI; Main & Goldwyn, 1988) which is considered the most valid attachment measurement instrument as it corresponds closely to observational assessments of attachment. The PBI scale scores were found to correlate with their corresponding scales on the AAI, and could distinguish between those with the most optimal and least optimal attachment types. However, the PBI could not differentiate further between the four attachment categories. Manassis et al. (1999) therefore consider the PBI most appropriate for samples where most participants report optimal attachment-related experiences.

The PBI was chosen for the present study as it is the most widely used and validated self-report measure of parent-child attachment. It has the advantage that mothers and fathers are assessed separately, giving more precise data. The study design, whereby questionnaire packs were posted to participants, meant that the use of the AAI interview was not possible.

**2.5.8 Time 2 questionnaire.** This brief set of questions assessed for birth complications and infant temperament, and was completed at Time 2. These two factors have been found to be associated with the development of postnatal anxiety symptomatology, and were assessed in order to be able to control for these variables in the statistical analyses.

The questionnaire asks *Were there any complications during or after the birth?* and participants were asked to specify. An alternative to this very brief assessment of birth complications would have a questionnaire measure such as the

Peripartum Events Scale (O'Hara, Varner, & Johnson, 1986), which measures medical and obstetric risk factors, progress and method in delivery, and infant problems across several subscales, and provides a summation score. However, this was considered too lengthy and therefore too great a burden for participants at a time when they would be caring for their newborn infant.

The choice to assess infant temperament using three brief questions was based on a similar rationale. Several comprehensive measures of infant temperament exist, such as the 76-item Early Infancy Temperament Questionnaire (Medoff–Cooper, Carey, & McDevitt, 1993), but these are generally lengthy, and as the study already involved filling in several long measures, a briefer method of assessing infant temperament was chosen. The questions were *Would you consider your baby irritable or fussy?*, *Does your baby cry a lot?*, and *Is your baby difficult to console or soothe?* These questions form part of the Postpartum Depression Predictors Inventory (PDPI; Beck, 2002), a validated screening measure for risk factors for postnatal depression.

## 2.6 Procedure

**2.6.1 Time 1.** At Time 1, in the third trimester of pregnancy, participants were sent a questionnaire pack and consent form. A letter to participants was included (Appendix J) giving instructions to fill out the consent form first, followed by the study questionnaires. The Time 1 study questionnaires were the background information questionnaire, DASS-21, RAS, SOS, PBI, and ECR-R. It was estimated that these questionnaires would take up to 45 minutes to complete.

Participants were requested to return the questionnaires to the researcher in an enclosed stamped addressed envelope, and to include the consent form in the enclosed separate small envelope.

After receiving a participant's consent form and Time 1 questionnaires, the researcher sent a copy of the consent form back to the participant for her record. The researcher wrote a letter to the GP of each participant to inform them that their patient was participating in the research (Appendix F). Each participant's GP was also informed that they would be sent a letter prior to Time 2 contact with the participant (Appendix G), requesting the GP to fill in and return the included proforma (Appendix H) to state whether or not there was a reason why the researcher should not contact the participant. In this way, one participant was identified who was excluded prior to Time 2 as her GP stated she should not be contacted.

**2.6.2 Time 2.** It was planned that participants would be followed up between 6 to 12 weeks after delivery, although in practice the follow-up time ranged from 5 to 22 weeks. The limitations of this are discussed in section 4.3.3. After the researcher received confirmation from each participant's GP that contact at Time 2 could be made, the researcher either telephoned or sent a text message to each participant to ask if she was still willing to continue in the study and have the second questionnaire pack sent to her. This pack consisted of a letter to participants introducing the questionnaire pack (Appendix K), the Time 2 questionnaire which asked about birth complications and infant temperament, the DASS-21, and the EPDS. It was estimated that these would take no more than 20 minutes to complete.

**2.6.3 End of study.** Participants were asked to indicate on their consent forms whether they would like to be sent a brief report detailing the results of the completed study.

## 2.7 Data Analysis

Predictive Analytics Software version 18 (PASW 18) was used for the statistical analyses. Data from the two sets of self-report data received from each participant were entered into a spreadsheet, and checked for missing data and outliers.

**2.7.1 Descriptive statistics and correlation analyses.** Descriptive statistics were used to analyse the sociodemographic information. The mean scores and standard deviations of the DASS-21, SOS, RAS, ECR-R, PBI and EPDS were computed. All the variables were assessed for skewness and kurtosis in order to determine the normality of the distributions. In order to address each of the first four research questions the non-parametric Kendall's Correlation Coefficient was used, as none of the variables were normally distributed.

**2.7.2 Regression analyses.** Multiple Hierarchical Regression Analysis was used to address the fifth research question regarding the ability of the interpersonal and control variables to predict variance in the scores of both postnatal anxiety symptomatology and postnatal depression symptomatology. Based on the previous literature and an attachment theory of postnatal anxiety, as outlined in the introduction, it was planned to include the following five interpersonal variables in the regression analyses: social support, relationship satisfaction, attachment anxiety, maternal care and paternal overprotection. Only two of the PBI variables could be included in the analyses since the initial plan of analysis had failed to take into account that the PBI questionnaires produced four separate variables. Since parenting experiences with one's mother has been found to be more consistently associated with adult psychopathology (Enns, Cox, & Clara, 2002) the variable of maternal care was retained for analysis. However, since the correlation analyses

showed that maternal overprotection was not significantly associated with postnatal anxiety symptomatology, paternal overprotection was retained for analysis as the second PBI variable. Only one of the two social support variables could be included in the regression analyses, and total actual social support was selected since the correlation analyses showed that it was significantly associated with postnatal anxiety symptomatology, whereas total social support discrepancy was not (see section 3.5.1).

In addition, antenatal anxiety symptomatology and antenatal depression symptomatology were included in the regression analyses, in order to control for Time 1 mood, and the factors of infant temperament and birth complications were also included as control variables as existing evidence shows that these may be implicated in the development of postnatal anxiety symptomatology. Together, these interpersonal and control variables comprised the 9 predictors for which the study was powered.

As the literature review also indicated that low Household SEC and having a history of previous mental health problems are risk factors in the development of postnatal anxiety, it was considered optimal to be able to control for these factors also. Hence, a post-hoc power analysis for the regression analyses was carried out using G* Power, according to which these two additional control factors could be included.

# CHAPTER 3: Results

## 3.1 Chapter Overview

The results are presented in five main sections. First, the demographic characteristics of the sample are described, including age, relationship status, socioeconomic classification, stage of pregnancy at recruitment and time to postnatal follow-up. Second, an account is given of procedures for data screening and dealing with missing values. Third, descriptive data are provided for each of the study variables, and internal consistencies of the measures are reported.

In the fourth section, each of the study hypotheses is presented in turn. Each hypothesis is investigated using the non-parametric Kendall's correlation coefficient. Lastly, in the fifth section, multiple regression analyses are presented, which investigate the amount of variance in the outcome variables that can be accounted for by the predictor variables. Prior to the factors being entered into regression analyses, details are given of the assumptions required for the analyses, and how these are met by the data. A summary of the results is presented at the end of the chapter.

## 3.2 Demographic Characteristics

A total of 81 participants took part in the study at both time points. All but one participant stated their age. The mean age of the remainder of the sample was 30.7 (*SD* = 4.2) with ages ranging from 20 to 41. At the time of recruitment all the women were in the third trimester of pregnancy, with an average stage of 33.9 weeks' gestation (*SD* = 3.0, range 27 - 40). The average postnatal follow-up time was 11.8 weeks after birth (*SD* = 3.6), with the range being 5 to 22 weeks.

Seventy nine of the women (97.5%) were married or co-habiting. Of the remaining two participants, one stated she was single, and the other that she was

together with the baby's father but they were not co-habiting. The mean length of relationship was 6.9 years, or approximately 6 years and 11 months (*SD* = 3.6, range 1 – 14.5).

Further demographic variables are presented in Table 1. Household socioeconomic classification was based on the highest classified occupation reported, whether it was that of the participant or of their partner. The National Statistics Socioeconomic Classification was used (NS-SEC, Office for National Statistics, 2010), and some categories of low frequency were combined. The category of 'higher managerial/professional' comprised professions such as finance director, banker, and IT manager; 'lower managerial/ professional' included professions such as accountant, manager, engineer, doctor, and teacher; examples of jobs in the category of 'intermediate/small employers/own account workers' were salesman, technical sales manager, planning manager, and fundraiser; for 'lower supervisory and technical occupations' examples were roofer and electrician; and for 'semi-routine/routine' examples were porter and hairdresser. One participant's household was 'not classified' as both her and her partner were students. For the purposes of including household socioeconomic classification as a categorical variable in later analyses, participants' households were classified as being either 'Higher and lower managerial/professional' (69.1%) or 'Other' (30.7%).

Forty-three women (53.1%) gave birth to a girl and 38 (46.3%) gave birth to a boy. A total of 56 participants (69.1%) stated that they had experienced complications during or after the birth. Of these, some were categorised as more serious complications with either surgery or special care required. The most common serious complication was emergency delivery by caesarean section. Other

complications were categorised as relatively less serious and included episiotomy, assisted delivery with forceps or ventouse, difficulty breastfeeding, and jaundice.

Table 1

Demographic Sample Characteristics

| Demographic variables | *n* | % |
|---|---|---|
| Household socioeconomic classification | 3 | 3.7 |
| Higher managerial/professional | 53 | 65.4 |
| Lower managerial/professional | 10 | 12.3 |
| Intermediate/small employers/own account workers | 7 | 8.6 |
| Lower supervisory and technical occupations | | |
| Semi-routine/routine | 7 | 8.6 |
| Not classified | 1 | 1.2 |
| Highest educational level | | |
| GCSE/O Level | 9 | 11.1 |
| A levels | 15 | 18.5 |
| Further qualification | 8 | 9.9 |
| Degree | 49 | 60.5 |
| Ethnic group | | |
| White | 71 | 87.7 |
| Chinese | 2 | 2.5 |
| Indian | 1 | 1.2 |
| Caribbean | 1 | 1.2 |
| Mixed background | 1 | 1.2 |
| Other | 5 | 6.2 |
| Birth complications | | |
| Requiring surgery or special care | 23 | 28.4 |
| Not requiring surgery or special care | 33 | 40.7 |
| Edinburgh Postnatal Depression Scale score > 12 | 9 | 11.1 |
| Previous Mental Health Difficulties | 26 | 32.1 |
| Depression | 6 | 7.4 |
| Work-related stress | 6 | 7.4 |
| Panic attacks | 3 | 3.7 |
| Anxiety | 2 | 2.5 |
| Eating disorders in adolescence | 2 | 2.5 |
| Not specified | 7 | 8.6 |

### 3.3 Data Screening and Missing Values

The data were entered into SPSS and electronic data were screened and checked against the original data. Descriptive statistics were inspected for accuracy. Some of the variables contained missing values. Missing data analysis confirmed that data were missing completely at random (Little's MCAR test; Chi square = 0.00, *DF*: 4210, $p = 1.00$). In some cases, data were missing because particular subscales did not apply to a participant, and these were coded as missing. The remainder of missing values were prorated by adding the existing values for a scale or subscale and dividing by the number of existing values. This ensured that mean scores remained unchanged. This method was carried out for one value on the SOS, one value on the RAS, two values on the Time 1 DASS-21 depression subscale, seven values on the PBI, and 11 values on the ECR-R. No participant had more than one missing value across all their measures.

The data from Time 1 and Time 2 DASS-21 depression and anxiety subscales contained a total of six outliers, as defined by having standardized scores in excess of 3.29 (Tabachnick & Fidell, 2007). However, these scores were deemed to be valid and from the intended population and were therefore retained.

### 3.4 Descriptive Statistics

This section presents descriptive data for each of the study variables. Histograms and box plots were used to visually examine the distribution of the data and to check for outliers. The statistics for skewness and kurtosis were assessed for significance by dividing each statistic by its respective standard error (*SE*) in order to generate *Z* scores (Tabachnick & Fidell, 2007). *Z* scores for skewness and kurtosis greater than 1.96 or less than –1.96 were considered significant at the .05 level.

**3.4.1 Antenatal mental health.** At Time 1 the DASS-21 was used to assess depression and anxiety symptomatology. The DASS-21 also contains a subscale assessing stress symptomatology. It was beyond the scope of the current study to investigate stress symptomatology in addition to depression and anxiety symptomatology. However, descriptive data for the stress subscale is included for the sake of completion. The original DASS, from which the DASS-21 is derived, consists of 42 items, and DASS-21 scores are therefore multiplied by two to calculate final scores. Descriptive statistics for DASS-21 Time 1 scores are presented in Table 2.

Table 2
Descriptive Statistics for the Time 1 DASS-21 Subcale Scores

| Time 1 DASS-21 subscales | *N* | Min - max (range) | *M* | *SD* | *Mdn* | Skewness (*SE*) | Kurtosis (*SE*) |
|---|---|---|---|---|---|---|---|
| Depression | 81 | 0-20 (20) | 3.6 | 4.06 | 2 | 1.66 (.27) | 3.33 (.53) |
| Anxiety | 81 | 0-20 (20) | 3.3 | 3.84 | 2 | 1.60 (.27) | 3.58 (.53) |
| Stress | 81 | 0-28 (28) | 8.6 | 8.64 | 8 | .78 (.27) | .48 (.53) |

***3.4.1.1 Antenatal anxiety symptomatology.*** The mean score for the Time 1 DASS-21 anxiety subscale was similar to the mean of 3.56 (*SD* = 5.39) reported for Crawford and Henry's (2003) normative sample. Lovibond and Lovibond (1995a) have provided cut-off scores for defining different levels of severity for each subscale. Seventy participants' scores fell within the normal range of 0-7 given for the anxiety subscale, four participants' scores were in the mild range of 8-9, six scores fell into the moderate range of 10-14, and one score of 20 was in the

extremely severe range of above 20. The distribution of the Time 1 DASS-21 anxiety subscale scores shows both significant positive skewness and kurtosis, and as with the depression scores this was to be expected given that it is a normal sample.

***3.4.1.2 Antenatal depression symptomatology.*** The mean score for the Time 1 DASS-21 was lower than the mean of 5.55 (*SD* = 7.48) reported for DASS depression subscale scores from a large normative sample of 1771 individuals from the UK (Crawford & Henry, 2003). In relation to the cut-off scores provided by Lovibond and Lovibond (1995a), 73 participants' scores were in the normal range of 0-9; five participants' scores were in the mild range of 10-13; and three participants' scores were in the moderate range of 14-20. The distribution of the Time 1 DASS-21 depression subscale scores showed both significant positive skewness and kurtosis, as is to be expected in a normal sample. There was a significant positive correlation between antenatal anxiety symptomatology and antenatal depression symptomatology ($\tau$ = .23, p = .005).

**3.4.2 Social support.** The SOS provides a measure of actual support as well as a measure of discrepancy between actual and ideal support. All 81 women provided ratings for their partner. The participant who described herself as single rated a close friend as a substitute and this was included in the analysis. Eighty women also provided ratings for their mother. The missing data was from a participant whose mother was deceased. Seventy four women provided ratings for a further two individuals providing them with support, whilst two women provided ratings for just one more individual in addition to their partner and mother. The individuals most commonly specified for the first additional 'other' were sister (43.2%), friend (28.4%), brother (8.6%) and father (3.7%). For the second additional 'other' it was friend (55.6%), sister (14.8%), brother (9.9%) and father (4.9%). Other

individuals specified by one or two participants were mother-in-law, grandmother, sister-in-law, step-father, and cousin. One participant only provided a rating of actual support, not ideal support, and so a discrepancy score could not be obtained.

Descriptive statistics for the SOS total and subscale scores are presented in Table 3. The mean and range of SOS total scores for support indicated that women in the study sample reported high levels of support. The scores for partner support were particularly high. Thirty four participants (42%) gave the highest possible rating for each of the four questions of the subscale, and 81.5% of participants rated their partners at 25 or above out of a maximum of 28. As a result the distribution of the

Table 3

Descriptive Statistics for SOS Total and Subscale Scores

| Significant Others Scale | *n* | Min – max (range) | *M* | *SD* | *Mdn* | Skewness (*SE*) | Kurtosis (*SE*) |
|---|---|---|---|---|---|---|---|
| Total support | 74 | 70-112 (42) | 96.6 | 9.80 | 98.50 | -.36 (.28) | -.25 (.56) |
| Total discrepancy | 72 | -7-32 (39) | 8.3 | 7.71 | 7 | -.81 (.28) | .36 (.56) |
| Partner support | 81 | 19-28 (9) | 26.3 | 2.15 | 27 | -1.38 (.27) | 1.37 (.53) |
| Maternal support | 80 | 7-28 (21) | 23.4 | 4.83 | 24.50 | -1.22 (.27) | 1.27 (.54) |
| First ‘other’ | 76 | 14-28 (14) | 23.8 | 3.83 | 24 | -.77 (.28) | -.18 (.55) |
| Second ‘other’ | 74 | 15-28 (13) | 23.2 | 3.51 | 24 | -.44 (.28) | -.57 (.55) |

partner support scores was highly negatively skewed. This was expected given that the sample came from a population of women from households of relative high socioeconomic classification who were in long-term partnerships. Scores for

maternal support were also highly negatively skewed, with 49.3% of women rating their mothers at 25 or above, which was again to be expected.

The discrepancy scores indicated the difference between actual and ideal social support. They highlight individual differences in the perception of what constitutes ideal support, and the advantage of the SOS in providing a discrepancy score to take account of this. Discrepancy is measured continuously, and the SOS does not provide cut-off scores to define specific degrees of discrepancy. Three participants had negative discrepancy scores, reflecting that they felt they were receiving more support than they would like. Given the highly negatively skewed distributions of the subscales relating to partner and maternal support, SOS total scores for support and discrepancy were considered the most useful for further analysis. The distribution of total discrepancy scores was significantly negatively skewed.

**3.4.3 Relationship satisfaction.** All but one of the participants completed the RAS. The missing data was from the participant who reported she was single. Table 4 presents the descriptive data for the RAS total scores.

Table 4
Descriptive Statistics for RAS Total Scores

| Relationship Assessment Scale | *n* | Min – max (range) | *M* | *SD* | *Mdn* | Skewness (*SE*) | Kurtosis (*SE*) |
|---|---|---|---|---|---|---|---|
| Total score | 80 | 22-35 (13) | 32.8 | 3.10 | 34 | -1.69 (.27) | 2.45 (.54) |

Thirty-six of the women (44.4%) gave the maximum rating of 5 for each of the five questions regarding relationship satisfaction (a total rating of 35), whilst 77.7% gave a total rating of 32 or above out of a maximum of 35. The distribution of

scores was thus highly negatively skewed and showed highly significant positive kurtosis, a pattern which would again be expected given the sample population.

**3.4.4 Adult attachment style.** All participants completed the ECR-R, which measures two dimensions of attachment insecurity in adulthood: attachment anxiety and attachment avoidance. Since the study only had statistical power to investigate a limited number of variables, and since attachment anxiety in particular is hypothesized to be linked to the development of postnatal anxiety symptomatology, only scores for attachment anxiety were analysed in the correlation and regression analyses. However, descriptive statistics is provided here for both the subscales. Table 5 presents the descriptive statistics for the ECR-R subscales. The distributions of both the anxiety and avoidance scores were significantly positively skewed, which would again be expected for this sample. A correlation analysis using Kendall's correlation coefficient revealed that the avoidance and anxiety subscales were highly

Table 5

Descriptive Statistics for ECR-R Anxiety and Avoidance Subscales

| ECR-R subscales | *N* | Min- max (range) | *M* | *SD* | *Mdn* | Skewness (*SE*) | Kurtosis (*SE*) |
|---|---|---|---|---|---|---|---|
| Anxiety | 81 | 18-106 (88) | 42.7 | 20.78 | 35 | 1.05 (.27) | .58 (.53) |
| Avoidance | 81 | 24-78 (54) | 41.4 | 14.48 | 39 | .78 (.27) | -.21 (.53) |

significantly correlated ($\tau = .54$, $n = 81$, $p < .001$). This is in contrast to most samples where little correlation has been found between the two scales (Mikulincer & Shaver, 2007).

**3.4.5 Levels of care and overprotection from parents in childhood.** Five participants did not complete the PBI in relation to their experience of parenting by their father in childhood. These participants stated that their father was either deceased, or had not played a role in their upbringing. One participant rated her step-father instead of her father as she viewed him as her father figure, and this was included in the analysis. Descriptive data for the two sets of PBI subscales are presented in Table 6.

Table 6

Descriptive Statistics for the PBI Subscales

| Parental Bonding Instrument Subscales | *n* | Min-max (range) | *M* | *SD* | *Mdn* | Skewness (*SE*) | Kurtosis (*SE*) |
|---|---|---|---|---|---|---|---|
| Maternal care | 81 | 7-36 (29) | 28.6 | 8.47 | 32 | -1.25 (.27) | .42 (.53) |
| Maternal overprotection | 81 | 0-31 (31) | 10.1 | 6.68 | 9 | .94 (.27) | .52 (.53) |
| Paternal care | 76 | 0-36 (36) | 25.0 | 9.17 | 27 | -.76 (.28) | -.25 (.55) |
| Paternal overprotection | 76 | 0-30 (30) | 8.8 | 6.76 | 7 | .96 (.28) | .42 (.55) |

The distributions for both maternal and paternal care were highly negatively skewed, indicating that on average participants reported high levels of care from their mothers and fathers. Similarly, the distributions for maternal and paternal overprotection were significantly positively skewed, indicating that on average participants reported low levels of overprotection from both parents. Significant skewness on these variables was again considered to be as expected for the current sample.

**3.4.6 Infant temperament.** Infant temperament was assessed using a scale consisting of three questions: *Would you consider your baby irritable or fussy?*, *Does your baby cry a lot?*, and *Is your baby difficult to console and soothe?* (Beck, 2002). Each question required an answer of *yes* or *no*. All but one of the participants answered all three questions, whilst one participant only answered one of the questions and was therefore excluded from the analyses. A total of 11 women (13.6%) answered *yes* to one question, three women (3.7%) answered *yes* to two of the questions, and four (4.9%) answered *yes* to all three questions. Using a score of two answers of *yes* as a cut-off, the rate of difficult infant temperament was 8.6%. Descriptive statistics for the infant temperament scale are presented in Table 7.

Table 7
Descriptive Statistics for Infant Temperament

| Infant temperament | *N* | Min-max (range) | *M* | *SD* | *Mdn* | Skewness (*SE*) | Kurtosis (*SE*) |
|---|---|---|---|---|---|---|---|
| Total score | 80 | 0-3 (3) | 0.4 | 0.78 | 0 | 2.33 (.27) | 4.79 (.53) |

**3.4.7 Postnatal mental health.** Postnatal mental health was assessed using both the DASS-21 and the EPDS. Table 8 shows the descriptive statistics for Time 2 DASS-21 subscale scores. Descriptive statistics for EPDS scores are presented in Table 9.

***3.4.7.1 Postnatal anxiety symptomatology.*** The scores of 70 participants fell into the normal category of 0-7; three participants' scores were in the mild range of 8-9; five scores fell into the moderate range of 10-14; two scores were in the severe range of 15-19; and one score of 20 was in the extremely severe range of 20+. A total of 11 out of 81 participants therefore reported anxiety symptomatology above

normal levels, a rate of 13.6%. There was a slight decrease in mean scores of anxiety symptomatology between Time 1 and Time 2 from 3.3 (*SD* = 3.84) to 3.1 (*SD* = 4.36). The distribution showed significant positive skewness and kurtosis.

Given that several studies have shown the EPDS to have a 3-item anxiety subscale (e.g. Matthey, 2008; Brouwers et al., 2001), this was also used to assess anxiety symptomatology in the sample. Descriptive statistics for the anxiety subscale are presented in Table 9. There was a significant degree of correlation with the DASS-21 anxiety subscale, $\tau = .393$. $p < .001$.

Table 8

Descriptive Statistics for Time 2 DASS-21 Subscale Scores

| Time 2 DASS-21 subscales | *n* | Min - max (range) | *M* | *SD* | *Mdn* | Skewness (*SE*) | Kurtosis (*SE*) |
|---|---|---|---|---|---|---|---|
| Depression | 81 | 0-30 (30) | 4.3 | 5.89 | 2 | 2.55 (.27) | 7.88 (.53) |
| Anxiety | 81 | 0-20 (20) | 3.1 | 4.36 | 2 | 2.15 (.27) | 4.83 (.53) |
| Stress | 81 | 0-38 (38) | 11.8 | 8.54 | 10 | .91 (.27) | .15 (.53) |

However, in terms of identifying participants scoring above the cut-off for normal anxiety levels, the two scales differed. Using a cut-off score of 6 on the EPDS anxiety subscale, as recommended by Matthey (2008), a total of 11 participants were identified as having above normal anxiety levels. Six of these participants were also identified by the DASS-21 anxiety subscale, whilst five did not score above the cut-off for anxiety on the DASS-21. Of the 11 participants identified by the DASS-21 anxiety subscale, five were not identified by the EPDS

anxiety subscale. All of these five participants reported physical symptoms of anxiety which are not covered by the EPDS questions. This indicates that the two scales measure somewhat different aspects of anxiety.

***3.4.7.2 Postnatal depression symptomatology.*** On the DASS-21 depression subscale, a total of nine participants scored above the normal threshold, a rate of 11.1%. One of these scored in the mild range, six scored in the moderate range and two scored in the extremely severe range. Overall, there was an increase in mean scores from 3.6 (*SD* = 4.06) at Time 1 to 4.3 (*SD* = 5.89) at Time 2.

Eighty-one participants also completed the EPDS. One participant completed only one half of the questionnaire and was therefore not included in the analysis. Using a cut-off of 10 or above, as recommended by Dennis (2004), identified a total of 20 participants (24.7%) as having mild to moderate postnatal symptomatology. Using the cut-off score of 13 originally proposed by Cox et al. (1987), and used most widely in the research literature, the rate was 11.1% (nine participants).

Table 9

Descriptive Statistics for EPDS Total Scores and Anxiety Subscale Scores

| Edinburgh Postnatal Depression Scale | *n* | Min-max (range) | *M* | *SD* | *Mdn* | Skewness (*SE*) | Kurtosis (*SE*) |
|---|---|---|---|---|---|---|---|
| Total score | 80 | 0-21 (21) | 6.7 | 4.61 | 6 | .66 (.27) | .23 (.54) |
| Anxiety subscale | 81 | 0-9 (9) | 3.2 | 2.09 | 3 | .28 (.27) | -.52 .53 |

There was a highly significant correlation between the Time 2 DASS-21 depression scores and EPDS scores ($\tau = .52$, $p < .001$), indicating the suitability of the DASS-21 for use in the postpartum. Of the nine participants identified by the

EPDS as scoring above the cut-off, seven were also identified by the DASS-21 depression subscale. The two who were not identified by the EPDS scored highly on the DASS-21 stress subscale. Using the respective cut-off scores, two participants were identified by the DASS-21 depression subscale but not by the EPDS. These two endorsed items such as feeling life is meaningless, feeling not worth much as a person, and unable to work up an initiative to do things, which are symptoms of depression not assessed by the EPDS.

#### 3.4.8 Comorbidity of postnatal anxiety and depression symptomatology.

The descriptive statistics above revealed a prevalence rate of 13.6% for postnatal anxiety symptomatology and a rate of 11.1% for postnatal depression symptomatology. Four of the participants (4.9%) scored above the cut-off specified for the DASS-21 for both anxiety and depression at Time 2, and were therefore considered to have comorbid postnatal anxiety and depression symptomatology. Seven participants (8.6%) scored above the cut-off for anxiety only, and five participants (6.2%) scored above the cut-off for depression only, providing rates of pure postnatal anxiety and pure postnatal depression symptomatology respectively.

### 3.5 Correlation Analyses

In this section each of the research questions and corresponding hypotheses are stated in turn, and the correlation analyses carried out in order to test the study hypotheses are presented. All correlations were one-tailed.

#### 3.5.1 Primary and secondary hypotheses 1: Association between social support and the dependent variables.

*Primary hypothesis 1: It is predicted that there will be a significant positive association between scores of discrepancy between actual and ideal social support*

*and postnatal anxiety symptomatology, and a significant negative association between actual levels of social support and postnatal anxiety symptomatology.*

*Secondary hypothesis 1: It is predicted that for levels of postnatal depression symptomatology there will also be a significant positive association with scores of social support discrepancy, and a significant negative association with actual levels of social support.*

There was a significant negative association between total scores for social support and postnatal anxiety symptomatology ($\tau$ = -.22, $n$ = 74, $p$ = .008), indicating that lower scores for social support was related to higher scores of anxiety. There was a positive association between total scores for social support discrepancy and postnatal anxiety symptomatology, which fell just short of conventional levels of statistical significance ($\tau$ = .15, $n$ = 72, $p$ = .055).

Total scores for social support were also significantly negatively correlated with postnatal depression symptomatology, as measured by the DASS-21 depression subscale ($\tau$ = -.28, $n$ = 74, $p$ = .001). There was also a significant positive association between scores for social support discrepancy and DASS-21 depression scores ($\tau$ = .26, $n$ = 72, $p$ = .002), indicating that a higher degree of discrepancy between actual and ideal social support was related to higher depression scores.

The primary hypothesis was therefore in part supported, and the secondary hypothesis fully supported, by the results, although in all cases correlations were small.

### 3.5.2 Primary and secondary hypotheses 2: Association between relationship satisfaction and the dependent variables.

*Primary hypothesis 2: It is predicted that there will be a significant negative association between levels of relationship satisfaction and levels of postnatal anxiety symptomatology.*

*Secondary hypothesis 2: It is predicted that there will also be a significant negative association between levels of relationship satisfaction and levels of postnatal depression symptomatology.*

There was a negative association between total scores for relationship satisfaction and postnatal anxiety symptomatology, which fell just below conventional levels of significance, ($\tau$ = -.147, $n$ = 81, $p$ = .054). This indicated a possible weak relationship between lower scores for relationship satisfaction and higher scores of postnatal anxiety symptomatology.

There was no significant relationship between Time 2 DASS-21 depression scores and relationship satisfaction ($\tau$ = - .05, $n$ = 81, $p$ = .301).

The primary and secondary hypotheses were not supported. However, there was a trend towards a small correlation between relationship satisfaction and postnatal anxiety symptomatology.

### 3.5.3 Primary and secondary hypothesis 3: Association between adult attachment anxiety and the dependent variables.

*Primary hypothesis 3: It is predicted that there will be a significant positive association between levels of adult attachment anxiety and levels of postnatal anxiety symptomatology.*

*Secondary hypothesis 3: It is predicted that there will also be a significant positive association between levels of adult attachment anxiety and levels of postnatal depression symptomatology.*

The anxiety subscale of the ECR-R was significantly positively correlated with Time 2 DASS-21 anxiety scores ($\tau = .22$, $n = 81$, $p = .005$), thereby indicating that higher levels of adult attachment anxiety were associated with higher levels of postnatal anxiety symptomatology.

There was also a significant positive correlation between attachment anxiety and postnatal depression symptomatology ($\tau = .21$, $n = 81$, $p = .005$).

Both the primary and secondary hypotheses were supported by the results, although all correlations were small.

### 3.5.4 Primary and secondary hypothesis 4: Association between levels of care and overprotection from parents in childhood and the dependent variables.

*Primary hypothesis 4: It is predicted that there will be a significant negative association between levels of care from parents in childhood and levels of postnatal anxiety symptomatology, and a significant positive association between levels of overprotection from parents in childhood and levels of postnatal anxiety symptomatology.*

*Secondary hypothesis 4: It is predicted that there will also be a significant negative association between levels of care from parents in childhood and levels of postnatal depression symptomatology; and a significant positive association between levels of overprotection from parents in childhood and levels of postnatal depression symptomatology.*

There was a significant negative correlation between postnatal anxiety symptomatology and levels of both maternal care in childhood ($\tau$ = -.15, $n$ = 81, $p$ = .043) and paternal care in childhood ($\tau$ = -.15, $n$ = 76, $p$ = .040). This indicated that participants' reports of high levels of care from their parents were associated with lower levels of postnatal anxiety symptomatology. There was a significant positive correlation between postnatal anxiety symptomatology and levels of paternal overprotection, $\tau$ = .18, $n$ = 76, $p$ = .021, indicating that those participants who reported their fathers to be more overprotective also reported higher levels of anxiety symptomatology at Time 2. However, there was no significant association between postnatal anxiety symptomatology and levels of maternal overprotection ($\tau$ = .00, $n$ = 81, $p$ = .490).

For postnatal depression symptomatology there was a negative association with maternal care in childhood, but this was not statistically significant ($\tau$ = -.13, $n$ = 81, $p$ = .063). There was a significant negative association with paternal care ($\tau$ = -.16, $n$ = 76, $p$ = .035), and significant positive associations with maternal overprotection ($\tau$ = .15, $n$ = 81, $p$ = .041) and paternal overprotection ($\tau$ = .16, $n$ = 76, $p$ = .030).

Both the primary and secondary hypotheses were for the most part supported by the results, although correlations were again low. The exceptions were the lack of correlation between maternal overprotection and postnatal anxiety symptomatology, and the non-significant correlation between maternal care and postnatal depression symptomatology.

### 3.5.5 Pearson's correlation coefficient sensitivity analysis

Given the small size of the associations found in the correlation analyses, a sensitivity analysis was carried out in order to account for the possibility that the data met assumptions for using Pearson's correlation coefficient, despite the violations of the distributional assumptions, and to assess whether the use of Kendall's correlation coefficient may have led to a loss of power. The results are presented in Table 10.

Table 10

Correlation Analyses using Pearson's Correlation Coefficient

| Risk factor | Postnatal anxiety symptomatology | Postnatal depression symptomatology |
|---|---|---|
| Social Support total scores | -.21 * | -.32 ** |
| Social Support discrepancy scores | .14 | .21 * |
| Relationship Satisfaction | -.06 | -.07 |
| Attachment Anxiety | .30 ** | .29 ** |
| Maternal Care | -.11 | -.17 |
| Maternal Overprotection | -.09 | .08 |
| Paternal Care | -.20 * | -.16 |
| Paternal Overprotection | -.35 ** | .14 |

*Note.* * = $p < .05$, ** = $p < .01$.

The results of the correlations using Pearson's correlation coefficient were broadly similar to those using Kendall's correlation coefficient, although there were two main differences. Firstly, the strength of the correlations of both attachment anxiety and paternal overprotection with postnatal anxiety symptomatology was higher using Pearson's correlation coefficient. Secondly, using Pearson's correlation coefficient, no significant relationship was found between maternal care and postnatal anxiety symptomatology, and between maternal overprotection, paternal care, and paternal overprotection and postnatal depression symptomatology. From the sensitivity

analysis it can therefore be concluded that, although the strength of some of the significant relationships found was less, using Kendall's correlation coefficient did not result in any associations between the variables remaining undetected; and in the case of four correlations, Kendall's correlation coefficient detected small significant correlations which were not detected using Pearson's correlation coefficient.

## 3.6 Risk Factors that Predict Postnatal Anxiety and Depression Symptomatology

The correlation analyses indicated that many of the interpersonal risk factors are significantly associated with postnatal anxiety symptomatology as well as postnatal depression symptomatology. However, all correlations were relatively small, with correlation coefficients ranging from .16 to .31. Multiple regression analyses were carried out in order to examine the extent to which the interpersonal variables in combination are able to account for variance in postnatal anxiety and depression symptomatology, whilst controlling for other risk factors which have been identified by previous research. Prior to the presentation of results from the regression analyses, the assumptions of multiple regression analyses and how these were met by the data are discussed.

**3.6.1 Assumptions of multiple regression analysis.** This section describes how the data were analysed to assess whether the assumptions of multiple regression analysis were met. Assessment of the residuals (the differences between predicted and obtained dependent variable values) of each of the three regression analyses was selected as the most appropriate method of checking whether assumptions were met by the data, rather than assessment of the variables themselves (Tabachnick & Fidell, 2007). This was due to the fact that the distributions of all but one of the study variables showed either significant skewness or kurtosis or both, as was to be

expected given the demographic characteristics of the sample. Assumptions were tested through assessment of residuals from initial screening runs of the regression analyses.

***3.6.1.1 Normality.*** The assumption of normality of errors was assessed by inspecting the histograms of the standardized residuals and the normal probability plots (Appendix L). In the regression analyses with postnatal anxiety symptomatology as the dependent variable, these indicated that the residuals were normally distributed. With postnatal depression symptomatology as the dependent variable, histograms and normal probability plots showed regression residuals to be negatively skewed.

***3.6.1.2 Linearity and homoscedasticity.*** The assumption of linearity is that there is a straight-line relationship between two variables. The assumption of homoscedasticity is that the variability in scores for one continuous variable is similar at all values of another continuous variable. Inspection of the normal probability plots for each of the regression analyses (Appendix L) revealed that with postnatal anxiety symptomatology as the dependent variable, the data did not appear to violate the assumption of linearity. However, the plot for the data from the regression analysis with postnatal depression symptomatology as the dependent variable showed that the data violated the assumption of linearity. In addition, inspection of the plots of standardized residuals against standardized predicted values for each of the regression analyses showed that in each case a funnel shape was apparent, indicating heteroscedasticity, i.e. an increasing variance across the residuals. Whilst this does not invalidate the regression analysis, it may result in reduced predictability of the regression model, and should be taken into consideration when interpreting the results (Tabachnick & Fidell, 2007).

***3.6.1.3 Multicollinearity.*** Another assumption of multiple regression analysis is that there are no high correlations between two or more of the predictors. Table 11 presents a correlation matrix showing all the predictor variables. There were significant correlations between several of the variables, but all were lower than .70 and were therefore not considered to be highly correlated (Field, 2000).

**3.6.2 Multiple hierarchical regression analyses.** Two separate multiple hierarchical regression analyses were conducted in order to identify the extent to which the predictor variables account for the variation in scores of postnatal anxiety symptomatology, and postnatal depression symptomatology. SPSS output for the regression analyses is provided in Appendix L.

A priori power calculations showed that a sample size of 114 would give sufficient power to test nine predictor variables, given a power of .80, alpha level of .05 and assuming a medium effect size. Since the number of predictors which would ideally be analysed in the regression analyses was greater than nine (five interpersonal variables and six control variables), and given that the total number of participants recruited to the study was only 81, post-hoc power calculations were carried out using G* Power. Based on a squared multiple correlation coefficient ($\rho^2$) of 0.83 calculated from the 11 predictors, it was confirmed that the regression analyses had sufficient statistical power. As a result, a total of five interpersonal predictor variables were included: social support total scores, relationship satisfaction, attachment anxiety, maternal care, and paternal overprotection. Six

Table 11

Intercorrelations Among Predictor Variables

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1: Household SEC | — | | | | | | | | | |
| 2: Previous mental health | .01 | — | | | | | | | | |
| 3: DASS-21 – Time 1 depression | -.14 | -.06 | — | | | | | | | |
| 4: DASS-21 – Time 1 anxiety | -.14 | -.10 | .27 | — | | | | | | |
| 5: Birth complications | -.02 | -.07 | .13 | .03 | — | | | | | |
| 6: Infant temperament | .07 | .02 | .14 | -.09 | .10 | — | | | | |
| 7: Social support – total scores | .11 | -.17 | -.27 | .07 | -.10 | -.25 | — | | | |
| 8: Relationship satisfaction | .10 | -.00 | -.36 | .10 | -.07 | -.12 | .21 | — | | |
| 9: Attachment anxiety | .05 | .11 | .40 | .08 | .04 | .21 | -.47 | -.56 | — | |
| 10: Maternal care | .02 | -.17 | -.15 | -.06 | -.11 | -.15 | .55 | .09 | -.19 | — |
| 11: Paternal overprotection | -.17 | .13 | .12 | .21 | -.11 | -.17 | -.09 | .07 | .15 | -.24 |

*Note.* Absolute values (including negative values) of .27 and above are significant at $p < .01$, values of .36 and above are significant at $p < .001$.

variables were controlled for in the analyses: household socioeconomic classification, previous mental health difficulties, antenatal depression symptomatology, antenatal anxiety symptomatology, birth complications, and infant temperament. The control variables were entered in step 1 of the regression analysis, and the interpersonal variables were entered in step 2.

#### *3.6.2.1 Partial correlations controlling for Time 1 depression and anxiety symptomatology.*

As a preparatory analysis, the degree of association between the predictor and dependent variables, whilst controlling for Time 1 anxiety and depression, were examined using partial zero-order correlations. It can be seen from Table 12 that after controlling for Time 1 anxiety and depression, only three correlations were

Table 12

Zero-order Correlations between Predictor and Dependent Variables, Controlling for Time 1 Anxiety and Depression Symptomatology

| Predictor Variables | Postnatal anxiety symptomatology | Postnatal depression symptomatology |
|---|---|---|
| Household SEC | .08 | .15 |
| Previous mental health | -.06 | .12 |
| Birth complications | -.02 | .10 |
| Infant temperament | .06 | .17 |
| Social support | -.18 | -.27 * |
| Relationship satisfaction | -.04 | .05 |
| Attachment anxiety | .24 * | .16 |
| Maternal care | -.07 | -.12 |
| Paternal overprotection | .28 * | .12 |

*Note.* * = $p < .05$, ** = $p < .01$.

significant; postnatal anxiety symptomatology was significantly positively correlated with both attachment anxiety and paternal overprotection, and postnatal depression symptomatology was significantly negatively correlated with social support.

***3.6.2.2 Postnatal anxiety symptomatology.*** Table 13 presents regression coefficients and values for $R^2$ and $R^2$ change for the regression analysis with postnatal anxiety symptomatology as the outcome variable. The control variables

Table 13

Multiple Hierarchical Regression of Control Variables and Interpersonal Variables on Postnatal Anxiety Symptomatology

| | *B* | *SE B* | *ß* |
|---|---|---|---|
| Step 1 | | | |
| Household SEC | -.61 | 1.04 | -.07 |
| Previous mental health | -.48 | 1.01 | -.05 |
| Antenatal anxiety | .45 | .13 | .40* |
| Antenatal depression | .20 | .13 | .19 |
| Birth complications | -.23 | 1.05 | -.02 |
| Infant temperament | .35 | .62 | .06 |
| Step 2 | | | |
| Household SEC | -.28 | 1.06 | -.03 |
| Previous mental health | -1.13 | 1.00 | -.12 |
| Antenatal anxiety | .42 | .13 | .37* |
| Antenatal depression | .08 | .13 | .08 |
| Birth complications | .06 | 1.02 | .01 |
| Infant temperament | .29 | .62 | .05 |
| Social support | -.09 | .07 | -.19 |
| Relationship satisfaction | .05 | .19 | .04 |
| Attachment anxiety | .03 | .03 | .16 |
| Maternal care | .05 | .07 | .10 |
| Paternal overprotection | .17 | .08 | .26* |

*Note.* $R^2 = .25$ for Step 1, $\Delta R^2 = .12$ for Step 2 ($p = .07$). * = $p < .01$.

explained 25% of the variance in postnatal anxiety symptomatology ($R^2$ = .25, Adjusted $R^2$ = .18). An additional 12% of the variance was explained by the interpersonal variables of social support, relationship satisfaction, attachment anxiety, maternal care and paternal overprotection ($R^2$ = .37, adjusted $R^2$ = .26, $\Delta R^2$ = 0.12). The initial model, consisting of only the control variables, significantly improved prediction of scores of postnatal anxiety symptomatology, $F(6, 63) = 3.58$, $p$ = .004. The inclusion of the interpersonal variables (model 2) resulted in a greater improvement in the ability to predict postnatal anxiety symptomatology, $F(11, 58)$, = 3.15, $p$ = .002. However, the only individual predictors to make a significant contribution to the model were antenatal anxiety ($t$ (69) = 3.15, $p$ = .003) and paternal overprotection ($t(69) = 2.18$, $p$ = .034).

***3.6.2.3 Postnatal depression symptomatology.*** Table 14 presents regression coefficients and values for $R^2$ and $R^2$ change for the regression analysis, with postnatal depression symptomatology as the outcome variable. The control variables explained 21% of the variance in postnatal anxiety symptomatology ($R^2$ = .21, adjusted $R^2$ = .13). An additional 6% of the variance was explained by the interpersonal variables of social support, relationship satisfaction, attachment anxiety, maternal care and paternal overprotection ($R^2$ = .26, adjusted $R^2$ = .12, $\Delta R^2$ = 0.6). The initial model, consisting of only the control variables, significantly improved prediction of scores of postnatal depression symptomatology, $F(6, 63)$ = 2.72, $p$ = .021. The inclusion of the interpersonal variables (model 2) led to a reduction in the ability to predict postnatal depression symptomatology, $F(11, 58)$, = 1.89, $p$ = .060. The only individual predictor to make a significant contribution to the model was antenatal depression ($t$ (69) = 2.02, $p$ = .048).

Table 14

Multiple Hierarchical Regression of Control Variables and Interpersonal Variables on Postnatal Depression Symptomatology

| | *B* | *SE B* | *ß* |
|---|---|---|---|
| Step 1 | | | |
| Household SEC | -.88 | 1.45 | -.07 |
| Previous mental health | 1.38 | 1.41 | .11 |
| Antenatal anxiety | .19 | .18 | .13 |
| Antenatal depression | .46 | .17 | .32* |
| Birth complications | 1.15 | 1.46 | .09 |
| Infant temperament | 1.15 | .87 | .15 |
| Step 2 | | | |
| Household SEC | -.87 | 1.55 | -.07 |
| Previous mental health | .76 | 1.47 | .06 |
| Antenatal anxiety | .16 | .20 | .11 |
| Antenatal depression | .40 | .20 | .27* |
| Birth complications | 1.20 | 1.49 | .09 |
| Infant temperament | .86 | .91 | .11 |
| Social support | -.11 | .10 | -.18 |
| Relationship satisfaction | .29 | .29 | .15 |
| Attachment anxiety | .04 | .05 | .14 |
| Maternal care | .03 | .10 | .04 |
| Paternal overprotection | .05 | .11 | .06 |

*Note.* $R^2$ = .21 for Step 1, $\Delta R^2$ = .06 for Step 2 ($p$ = .48). * = $p < .05$.

***3.6.2.3 Additional analyses.*** Given the high correlations between adult attachment anxiety and both social support ($\tau$ = -.47) and relationship satisfaction ($\tau$ = -.56), an additional regression analysis was carried out in order to test whether attachment anxiety was a predictor of social support and relationship satisfaction. After controlling for antenatal depression and anxiety scores, adult attachment

anxiety statistically predicted social support, $R^2 = .24$, $\Delta R^2 = .13$, $F\ (3, 73) = 7.49$, $p = .00$. Adult attachment anxiety also statistically predicted relationship satisfaction, $R^2 = .36$, $\Delta R^2 = .21$, $F\ (3, 79) = 16.04$, $p = .00$. This lends support to the attachment theory framework and will be discussed further in the following section.

### 3.7 Summary of Results

The results suggest that hypotheses 1, 3 and 4 have for the most part been supported. Regarding hypothesis two, there was a small near-significant association between relationship satisfaction and postnatal anxiety symptomatology, but no significant association between relationship satisfaction and postnatal depression symptomatology. All significant correlations were small to moderate.

In the multiple regression analyses the overall regression model, which included the interpersonal variables as well as control variables was highly significant and explained 37% of variance in postnatal anxiety symptomatology. Of this, 12% of the variance was explained by the interpersonal factors over and above the control variables, an addition which was near to reaching statistical significance. With postnatal depression symptomatology as the dependent variable, interpersonal variables explained 6% of the variance over and above the 21% explained by control variables, which was a statistically non-significant addition. In the overall model, the inclusion of the interpersonal variables led to a reduction in the ability to predict postnatal depression symptomatology. It should be noted that the data violated the assumption of homoscedasticity and also, in the case of the regression analysis with postnatal depression symptomatology as the outcome variable, the assumption of linearity. This, together with the fact that all the values for adjusted $R^2$ were considerably lower than those for $R^2$ in the three regression analyses, indicated poor

generalisability of the regression models beyond the study sample. The results will be discussed further in the following chapter.

# CHAPTER 4: Discussion

## 4.1 Chapter Overview

In this chapter the findings relating to the study hypotheses are evaluated and compared to findings from the existing literature. The study is critically evaluated in terms of its methodological strengths and weaknesses, and the theoretical and clinical implications of the findings are discussed. Following this, directions for future research are suggested and overall conclusions are presented.

## 4.2 Evaluation of Findings

**4.2.1 Rates of postnatal anxiety and depression symptomatology.** In the current study, 13.6% of participants reported anxiety symptomatology above normal levels. This was similar to prevalence rates for postnatal anxiety symptomatology reported in other studies which have used the DASS-21 (e.g. Yelland et al., 2010). However, in the current study, the DASS-21 anxiety scale had poor internal consistency, indicating that it was not a reliable measure of anxiety. This has the implication the rate of anxiety found in this study may not have been a true indication of the prevalence of anxiety symptomatology in the current sample. The prevalence rate for above threshold postnatal depression symptomatology was 11.1%, which was lower than the average of 13% found in a meta-analysis (O'Hara, 2009). In terms of comorbidity, 4.9% of participants scored above the cut-off specified for the DASS-21 for both anxiety and depression. This was similar to the prevalence rate of 4% reported by Matthey et al. (2003), but much lower than the rates of 37.7% and 22% reported by Austin et al. (2010) and Wenzel et al. (2005) respectively.

**4.2.2 Primary and secondary hypotheses 1: Association between social support and the dependent variables.** Primary hypothesis 1 predicted there would be a significant positive association between scores of discrepancy between actual and ideal social support and postnatal anxiety symptomatology, and a significant negative association between actual levels of social support and postnatal anxiety symptomatology. The hypothesis was partly supported by the correlation analyses. There was a significant negative association between total scores for social support and postnatal anxiety symptomatology, but the association between total scores for social support discrepancy and postnatal anxiety symptomatology fell just below conventional levels of statistical significance.

The level of correlation of -.22 was similar to that found in two of the three previous longitudinal studies which have investigated the association between social support and postnatal anxiety. Castle et al. (2008) reported a correlation of .22 (a positive correlation, as high scores on the FSSQ indicates low levels of perceived social support), and Britton (2008) reported a correlation of -.27. The measures of social support used in these two studies were designed to assess isolation and family functioning respectively, and were therefore not considered ideal measures of the construct of social support relevant to women in the transition to motherhood. The fact that the findings from these studies were replicated by the present study, using the SOS which has frequently been used in research relating to the perinatal period, provides evidence that social support can more reliably be considered to be associated with postnatal anxiety symptomatology.

In the most recent study of social support and postnatal anxiety symptomatology, Aktan (2012) reported a higher correlation of -.50. The measure used was the Personal Resource Questionnaire Part 2 (PRQ-85 – Part 2; Weinert,

1987), a comprehensive questionnaire with 25 items answered on a Likert scale and covering many aspects of social support including practical help, emotional availability, information provision, and availability of social activities. It is possible that this questionnaire was better able to discriminate between participants than the SOS, which in the current study demonstrated a ceiling effect whereby a high proportion of participants gave the highest rating possible, in particular for their partners. The implication is that the relatively small association found in the current and previous studies may be an underestimation of the role of social support in the development of postnatal anxiety symptomatology, and that future research should use more comprehensive measures such as the PRQ-85 when investigating the relationship. The SOS will be discussed further in section 4.3.4.2.

Secondary hypothesis 1 predicted that for levels of postnatal depression symptomatology there would also be a significant positive association with scores of social support discrepancy, and a significant negative association with actual levels of social support. This hypothesis was supported by the findings, although the correlations of -.28 and .26 were small (the correlation with discrepancy scores was positive, whilst for actual social support it was negative). The correlations were lower than the average coefficients reported in the two major meta-analyses of risk factors for postnatal depression. Beck (2001) found a mean correlation of -.40 for social support across 27 studies, and Robertson et al. (2004) reported a mean correlation of -.64 based on previous meta-analyses and subsequent large clinical studies, indicating social support is a moderate to strong risk factor.

It is possible that the lower correlation between social support and depression symptomatology found in this study may be an underestimation of the relationship between the two variables, due to difficulties with the SOS in discriminating

adequately between participants. The finding may also be influenced by the narrow demographic of the current sample, which on the whole reported very high rates of social support. A further possibility is that in at least some cases, the findings of previous research may have been confounded by the fact that the EPDS contains three questions which have been shown to form an anxiety subscale. The higher correlations between social support and depression symptomatology found in previous studies may therefore in part have been due to the correlation between social support and anxiety symptomatology.

**4.2.3 Primary and secondary hypothesis 2: Association between relationship satisfaction and the dependent variables.** Primary hypothesis 2 predicted there would be a significant negative association between levels of relationship satisfaction and levels of postnatal anxiety symptomatology. This hypothesis was not supported since, although there was a weak association, it did not reach levels of statistical significance. This was in contrast to previous findings. Although inconsistent results were reported by studies using a single question Likert scale rather than validated measures of relationship satisfaction (Britton, 2008; Britton, 2005), two recent studies, published since the present study was planned, have reported significant associations with postnatal anxiety symptomatology. The measures used were the Dyadic Adjustment Scale-7 (Whisman et al., 2011) and the Marital Adjustment Test (Tanner Stapleton et al., 2012), with the former reporting marital satisfaction as a significant predictor of postnatal anxiety symptomatology and the latter reporting a significant correlation of -.25.

The discrepancy between these and the finding of the current study may be partly explained by differences in sample characteristics. The study by Whisman et al. (2011) was based on a sample of women with a prior history of major depression,

while the sample in the study by Tanner Stapleton et al. (2012) was much larger and with greater sociodemographic variance than the current study.

The nature of the RAS measure should also be considered when interpreting the finding relating to relationship satisfaction and postnatal anxiety symptomatology. Almost 80% of participants gave very high ratings for all items on the RAS, thereby demonstrating a ceiling effect, and indicating that the measure did not distinguish well between participants. The measure will be discussed further in section 4.3.4.3.

Another significant factor influencing the interpretation of the results is that the achieved sample size did not give the study sufficient power to detect a correlation effect size of around .2. Given that the association between relationship satisfaction and postnatal anxiety symptomatology approached significance, it is possible that with a larger sample size providing sufficient power to detect below medium effect sizes, results for this hypothesis may have been significant.

Secondary hypothesis 2 predicted that there would also be a significant negative association between levels of relationship satisfaction and postnatal depression symptomatology. This hypothesis was not supported by the findings. There was no significant association between relationship satisfaction and postnatal depression symptomatology. This finding contrasts with that of the two large meta-analytical analyses, both of which have found a mean *r* effect size of .39 (Beck, 2001; Robertson et al., 2004) for the relationship with postnatal depression. The non-significant finding of the current study may again be explained by factors such as the limitations of the RAS, the demographic homogeneity of the sample, and insufficient statistical power.

An additional or alternative explanation could again be that the significant correlations found by previous studies have in part been due to the items of the anxiety subscale which has been found within the EPDS, the outcome measure used almost exclusively in research on postnatal depression. An advantage of the current study is that risk factors were investigated in relation to both anxiety and depression symptomatology in the same sample, using a measure with good discriminant validity. The finding that there was no association between relationship satisfaction and depression symptomatology, whilst for anxiety symptomatology there was a near significant negative association, could indicate that lower relationship satisfaction is related to the development of anxiety symptoms to a greater extent than depression symptoms in the postpartum. This will be discussed further in section 4.4.1.

**4.2.4 Primary and secondary hypothesis 3: Association between adult attachment anxiety and the dependent variables.** Primary hypothesis 3 stated that there would be a significant positive association between levels of adult attachment anxiety and levels of postnatal anxiety symptomatology, and this was supported by the results. There was a significant positive association with attachment anxiety. This was consistent with the recent finding by Tanner Stapleton et al. (2012) that a 'fear of rejection' subscale of the Adult Attachment Scale (Collins & Read, 1990) had an inverse correlation of -.30 with HADS anxiety scores, although the correlation in the current study of .22 was lower. This may in part be due to the differences in measures used, as well as the fact that the sample in the study by Tanner Stapleton et al. (2012) was much larger and less homogenous than the current study sample.

In the only other study to investigate adult attachment and postnatal anxiety symptomatology, van Bussel et al. (2009) did not report correlations between

variables but, when tested in an individual regression analysis, a more secure adult attachment relationship was a significant predictor of lower anxiety symptoms. However, in a more complex regression model controlling for other variables, attachment security was no longer a significant predictor. In the regression model of the current study, attachment anxiety was also not a significant predictor of postnatal anxiety symptomatology. This would suggest that other variables not investigated in the current study may be mediating or moderating the relationship between attachment anxiety and postnatal anxiety symptomatology. Some potential alternative risk factors are discussed in section 4.2.7.

Secondary hypothesis 3 predicted that there would also be a significant positive association between levels of adult attachment anxiety and postnatal depression symptomatology, and this was also supported by the findings. The result was in line with recent studies which have shown that clinically depressed mothers report less secure attachment and more preoccupied and fearful attachment than non-depressed mothers (Meredith & Noller, 2003; Wilkinson & Mulcahy, 2010), and that attachment anxiety is correlated with scores of postnatal depression (Feeney et al., 2003; McMahon et al., 2005). However, the size of correlation of .21 was smaller than that of .35 found in the study by Feeney et al. (2003), and that of .44 found by McMahon et al. (2005), although this latter high correlation may be explained by the fact that it was a high risk sample of mothers admitted to a parentcraft hospital.

**4.2.5 Primary and secondary hypothesis 4: Association between levels of care and overprotection from parents in childhood and the dependent variables.** Primary hypothesis 4 predicted that there would be a significant negative association between levels of care from parents in childhood and levels of postnatal anxiety symptomatology, and a significant positive association between levels of

overprotection from parents in childhood and levels of postnatal anxiety symptomatology. The hypothesis was for the most part supported by the findings. Higher levels of postnatal anxiety symptomatology were significantly associated with lower reported levels of both maternal and paternal care, and higher levels of paternal overprotection, although all correlations were small (ranging from .15 to .18). There was no association between postnatal anxiety symptomatology and levels of maternal overprotection.

These findings contrast with those of the only other study which has investigated these factors, which found that recalled adverse parenting in childhood as measured by the PBI was not significantly associated with maternal anxiety (van Bussel et al., 2009). However, they are in line with research investigating anxiety outside the postnatal period, which has demonstrated adverse parenting and insecure childhood attachment patterns as being risk factors in the development of anxiety in both children (Warren et al., 1997) and adults (Heider et al., 2008; Cassidy et al. 2009). As the current study is the first to show that parenting in childhood may have a role in the later development of postnatal anxiety, and given the small size of the correlations found, the finding should however be considered preliminary, and will require replication in future studies.

In relation to the finding that paternal overprotection was associated with postnatal anxiety whilst maternal overprotection was not, research demonstrating the unique contributions of fathers and mothers to the development of attachment representations in adolescents may offer an explanation. Results from a 16 year longitudinal study showed that whilst mothers' influence on the development of attachment representations was related to their functioning as a haven of safety, fathers' influence was based on functioning as a sensitive and supporting companion

during exploration away from the secure base (Grossman et al., 2002). It is possible to hypothesize that maternal overprotection was not found to be a risk factor for anxiety symptomatology, as it is congruent with the maternal role of providing a safe base. Paternal overprotection on the other hand is incongruent with the role of supporting and encouraging exploration, and could therefore be understood as hindering the development of secure attachment representations and thereby contributing vulnerability to the later development of postnatal anxiety symptomatology.

Secondary hypothesis 4 stated that in the case of postnatal depression symptomatology there would also be a significant negative association with levels of care from parents in childhood, and a significant positive association with levels of overprotection from parents in childhood. As in the case of postnatal anxiety symptomatology, this hypothesis was largely supported by the findings, although all correlations were again small. There was a significant negative association with paternal care, and significant positive associations with maternal and paternal overprotection. However, the association with maternal care in childhood was not statistically significant. These results largely correspond to those of a number of prospective studies of depression in the transition to parenthood which have found significant associations between low parental care and parental overprotection during childhood and depression in the postpartum (Boyce et al., 1991; Gotlib et al., 1991; Matthey et al., 2000). However, the finding that the association between maternal care and postnatal depression did not reach statistical significance contrasted with results from the study by McMahon et al. (2005) which found low maternal care to be a predictor of postnatal depression scores. This may in part be explained by the study not having sufficient statistical power to detect below medium effect sizes.

Previous research into the association between adverse parenting as measured by the PBI and psychiatric diagnoses has concluded that the risk appears to be non-disorder specific (Enns et al., 2002; Heider et al., 2008; Kendler, Myers, & Prescott, 2000). The results of the present study relating to hypothesis 4 supported this conclusion in part, with the exception being that maternal overprotection was a risk factor only for depression symptomatology, and that the association between maternal care and postnatal depression symptomatology did not reach statistical significance.

**4.2.6 Regression analyses.** In the regression analyses the overall model, including the control variables and the interpersonal variables, predicted 37.4% of the variance in anxiety symptomatology, 12% of which was due to the interpersonal variables. In relation to depression symptomatology, the model explained 26.4% of the variance, 6% of which was due to the interpersonal variables. However, only a few of the variables in each of the regression models emerged as significant individual predictors. Prenatal anxiety scores and paternal overprotection were the only significant predictors of postnatal anxiety symptomatology, whilst prenatal depression symptomatology was the only significant predictor of postnatal depression symptomatology.

The finding that antenatal mental health predicts postnatal mental health is consistent within existing research, which has consistently found it to be one of the strongest predictors of postpartum outcome in relation to depression symptomatology (e.g. Beck, 2001) and anxiety symptomatology (e.g. Shi et al., 2007). However, unlike some previous studies which have found that a history of an anxiety disorder is a risk factor for both postnatal depression and anxiety (e.g. Matthey et al., 2003), and that antenatal anxiety independently predicts postnatal

depression at several time points postpartum (Coelho et al., 2011), the present study found that antenatal anxiety symptomatology only predicted anxiety symptomatology in the postpartum, and not depression symptomatology, and there was no correlation between scores of antenatal anxiety and scores of postnatal depression symptomatology.

It is possible that this may be explained by the use of the DASS-21 in the present study leading to symptoms of depression and anxiety being separated out better than by other measures, thereby reducing confounding. However, it may also be the case that the lack of association between antenatal anxiety symptomatology and postnatal depression symptomatology was particular to this study, and perhaps related to the comparatively low rate of postnatal depression found of 11.1%. Future studies should use measures which discriminate well between symptoms of anxiety and depression in order to investigate links between them across the perinatal period.

Antenatal depression symptomatology was only a predictor of postnatal depression symptomatology. However, there was a significant medium-sized positive correlation with postnatal anxiety symptomatology, indicating an association between the two variables. Such an association was also found in a study by Britton (2005), which showed that pre-discharge postnatal anxiety was associated with a history of depression.

In the regression analyses, the interpersonal model better explained postnatal anxiety symptomatology than postnatal depression symptomatology. This resulted particularly from higher beta values for maternal care and paternal overprotection in the regression analysis with anxiety symptomatology as the outcome variable, compared to depression symptomatology. This may be suggestive of a stronger link in the current sample between adverse parenting in childhood and the development

of anxiety symptomatology. Reasons for this are likely to be related to multiple psychological, biological and environmental variables, as has been described by Mikulincer and Shaver regarding attachment-related risk factors:

> Such problems constitute a general vulnerability to psychological disorders, whose detailed realization in symptoms probably depends on organic and environmental factors . . . attachment insecurities contribute non-specifically to many kinds of psychopathology because of their negative effects on central psychological resources; feelings such as optimism, hope, and self-worth; and intra- and interpersonal regulatory skills. (2007, p. 372-373)

Understood in this way the type of symptoms which emerge, whether anxiety or depression or both, is based on multiple psychological, biological and environmental variables, inevitably resulting in differences in the way in which those variables predict and contribute to symptoms.

The majority of the control variables and interpersonal variables were not independent predictors of either postnatal anxiety or depression symptomatology. With regard to postnatal anxiety symptomatology, several previous studies have also found that variables correlate with but do not predict the outcome variables. For example, Castle et al. (2008) and Britton (2008) found social support did not predict anxiety scores, although a significant correlation existed; and van Bussel et al. (2009) found that adult attachment anxiety did not predict postnatal anxiety when other factors were controlled for in the regression analyses. Whisman et al. (2011) found that relationship satisfaction inversely predicted postnatal anxiety, but this was in a sample of women with a history of major depression.

In relation to postnatal depression symptomatology, the finding that no other variables apart from antenatal depression significantly predicted outcome contrasts with some previous findings. In particular, adult attachment anxiety has been found by two studies to be a significant predictor of depressive symptoms, after controlling for other risk factors (Feeney et al., 2003; Monk et al., 2008). However, this discrepancy may be in part due to the high proportion (41%) of the sample in the study by Monk et al. (2008) who had a psychiatric diagnosis at antenatal assessment, and the fact that in the study by Feeney et al. (2003), the regression analyses assessed the ability of attachment anxiety to predict changes in depression scores, rather than the actual scores. Overall, the fact that few variables were significant individual predictors of outcome is to be anticipated in a non-clinical sample such as that of the present study, with high socioeconomic advantage, social support and relationship satisfaction, since effect sizes will be smaller than if the sample had been more heterogenous.

**4.2.7 Alternative possible risk factors in the development of postnatal anxiety symptomatology.** The results of the current study indicate that 12% of the variance in postnatal anxiety symptomatology can be explained by interpersonal factors, over and above other control factors. Only one of the interpersonal factors, paternal overprotection, was a significant individual predictor of postnatal anxiety symptomatology. Therefore a large proportion of variance in the scores of postnatal anxiety symptomatology is not accounted for by the variables examined in the current study. This indicates that for the women in the study sample, other factors may have been more important.

This was a sample of highly educated and socioeconomically secure women with high levels of support and relationship satisfaction, and yet they reported levels

of anxiety and depression symptomatology equivalent to those found in other research studies. It may be that other interpersonal factors were involved, notably 'silencing the self' (Jack, 1991) and 'interpersonal submissiveness' (Pearson, Watkins, & Mullan, 2010), both of which will be discussed briefly below.

Jack (1991) describes the act of 'silencing the self' as continually monitoring feelings, censoring oneself, and trying to change one's thoughts into what one 'ought' to feel. Underlying the concept of self-silencing are themes of putting others' needs first and attempting to reduce conflict in order to increase intimacy and create harmony. However, this leads to a sense of a 'divided self' that is outwardly calm but inwardly angry and resentful, bringing a feeling of disconnection and 'loss of self' rather than the desired closeness (Jack, 1991). Several studies have found self-silencing to be implicated in the development of depression (Thompson, Whiffen, & Aube, 2001; Whiffen, Foot, & Thompson, 2007) and anxiety (Pertz & Ussher, 2006; Ussher & Pertz, 2010). O'Mahen, Flynn, & Nolen-Hoeksema (2010) found that women in the antenatal period who had high scores of self-silencing also had increases in depressive symptoms three months later.

Pearson et al. (2010) examined the role of 'interpersonal submissiveness' on the development of depressive symptoms in a heterogenous adult sample. Interpersonal submissiveness, an interpersonal style characterised by passive, overly-accommodating, non-assertive, and self-sacrificing behaviours, prospectively predicted depression symptoms 6 months later, including when other interpersonal factors such as a needy interpersonal style and rejection sensitivity were controlled for.

Submissive and passive behaviours have been found to be associated with a wide range of psychological problems (Allan & Gilbert, 1997). According to

evolutionary, interpersonal, and behavioural theories, submissive and avoidance behaviours impedes practical and interpersonal problem solving, and may reduce positive reinforcement, thereby increasing risk of psychopathology (Pearson et al., 2010). In line with the findings relating to these concepts, it could be hypothesised that the women in the current sample who had higher levels of postnatal anxiety symptomatology may not have utilized the support that they had, and that they may have been putting the needs of others first and not expressing their needs and feelings openly, especially if these conflicted with ideas of how they ought to feel and cope following the birth of their baby. This hypothesis would need to be tested out in future research studies, especially given that research to date has focused mainly on these interpersonal factors as a risk factor for depression rather than anxiety.

### 4.3 Methodological Critique

**4.3.1 Sample.** The study achieved a high retention rate of 94% across the two time points. Of the five participants who did not complete the Time 2 questionnaire pack, four did not return their envelopes despite reminders and were considered lost to follow-up. One participant was not sent the Time 2 questionnaire pack as the GP postnatal confirmation letter stated that there was a reason why she should not be contacted. The 81 participants were recruited from eight different localities of varying socioeconomic demographics in and around the city of Cambridge.

Despite this, the final study sample consisted of 81 women who were predominantly of a White ethnic background, well educated, employed, and from households of high socioeconomic status. All but two were married or cohabiting, and the majority reported extremely high relationship satisfaction and partner support. Whilst these characteristics are typical of many samples within research on

mood in the postnatal period (e.g. Coelho et al., 2011; Tanner Stapleton et al., 2012), the fact that the sample does not represent the general population restricts the extent to which the findings can be generalised.

The final sample size of 81 participants was lower than the sample size of 97 required for the correlation analyses and 114 required for the regression analyses, as identified by the power calculation in section 2.3.1. As such the current study was underpowered, with the implication that the findings may not have detected all significant effects. This both limits the comparisons which can be made with existing research findings, and the conclusions which can be drawn from the findings.

In terms of rates of anxiety and depression in the antenatal period, the sample was comparable to Crawford and Henry's (2003) large normative sample assessed using the DASS-21, although scores for depression and overall distress were lower in the study sample. In the postnatal period the rate of anxiety was 13.6%, similar to that of 13% found in the study by Miller et al. (2006) and that of 12.7% found by Yelland et al. (2010) using the DASS-21, although as mentioned above, the lack of reliability of the DASS-21 anxiety scale in the current study, limits the interpretation of the rates found. In terms of depression, both of the above studies reported higher rates of depression of 19% and 17.4% respectively, whilst the rate of depression in the study sample was 11.1%. This may in part have been due to the demographic characteristics of the sample, since the rate of mood disorders is known to be higher among individuals with socioeconomic disadvantage (e.g. Lenzi et al., 1993). This again indicates that the sample is not representative of the general population and that this affects the interpretation of the results.

**4.3.2 Recruitment.** The rate of recruitment for the study was lower than anticipated. A total of 221 women were approached during the recruitment period,

114 of whom expressed interest in the study, and 81 of who (36.7%) went on to complete the study. In a comparable study carried out in the same localities, more than half of those approached agreed to take part (Hipwell, 2000). Given the time available in which to recruit, this resulted in a lower sample size than required by the power analysis for the study. Several factors may have affected the rate of recruitment to the study. Firstly, the overall number of women who were approached was less than anticipated. Although it had been agreed with the community midwife manager that midwives would recruit to the study in the researcher's absence, in practice the community midwife teams were extremely busy and unable to afford the time required to give out the study information sheets to potential participants, and ask them to fill out the consent to contact form.

It had also been agreed that the researcher could recruit participants from midwife clinics, but as these operated on a self-booking basis, women at any stage from early pregnancy to postnatal check up attended appointments, and being present during clinics did not prove to be a time effective method of recruitment. Except for one participant recruited in this way, recruitment was through antenatal classes only. This is also likely to have affected the demographic composition of the sample as, according to the midwife teams, women from more advantaged backgrounds and those in a relationship are more likely to attend the antenatal classes.

The overt reference to anxiety may also have influenced the rate of recruitment. A study by Vieten and Astin (2008) noted that recruitment rates of pregnant women were significantly higher when they changed materials from mentioning 'dealing with anxious or depressed mood' to 'dealing better with stress and difficult moods'. The authors hypothesized that pregnant women were reluctant to identify themselves as anxious or depressed. Although care was taken during

recruitment to the present study to emphasise that many women do not experience any anxiety symptoms and the researcher was interested in finding out about everyone's experiences, it may have been the case that some women did not wish to think about potential difficulties with mental health at a time when they were focused on looking forward to the birth of their baby.

Furthermore, the focus on interpersonal factors, including relationship satisfaction, may have influenced some to decline participation. All but a few women were attending the antenatal classes with their partner, and may have felt unsure about expressing interest in a study which would involve answering questions about their relationship. This was a limitation of the recruitment strategy of the study.

**4.3.3 Design.** The study used a longitudinal design and this was a methodological strength. In contrast to cross-sectional designs, this allows conclusions to be drawn regarding causal relationships between the variables and therefore enables a better understanding of the variables being investigated. The study was designed to include not only anxiety symptomatology but also depression symptomatology. Given the finding in the literature that anxiety and depression frequently co-occur, it seems increasingly important that any investigation into one aspect of postnatal mood should also include a measure of the other. Only then can questions begin to be answered regarding classification of disorders and their detection and most effective treatment.

A limitation of the design was the degree of variation in postnatal follow-up time, between 5 weeks to 22 weeks (mean of 11.8 weeks), resulting from the fact that participants recruited later in the study had to be followed up much sooner in order that the time scale could be adhered to. This is in contrast to the majority of studies investigating postnatal anxiety which have followed up participants at more

precise time points. As discussed in section 1.3.1, the course of anxiety symptoms has been shown to vary over time with, for example, Heron et al. (2004) reporting a rise in the prevalence rate of anxiety from 8.1% at 8 weeks postpartum to 14.6% at 18 weeks postpartum. It is therefore possible that for the participants who completed Time 2 questionnaires early in the postpartum some anxiety symptoms may not yet have developed. Had more time and resources been available, it would have been preferable to follow up all the participants at the same time point, and also to have added further follow-up time points later in the postpartum to investigate whether the influence of the risk factors vary with time.

**4.3.4 Choice of measures.** This study is based on self-report measures alone, and this necessarily leads to a degree of error, for example due to differing subjective views on the presence or absence of symptoms or due to reporting bias. It should therefore be recognised as a general limitation of the study. Furthermore, although the questionnaires in each questionnaire pack were presented in the same order, the instructions to participants did not mention that this order should be adhered to. It is therefore possible that some participants may have answered the questionnaires relating to the interpersonal variables first and the DASS-21 measure last, and that their mood or anxiety levels were influenced by thoughts about their relationships.

***4.3.4.1 Depression Anxiety Stress Scales - 21.*** This measure was chosen because it possesses good convergent and discriminant validity in assessing anxiety and depression symptoms independently of each other. This made it particularly well suited to the aims of the current study. However, the levels of internal consistency for the DASS-21 anxiety scale at both time points in the current study were at below acceptable levels, indicating that the items may not have been measuring the same underlying construct. It is possible that the items relating to physical symptoms of

anxiety, i.e. item 2 (*I was aware of dryness in the mouth*), item 4 (*I experienced breathing difficulty e.g. excessively rapid breathing, breathlessness in the absence of physical exertion*), item 7 (*I experienced trembling e.g. in the hands*) and item 20 (*I was aware of the action of my heart in the absence of physical exertion e.g. sense of heart rate increase, heart missing a beat*), could also be related to other factors such as physical symptoms of pregnancy at Time 1, and factors such as breast-feeding and lack of sleep at Time 2. In support of this, analysis of internal consistency of the DASS-21 anxiety scale at Time 2 revealed that Cronbach's alpha would have been higher and near to acceptable levels if item 2 was deleted. This therefore has the implication that the results of the current study relating to anxiety symptomatology should be interpreted with this limitation in mind.

***4.3.4.2 Significant Others Scale.*** The SOS was chosen because it is a reliable and valid measure which is relatively brief and is adaptable to focus on significant relationships important in the postnatal period. It provides a measure of discrepancy between actual and ideal social support as well as a total score of social support, and this recognises that people may differ in what they perceive to be an ideal level of support.

In the present study however, there was a high correlation between discrepancy and total scores, and having two separate scores was of limited benefit. Furthermore, it was apparent that the instructions for the measure may have been unclear. In the two last sections of the form, participants were asked to provide answers for two other significant persons such as siblings or friends and say how well support is provided by them. Seven participants did not complete this section. This may have been because they could not identify further people who they perceived as supportive, and it is likely that it would not have made sense to

complete a rating for an additional person who would be given a low score on the scales. Another difficulty with the SOS in this study was that a very high proportion of participants gave the highest rating possible, in particular for their partners. A ceiling effect was therefore demonstrated which resulted in a reduced ability of the scale to discriminate between participants. There are many different ways of conceptualizing and measuring social support, and the present study may have benefitted from a broader measure such as the PRQ-85 used by Aktan (2012) that includes aspects of information provision and availability of social activities, both of which may be particularly important for new mothers.

***4.3.4.3 Relationship Assessment Scale.*** The RAS was chosen for the present study as it has been shown to be a reliable and valid measure of relationship satisfaction. It is brief, thus reducing the burden on participants, and also correlates highly with Spanier's (1976) Dyadic Adjustment Scale (DAS), which is the most widely used measure of relationship satisfaction.

In this study however, the RAS did not discriminate well between participants, with the majority of women giving the highest possible rating for relationship satisfaction. In contrast to the 32 items of the DAS, the 7 items of the RAS provide a much less nuanced assessment of relationship satisfaction. Due to the questionnaire being brief, the questions are by necessity direct (e.g. *how good is your relationship compared to most?* and *how often do you wish you hadn't gotten in this relationship?*). It may be that they were experienced as too direct by the participants, and that in response they gave the most positive answers. Whilst the use of the RAS in this study was an improvement on the single question Likert scales used in the only two previous studies investigating relationship satisfaction as a risk factor for postnatal anxiety symptomatology (Britton, 2008; Britton, 2005) identified at the

time the present study was planned, it would have been preferable to have used the DAS.

***4.3.4.4 Experiences in Close Relationships - Revised.*** The ECR-R was chosen as it has very good psychometric properties, and is one of the most widely used measures in adult attachment research (Mikulincer & Shaver, 2007). It provides a dimensional measure of attachment anxiety and avoidance, and is therefore better able to measure differences among people than categorical measures such as the RQ, which was the measure used in the study by van Bussel et al. (2009). However, with the present sample there was a high correlation between the anxiety and avoidance subscales, which brings into question the extent to which the ECR-R was an accurate measure of attachment anxiety. Mikulincer and Shaver (2007) note some difficulties with the measure, and these may have affected the results. Firstly, the fact that the ECR-R anxiety subscale contains only two items which are reverse scored may make it vulnerable to acquiescence response bias. Secondly, some items refer to 'partners' (plural) and other items refer to 'partner' (singular) and this may have confused respondents. Two participants in this study noted on the questionnaire that they did not quite understand what the measure was asking, indicating that item wording may have presented a difficulty and thereby affected answers in some cases.

***4.3.4.5 Parental Bonding Instrument.*** The PBI was selected for this study as it is one of the most widely used self-report measures of early parent-child relationships and is widely used in research to assess parental contribution to subsequent psychiatric disorder (Wilhelm & Parker, 1990). An advantage of the PBI is that, in contrast to other measures, ratings are made for each parent separately, thereby allowing relationships with both mothers and fathers to be assessed. However, in this study, assessing parents separately also resulted in missing data

from participants whose fathers or mothers were either deceased or had not participated in their upbringing, and this was a drawback given the relatively small sample size.

**4.3.5 Omissions.** A number of variables of potential interest could not be included, as investigating further risk factors was beyond the scope the study. These included negative life events, personality traits, and factors such as coping style and affect regulation which may mediate the relationship between insecure attachment and postnatal anxiety symptomatology (Alexander et al., 2001; Behringer, Rainer, & Spangler, 2011; van Bussel, 2009).

A further important omission of the present study was the assessment of partner attachment style. Attachment is both an intrapersonal and interpersonal concept, since the attachment strategies a person uses depends not only on their internal working models of self and others, but also on interactions with the attachment figure, which are in turn theorized to be influenced by the attachment characteristics of the attachment figure. Whiffen (2005) found that avoidance of closeness in one partner was associated with perceived unresponsiveness to vulnerability and attachment insecurity in the other partner. Future studies investigating attachment style as a risk factor for developing postnatal anxiety should also assess partners' attachment style in order to investigate whether this may mediate the relationship between attachment anxiety and postnatal anxiety symptomatology.

## 4.4 Implications of the Study

### 4.4.1 Theoretical implications.

***4.4.1.1 Attachment model of postnatal anxiety.*** The results of the present study show that there are small but significant associations between postnatal anxiety symptomatology and the interpersonal variables of social support, adult attachment anxiety, and three aspects of parenting in childhood: maternal care, paternal care and paternal overprotection. There was also a small association with relationship satisfaction but this was not statistically significant. Of the interpersonal variables only paternal overprotection emerged as an individual predictor of postnatal anxiety symptomatology. However, an overall regression model which included the interpersonal variables as well as control variables significantly improved prediction of scores of postnatal anxiety symptomatology, and the additional 12% variance explained by the interpersonal factors over and above the control variables was near to reaching statistical significance. These results should be interpreted in the context of the significant limitations of the study, in particular the small sample size and resulting reduction in statistical power, the high socioeconomic status and educational level of the majority of participants, and the ceiling effect apparent in the RAS and SOS measures. These limitations prevent any definitive conclusions being drawn from the results. It is possible that in a larger and more diverse sample, using measures better able to distinguish between participants, effect sizes may have been greater. Not all the assumptions of regression analysis were met by the data, therefore affecting the extent to which the findings can be generalised beyond the sample of the present study.

The results show some limited preliminary support for understanding postnatal anxiety symptomatology from an attachment theory perspective. The

association between adult attachment anxiety and higher scores of postnatal anxiety symptoms could be understood as supporting an attachment-based diathesis-stress model, in which an anxious attachment style represents an underlying vulnerability. Childbirth, as a major life transition and a period of uncertainty, change, and interpersonal stress, is conceptualized as the stressor, in particular because the arrival of the new child affects the existing attachments (Whiffen, 2003). As a result of the stressor, a woman's attachment system is activated. If an anxious attachment style is present, insecure strategies for processing feelings and dealing with emotion, such as heightened attention to negativity and increased expression of distress, may lead to the person remaining in a state of heightened anxiety (Dozier et al., 2008; Kobak & Sceery, 1988). In contrast, a secure attachment style is more likely to lead to the adaptive communication of needs and eliciting of support, which may facilitate adjustment to the stressful event of childbirth and transition to parenthood (Mikulincer & Florian, 1998).

The finding that higher scores of postnatal anxiety were associated with low maternal and paternal care and high paternal overprotection can also be understood in terms of Bowlby's (1973, 1980) explanation of the way in which adverse or sub-optimal experiences of maternal and paternal care are thought to influence the development of later psychopathology. It must be recognised, however, that the use of the PBI to assess for adverse attachment experiences in childhood has its limitations. As discussed in section 2.5.7, whilst the PBI scales were found in a study by Manassis et al. (1999) to be correlated with the corresponding scales of the Adult Attachment Interview (Main & Goldwyn, 1988) and to be able to distinguish broadly between the most and least optimal attachment types, it could not distinguish AAI 'preoccupied' and 'dismissing' attachment styles. Furthermore, the measure consists

of two separate scales, and does not produce an overall score even though it has been recognised that the combinations of the two are of importance: high care and low overprotection is considered most optimal, while low care and high overprotection ('affectionless control') is considered least optimal (Parker, 1990). It can be questioned whether high overprotection, in combination with high care, should be seen as negative. Some degree of overprotection can be considered to be within the normal range of parenting practice and may at times be appropriate, for example in relation to existing vulnerabilities in a child. In the context of this, the link between scores on the PBI and postnatal anxiety symptomatology should only be considered to be a preliminary indication of the potential importance of childhood attachment experiences, and would need to be replicated using the AAI.

The finding in the current study of a negative association between postnatal anxiety symptomatology and both social support and relationship satisfaction may also be explained within the attachment theory framework. Those with an anxious attachment style are hypothesized to be less likely to turn to others for practical support due to negative perceptions or doubts about the availability of support. Attachment anxiety can give rise to relationship dissatisfaction particularly through its adverse effects on communication, negotiation, and conflict resolution (Mikulincer & Shaver, 2007) as well as insecure individuals' greater tendency to be vigilant of their partner's availability and responsiveness, and potential signals of rejection (Campbell, Simpson, Boldry, & Kashy, 2005) . The finding in the additional analyses of the current study that adult attachment anxiety was significantly associated with, and a negative predictor of, both relationship satisfaction and social support, supports this understanding. This would suggest, as Alexander et al. (2001) have noted, that attachment anxiety is a risk factor that is

developmentally prior to risk factors such as social support and relationship satisfaction.

In summary the results of the current study are compatible with an attachment model of postnatal anxiety. However, the limitations of the study, in particular the fact that it was underpowered, and that the sample was not representative of the general population, prevent any definitive conclusions to be drawn from the results. Further studies with adequate sample sizes are required to further investigate the link between attachment anxiety and the development of postnatal anxiety.

#### *4.4.1.2 Classification of anxiety symptomatology in the postnatal period.*

The focus of this study was on anxiety symptomatology in the postnatal period. However, the study also assessed postnatal depression symptomatology, in order to contribute evidence regarding the classification of anxiety in the postnatal period. Some researchers have proposed that anxiety symptoms occurring in the postpartum can be understood primarily as a feature of postnatal depression, rather than as a separate clinical entity (e.g. Matthey et al., 2003; Marrs et al., 2009; Ross et al., 2003), whilst others have concluded that postnatal anxiety is largely distinct from postnatal depression (e.g. Muzik et al., 2000; Wenzel et al., 2003). Some research which has shown a close link between anxiety and depression symptoms, including high comorbidity rates, may have been influenced by the lack of precision of measures such as the EPDS and the STAI. This study therefore used the DASS-21 to ensure minimal overlap between symptoms of anxiety and depression.

The conclusions regarding the classification of postnatal anxiety which can be drawn from the findings of the present study are tentative, and should be seen in the context of the limitations of the study. In particular, the fact that the data for the

regression analysis with postnatal depression symptomatology as the outcome variable did not meet the assumptions of both homoscedasticity and linearity limits the extent to which the results can be seen as having implications beyond the study sample.

The findings of the correlation analyses showed broadly similar patterns of association between the interpersonal variables and both postnatal anxiety and depression symptomatology, as predicted by the study hypotheses. This demonstration of shared risk factors would suggest that anxiety and depression in the postpartum share the same underlying vulnerability, a view which corresponds with the transdiagnostic dimensional model of depression and GAD. According to this model of psychopathology, depression and GAD are understood not as separate illnesses, but as two clinical presentations of the same core pathological processes which underlie them (Krueger et al., 1998; Watson, 2005; Widiger & Clark, 2000).

However, the results of the regression analyses, as well as the low comorbidity rate of 4.9% found in the study, appear to contrast with the above understanding. In the regression analyses antenatal anxiety symptomatology was a significant predictor of anxiety symptomatology in the postpartum but not depression symptomatology, and antenatal depression symptomatology was a significant predictor of depression symptomatology postpartum but not anxiety symptomatology. Furthermore, in the two regression analyses there were differing patterns of contribution by the individual variables, and the overall model significantly predicted variance in postnatal anxiety symptomatology but not variance in depression symptomatology.

These differences could be seen as evidence that postnatal anxiety and depression are distinct constructs and not merely different manifestations of a single

factor such as ‘internalizing’ or ‘distress’, and that anxiety is not primarily an aspect of depression. Such a view parallels that of researchers investigating the relationship between depression and GAD who have argued that differences in risk factors, amongst other evidence, points towards depression and GAD as being closely related but distinct disorders (e.g. Kessler et al., 2008; Moffitt et al., 2007).

Researchers attending a diagnosis-related research planning conference focusing on depression and GAD, convened by the APA as part of the DSM-5 development programme have noted that the disorders are so closely interlinked that research studies, whether investigating risk factors, intervention outcomes or mathematical models, cannot easily determine whether they are either different manifestations of the same underlying disorder or separate but closely related disorders (First, 2007). The general agreement among researchers is, however, that the two disorders are not identical, since they are not similar with regard to all validators used to differentiate between them (First, 2007). However, the fact that they are closely related leads some researchers to recommend that dimensional elements should be included within the categorical classifications of the two disorders in recognition of this. Further research into the biomarkers of depression and GAD is also recommended to advance the classification debate (First, 2007).

Similar conclusions may be drawn regarding the question of how postnatal anxiety should be defined in relation to depression in the postpartum. The results of the current study suggest that postnatal anxiety is closely related to postnatal depression, but that there are differences. The results indicate that, in a sample where depression and anxiety symptomatology have been well differentiated, pure anxiety symptomatology occurred at a rate that is higher than that for pure depression symptomatology and for comorbid symptomatology. Furthermore, a regression

model consisting of interpersonal and control variables significantly predicted scores of anxiety symptomatology but not depression symptomatology. This suggests that a hierarchical view of postnatal anxiety as being merely an aspect of, and subsidiary to, postnatal depression is not supported. The fact that anxiety symptomatology may occur in the absence of depression symptomatology in the postpartum, and may be better predicted by interpersonal risk factors appears to support the view of postnatal anxiety and depression as being distinct but closely related. However, future research into the biomarkers of postnatal depression and anxiety are required in order for conclusions to be drawn regarding their classification.

**4.4.2 Clinical implications.** Due to the limitations of the study, the findings do not have strong clinical implications. Nevertheless, the findings indicate some areas in relation to screening for, and the treatment of, psychological symptoms in the postnatal period, which require further research. As highlighted in the previous section, assessing participants with the DASS-21 identified several participants with pure anxiety symptomatology. Had the EPDS been used as the only measure of postnatal symptomatology, five participants with significant symptomatology would not have been identified. These included one case of comorbid anxiety and depression, one case of severe anxiety, and three cases of mild anxiety. Notwithstanding the poor internal consistency of the DASS-21 anxiety scale in the current study, this highlights the point made by Wenzel et al. (2005) that the common practice of using depression screening tools to decide which women should be clinically assessed may miss those women who screen low on depression but who have anxiety symptoms or an anxiety disorder. Using a screening measure with good discriminant validity which assesses anxiety and depression symptoms separately allows the detection of cases where anxiety symptoms are the predominant problem,

as well as the detection of comorbidity (Matthey et al., 2003). This has potential treatment implications as different interventions may be needed according to whether anxiety or depression symptoms are predominant (Emmanuel, Simmonds, & Tyrer, 1998). Given the potential consequences of postnatal anxiety for both mothers and infants (see section 1.4), it is important that healthcare staff are educated regarding the importance of screening for anxiety symptoms as well as depression symptoms in the postnatal period. This is especially so because women have been found to be less likely to speak to a health professional about anxiety symptoms compared to depression symptoms (Woolhouse, Brown, Krastev, Burlen, & Gunn, 2009).

Whilst some of the additional cases identified by the DASS-21 were mild, it is clearly of importance that self-report questionnaires identify as many women as possible who may be at risk of postnatal distress, even if it is established by clinical interview that no formal diagnosis or treatment is warranted. Studies have also shown that mild symptomatology can worsen with time (Breitkopf et al., 2006), and the implication is therefore that women who are identified as having mild symptoms of anxiety should be monitored for any changes in their mental health.

The findings of the current study that interpersonal factors were associated with symptoms of postnatal anxiety, and that in regression analyses interpersonal variables accounted for 12% of the variance in scores of postnatal anxiety symptomatology after controlling for other known risk factors, can be seen as a possible indicator that in the case of some women, for whom these risk factors are apparent, interventions for postnatal anxiety which focus on the couple relationship and other interpersonal relationships may be of more benefit than individual therapy.

Only limited research has been carried out on the treatment of postnatal anxiety, and only one study was identified which focused on a couples intervention

(Midmer, Wilson, & Cummings, 1995). In relation to postnatal depression, the emphasis has been on the individual therapies of CBT, psychodynamic psychotherapy and IPT, although a study by Misri, Kostaras, Fox, and Kostaras (2000) found that including partners in therapy led to significantly better postnatal adjustment than individual therapy alone. The findings of the present study suggest that further research into the treatment of postnatal anxiety should include couples interventions, in order to explore the potential benefit of these in comparison to individual therapies.

The finding that adult attachment anxiety is associated with postnatal anxiety symptomatology indicates that there may be a potential benefit in assessing women presenting with postnatal anxiety symptomatology for attachment-related problems, as well as the potential use of attachment-based interventions. One example of an intervention which uses the attachment framework is emotionally focused therapy (EFT; Greenberg & Johnson, 1988) which was developed to understand and treat relationship difficulties and has since been widely empirically validated as a couples therapy. It focuses on assessing and developing the security of the attachment bond between couples and addresses the accessibility and responsiveness of each partner. Other approaches include addressing cognitive representations of attachment such as cognitive biases, interpretations of interactions, and beliefs about trust through cognitive therapy (Collins & Read, 1994), and integrating attachment theory in behavioural interventions by focusing on developing and expanding attachment behaviours and creating new emotional experiences (Davila, 2003). In order to identify women who may benefit from attachment-focused interventions, it would be of benefit to use a measure such as the ECR-R with those who have been identified by postnatal screening tools to have significant anxiety symptomatology. However,

given the significant limitations of the current study, it is important to note that research into attachment-focused therapies in the treatment of postnatal anxiety would only be appropriate if the association between attachment anxiety and postnatal anxiety has been demonstrated by adequately powered studies using samples representative of the general population.

Given the finding from a study by Murray, Cooper, Wilson, & Romaniuk (2003) that the significant beneficial effect of CBT and psychoanalytical therapy in the treatment of postnatal depression was no longer present at nine months postpartum, as well as the limited impact of the intervention on the mother-child relationship, it will be important for future research to validate the use of any therapy for the treatment of postpartum anxiety, and assess whether these have a lasting impact on maternal and infant outcomes.

In the current study, a large proportion of the variance in scores of postnatal anxiety symptomatology was not explained by the interpersonal factors. This has the clinical implication that, as many factors in the development of postnatal anxiety have not yet been identified or investigated, the theoretical foundation for specific clinical interventions is yet to be developed.

### 4.5 Directions for Future Research

Due to the limitations of the current study the results should be seen as preliminary and further research is therefore needed to replicate the findings. Given the ceiling effects found for both the SOS and RAS measures in the current study, future studies should ensure that measures of social support and relationship satisfaction are used which reflect the many facets of both of these variables, and which are able to distinguish clearly between participants. Investigations into the role

of social support and relationship satisfaction in the development of postnatal anxiety could be extended by assessing these variables both before and after birth, since women's needs are likely to change over this period.

In the current study preliminary evidence is presented of the association between early childhood attachment experiences with parents and the development of postnatal anxiety symptomatology. Further research is needed to replicate this finding and the use of the AAI, which is known to have good construct validity, would overcome the limitations of the PBI identified in this study.

Research into risk factors for psychopathology in the postnatal period is increasingly looking not just at direct relationships between variables, but is investigating mediating and moderating factors using structural equation modelling to test multiple hypothesized direct and indirect relationships between variables (e.g. Ross et al, 2004; Tanner Stapleton et al., 2012). Several potentially important factors have been identified. For example, social self-efficacy and emotional awareness have been found to be significant mediators in the relationship between attachment insecurity and psychological distress (Mallinckrodt & Wei, 2005) and expectations of parenthood and parenting efficacy have been found to be implicated in postnatal psychological adjustment (Harwood, McLean, & Durkin, 2007). O'Mahen et al., (2010) found that the cognitive factor of rumination and the interpersonal factor of "silencing the self" (Jack, 1991) interacted in the prediction of vulnerability to depressive mood in the transition to motherhood, and it can be hypothesized that such an interaction could also be present in relation to perinatal anxiety. Future research into postnatal and perinatal anxiety should aim to investigate potential mediating and moderating factors using complex hypotheses and structural equation modelling.

Lastly, future studies should aim to obtain samples which are more sociodemographically diverse and therefore representative of the general population. This could be done by, for example, recruiting through routine antenatal appointments rather than via self-selected groups such as antenatal classes.

### 4.6 Final Summary and Conclusion

Research into psychological problems experienced by women following childbirth has historically focused on postnatal depression. An extensive body of research has led to an in-depth understanding of this disorder (Beck, 2001; O'Hara, 2009) and the efficacy of several psychological therapies have been demonstrated in randomized controlled trials (Murray et al., 2003; O'Hara et al., 2000). In contrast, it is only in the last decade that systematic research into anxiety symptoms in the postpartum has been carried out. Prevalence rates of around 13% have been reported for above threshold non-specific anxiety symptoms in the postpartum, and numerous studies have demonstrated links between postnatal maternal anxiety and adverse outcomes for both mothers (Barnett et al., 1991) and children (Glasheen, Richardson, & Fabio, 2010). This highlights the clinical importance of furthering the understanding of the risk factors involved in the development of postnatal anxiety. The aim of this study was to use a prospective design and standardized measures to follow on from recent research which has presented preliminary evidence for the importance of interpersonal risk factors in the development of postnatal anxiety symptomatology.

There is disagreement in the literature as to whether symptoms of anxiety in the postpartum should be seen as a part of postnatal depression or as a distinct clinical entity. This study therefore also assessed postnatal depression symptomatology, with the further aim of investigating the extent to which the two

symptom sets have shared risk factors, and thereby contributing evidence towards understanding how anxiety in the postnatal period may best be defined.

The findings showed the interpersonal risk factors were significantly associated with postnatal anxiety symptomatology, except in the case of relationship satisfaction where the correlation fell below conventional levels of significance, and in the case of maternal overprotection. The overall regression model (interpersonal variables and control variables) was significant. Over and above the control variables, the interpersonal variables explained a further 12% of variance in scores of postnatal anxiety symptomatology. Antenatal anxiety symptomatology was a significant predictor of anxiety symptomatology in the postpartum, but not depression.

For postnatal depression symptomatology a similar pattern of associations with the interpersonal risk factors was found. The only difference was that there was a significant association with maternal overprotection, but not with maternal care. However, in the regression analyses only 6% of the variance in scores of postnatal depression symptomatology was explained by the interpersonal variables, and the overall regression model was not significant. Antenatal depression symptomatology was a significant predictor of postnatal depression symptomatology but not anxiety. In terms of comorbidity, only 4.9% of participants scored above the cut-off specified for the DASS-21 for both anxiety and depression. This appears to indicate that a hierarchical view of postnatal anxiety as being merely an aspect of, and subsidiary to, postnatal depression is not supported. Anxiety symptomatology may occur in the absence of depression symptomatology, and in this study was better predicted by the interpersonal risk factors, lending evidence to the view that they are closely related but distinct sets of symptoms. However, future studies comparing the biomarkers of

postnatal depression and anxiety are required in order for conclusions regarding their classifications may be made.

The present study was limited by several factors. In particular, the required number of participants could not be recruited within the timeframe and the study was therefore underpowered. In addition, the sample was smaller than required and women of high socioeconomic status were over-represented. Furthermore the data did not meet all of the assumptions of regression analysis, thereby limiting the extent to which the findings can be generalized beyond the study sample. The study can nevertheless be considered to be a preliminary indication of the potential importance of the interpersonal variables of social support, adult attachment anxiety, and levels of care and overprotection from parents in childhood. The results are compatible with an attachment theory perspective on postnatal anxiety symptomatology, and indicated that interventions for postnatal anxiety that focus on the couple relationship and other interpersonal relationships may be appropriate for some women. In terms of screening, it is important that anxiety symptoms as well as depression symptoms are screened for in the postnatal period. However, in the current study only a small overall proportion of variance was explained by the interpersonal variables and only paternal overprotection emerged as a significant predictor of postnatal anxiety. Future studies are needed to replicate the findings of this preliminary study, and to investigate other potential factors in the development of postnatal anxiety, including variables which may mediate the relationship between interpersonal risk factors and development of postnatal anxiety.

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Appendix A: Cambridge Central Research Ethics Committee Approval Letter

NHS
National Research Ethics Service
NRES Committee East of England - Cambridge Central

Victoria House
Capital Park
Fulbourn
Cambridge
CB21 5XB

Telephone: 01223 597685
Facsimile: 01223 597645

20 October 2011

Ms Elisabeth Felter
Department of Psychological Sciences
Norwich Medical School, Elizabeth Fry Building
University of East Anglia, Norwich
NR4 7TJ

Dear Ms Felter

**Study title:** **Risk factors in the development of postnatal anxiety symptomatology**
**REC reference:** **11/EE/0394**

The Research Ethics Committee reviewed the above application at the meeting held on 14 October 2011. Thank you for attending to discuss the study.

**Approved documents**

The documents reviewed and approved at the meeting were:

| *Document* | *Version* | *Date* |
|---|---|---|
| Evidence of insurance or indemnity | Zurich Municipal | 28 June 2011 |
| Other: CV for Elisabeth Felter | | 30 July 2011 |
| Other: CV for Kiki Mastroyannopoulou | | 30 June 2011 |
| Other: CV for Dierdre Williams | | |
| Other: Letter to participants introducing Time 1 questionnaire pack | 1.0 | 21 July 2011 |
| Other: Letter to participants introducing Time 2 questionnaire pack | 1.0 | 21 July 2011 |
| Other: Letter to inform GP about low mood and/or high anxiety levels | 1.0 | 21 July 2011 |
| Other: Postnatal GP letter prior to time 2 contact | 1.0 | 21 July 2011 |
| Other: GP confirmation sheet | 1.0 | 21 July 2011 |
| Other: GP letter and form regarding patient participation | 1.0 | 21 July 2011 |
| Other: UEA covering letter regarding indemnity | Sue Steel | 20 August 2011 |
| Participant Consent Form: Anxiety Symptoms in the Transition to Motherhood | 1.0 | 21 July 2011 |
| Participant Consent Form: Consent to telephone contact | 1.0 | 21 July 2011 |
| Participant Information Sheet: Anxiety Symptoms in the Transition to Motherhood | 1.0 | 21 July 2011 |
| Protocol | 1.0 | 21 July 2011 |
| Questionnaire: Depression Anxiety Stress Scale - 21 (Lovibond & Lovibond, 1995) | | |
| Questionnaire: Relationship Assessment Scale (Hendrick, 1988) | | |

| | | |
|---|---|---|
| Questionnaire: Significant Others Scale (Power, Chamption, & Aris, 1988) | | |
| Questionnaire: Parental Bonding Instrument (Parker, Tupling & Brown, 1979) | | |
| Questionnaire: Experiences in Close Relationships Scale (Brennan, Clark & Shaver, 1998) | | |
| Questionnaire: Edinburgh Postnatal Depression Scale (EPDS) (Cox, Holden & Sagovsky, 1987) | | |
| Questionnaire: Time 1 Background Information Questionnaire | | |
| Questionnaire: Time 2 Questionnaire | | |
| REC application | 83379/2474 36/1/14 | 06 September 2011 |

After the Committees initial deliberations you were invited to the meeting to discuss the following issues:

1. You are planning to recruit 122 women in their last trimester of pregnancy through community midwife antenatal classes and 'parentcraft' parent education classes and only has five months in which to do this and the Committee were concerned as this is a hard population to recruit from and they wanted to know what you will do if you are unable to recruit the required numbers.

   The researcher confirmed that you are able to get an extension for the research if necessary or you will analyse the data with the numbers you have recruited.

2. You will be asking the participants to complete questionnaires before and after the birth of their baby and you will be asking them to send them and the consent forms back in separate envelopes and the Committee wanted to know what you would do if you received the envelope full of questionnaires but no consent form.

   You confirmed that if you received only the questionnaires you would contact the participant and ask them to send the consent form. The Committee then discussed the idea with you that the questionnaires could be used as implied consent and you would then not need to use consent forms at all and this would reduce the risk of wasting any questionnaires where the consent form was not received. It was agreed that this would be acceptable to the Committee if you decided to do this.

3. The Committee suggested to you that it might be useful to the participants to add some more information into the participant information sheet (PIS) about what post-natal anxiety is.

   You agreed that this would be possible.

4. The Committee were concerned that you might contact someone post-natally who has lost their baby or had a very stressful time as a result of the birth and wanted to know what steps were being put in place to ensure this would not happen.

   You confirmed that you would be contacting each participants GP surgery first to ensure everything is ok after the birth before contacting them. The Committee asked whether this was sufficient and you confirmed that the GP's would have more up to date information than midwifes. It was agreed that this should be added to the PIS.

**Ethical opinion**

The members of the Committee present gave a favourable ethical opinion of the above research on the basis described in the application form, protocol and supporting documentation, subject to the conditions specified below.

**Ethical review of research sites**

NHS Sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

**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 ("R&D approval") should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements.*

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

*Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.*

*For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.*

*Sponsors are not required to notify the Committee of approvals from host organisations*

5. The Committee would like to see some information about post-natal anxiety added to the participant information sheet, as discussed in point 3 above.

6. Information about you contacting the participants GP prior to contacting them post-natally should be added to the PIS as discussed in point 4 above.

**It is responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).**

**You should notify the REC in writing once all conditions have been met (except for site approvals from host organisations) and provide copies of any revised documentation with updated version numbers. Confirmation should also be provided to host organisations together with relevant documentation**

**Membership of the Committee**

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

**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**

Reporting requirements

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
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports
- Notifying the end of the study

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

Feedback

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.

Further information is available at National Research Ethics Service website > After Review

| 11/EE/0394 | Please quote this number on all correspondence |
|---|---|

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

Yours sincerely

pp NStorey

**Mrs Carolyn Read**
**Vice-Chair**

Email: Nicky.Storey@eoe.nhs.uk

Appendix B: Participant Information Sheet

Cambridge University Hospitals NHS
NHS Foundation Trust

NHS Cambridgeshire

University of East Anglia

Anxiety Symptoms in the Transition to Motherhood
**PARTICIPANT INFORMATION SHEET**

You are being invited to consider taking part in a research study about anxiety symptoms in the transition to motherhood. Before you decide whether or not you wish to participate, it is important to understand why the research is being done and what taking part would involve, so please take time to read this information sheet carefully.

**What is the purpose of the study?**
This study is designed to find out more about the factors involved when women develop symptoms of anxiety early months after giving birth. Symptoms of anxiety include worrying alot about things and feeling unable to control the worry; feeling tense, irritable and restless; and experiencing such things as breathlessness, increased heart rate or a dry mouth. Until recently, research has mainly focused on postnatal depression. However, it now clear that depression is not the only problem that can occur, and that it is important to find out more about other mood difficulties like anxiety. This is in order to get a better understanding of how best to help women who might be feeling vulnerable in the months after giving birth.

**Why have I been chosen?**
The study is focused on the experiences of women who are pregnant for the first time, and who are in the third trimester of pregnancy.

**What will I need to do if I decide to take part?**
If you decide to take part you will be asked to sign a consent form to say you have read and understood this information and agree to take part. The study involves filling out two sets of questionnaires. Details about these are given on the next page of this information sheet.

*Questionnaire Pack 1.* This pack is for filling out in the next few weeks while you are still pregnant. The questionnaires will take around 45 minutes to complete and have questions about:

- Background information: age, relationship status, education, ethnic origin, and previous difficulties with mental health
- Your current mood and your current levels of anxiety
- Your feelings about your current close relationship (if you are currently in a relationship)
- Your relationship with your parents when you were young
- Your style of relating to others
- Your view of the support you receive from others

*Questionnaire Pack 2.* This pack is for filling out 6-12 weeks after giving birth. These questionnaires will take no more than 20 minutes to fill out and have questions about:

- Your mood at the time and your levels of anxiety at the time
- There are also four short questions – one question to ask if you had any complications during delivery, and three questions about how you view your baby's temperament.

You will be given the questionnaires by me, Lizzie Felter, Trainee Clinical Psychologist at the University of East Anglia. I will either see you at your parent education class or antenatal clinic and give you the first questionnaire pack, or I will send the questionnaires to you after speaking to you on the phone if you have agreed with your midwife that you are happy for me to ring you. Either way, you will get a stamped addressed envelope to return the questionnaires in.

6-12 weeks after your due date I will contact your GP to get confirmation that everything is ok with you and your baby and that there is no reason why you should not be contacted about the research. Once I have received this confirmation, I will call you to ask if you are happy to continue taking part. If so, I will send you the second questionnaire pack in the post, again with a stamped addressed envelope for returning them in.

**Will my taking part in the study be kept confidential?**

Almost all of the information you provide will be anonymous and confidential. The only exception to this is the questionnaires about your mood and anxiety levels at 6-12 weeks after the birth. It is normal policy for researchers to inform a participant's GP if there is a concern about low mood or high anxiety levels. Therefore, if you choose to take part, you will be asked to give written consent to your GP being contacted if necessary. All the questionnaires will have a number written on it instead of your name to be sure that your answers remain anonymous and confidential. If your scores on the mood and anxiety questionnaires give cause for concern then the number on the questionnaire will be matched to your name so your GP can be contacted.

**What if I don't want to take part?**

If you decide not to take part, your care and that of your baby will not be affected in any way. Even after you have agreed to take part, you are free to withdraw from the study at any time without having to explain why.

**Are there any risks involved?**

Some of the questions ask about emotional well-being and about your relationships to others. It is possible that these questions may raise concerns for you. If this happens please stop completing the questionnaires. You may want to talk to your GP or local counselling service. Alternatively you could call The Samaritans who are a telephone service for anyone experiencing emotional distress (Tel. 08457 90 90 90). They are open 24 hours a day, 7 days a week.



For general advice about what it means to take part in research, you can contact the Patient Advice and Liaison Service (PALS) at Addenbrooke's Hospital on 01223 216756

**What will happen to the results of the research study?**
The results of the research will be used for part of my degree in clinical psychology. If you would like to be sent a brief summary of the results at the end of the study, please indicate this in the space provided on your consent form.

Thank you for considering taking part. At any stage, please ask me if there is anything that is not clear or if you would like more information.

Yours sincerely,

Lizzie Felter, Trainee Clinical Psychologist
(Supervised by Ms Kiki Mastroyannopoulou, Clinical Lecturer and Consultant Clinical Psychologist)
Department of Psychological Sciences, Norwich Medical School, Elizabeth Fry Building University of East Anglia, Norwich NR4 7TJ, Email address: elisabeth.felter@uea.ac.uk, mobile 07811 ******

Appendix C: Consent to Telephone Contact


Research Project: Anxiety Symptoms in the Transition to Motherhood

CONSENT TO TELEPHONE CONTACT

If you are interested in finding out more about the above research project, please provide a telephone number below, and sign your name to confirm that you are happy to be called by the researcher. The researcher will call between 9am and 5pm. Please indicate if there are any times during the day when you do not wish to be called.

| | |
|---|---|
| ..... | ..... |
| Telephone number | Any times when I do not want to be called |
| ..... | ..... |
| Name | Signature |

*Consent to Telephone Contact Version 1.0 21.07.11*

Appendix D: Participant Consent Form

Cambridge University Hospitals NHS
NHS Foundation Trust

NHS Cambridgeshire

University of East Anglia

**PARTICIPANT CONSENT FORM**

Anxiety Symptoms in the Transition to Motherhood

(Chief Investigator: Elisabeth Felter, Trainee Clinical Psychologist)

Please initial box:

1. I confirm that I have read and understand the information sheet dated 02.11.11 for the above study and have had the opportunity to ask questions. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason and my rights will not be affected. ☐
3. I agree to my GP being informed of my participation in the study. ☐
4. I understand that it is normal policy for the researcher to inform my GP if they have significant concerns about my mood level or anxiety level during the course of the study. I agree to my GP being informed about this. ☐
5. I agree to being contacted by the researcher by telephone 6-12 weeks after the delivery of my baby. ☐
6. I agree to take part in the above named study. ☐

| _____ | _____ | _____ |
|---|---|---|
| Name of participant | Signature | Date |
| _____ | _____ | _____ |
| Researcher | Signature | Date |

(A copy of the signed consent form will be sent to each participant in the post)

Please provide a contact telephone number:

Please provide the name of your GP and the Surgery:

……

Would you like to receive a brief summary of the results of the study when it has finished? YES/NO (*please delete as appropriate*)

*Participant Consent Form Version 2.0 02.11.11*

Appendix E: GP Letter and Form Regarding Patient Participation

Department of Psychological Sciences
Norwich Medical School
Elizabeth Fry Building
University of East Anglia
Norwich NR4 7TJ
(Tel: 07811 ******)

Date

Dear Dr.

**Research Project:**

Anxiety Symptoms in the Transition to Motherhood

One of the patients registered with your practice is taking part in the above research project and she has given her consent for us to notify you of her involvement. I have enclosed a notification form with details about the patient and the study.

The study aims to examine risk factors which may predispose a first-time mother to develop anxiety symptoms following birth. The study is using a prospective design where women are recruited in pregnancy and followed up when their baby is 6-12 weeks old.

It is clearly very important that the mother is only contacted at the second time point if both her and the baby are alive and well. Therefore I would be very grateful if you were able to complete and return a brief form to confirm whether you are aware of any reasons why I should not go ahead with contacting the mother. This will be in a few months' time, when the baby is about 6-12 weeks old.

Please feel free to contact me on the above number if you have any questions or concerns about the research study. Thank you in advance for your help.

Yours sincerely,

Elisabeth Felter
Trainee Clinical Psychologist
University of East Anglia

*GP Letter and Form regarding Patient Participation Version 2.0 25.04.12*

**RESEARCH PROJECT - NOTIFICATION TO GP**

Date:

Researcher's name and contact details:
Elisabeth Felter, Trainee Clinical Psychologist
Department of Psychological Sciences
Norwich Medical School
Elizabeth Fry Building
University of East Anglia
Norwich NR4 7TJ
Tel. 07811 ******

Dear Dr.

I am writing to tell you that the person named below, for whom you are the registered GP, has volunteered to take part in my research study. This involves filling out some questionnaires at two time points – once in late pregnancy, and once 6-12 weeks after the birth.

Please keep this as a permanent record of her involvement. I will inform you at a later date if there are any concerns about low mood or high anxiety levels during the course of the study. She has given her consent for me to contact you should this be the case.

Name of participant:

Date of birth:

Date of study: November 2011 – July 2012

Title of project: Anxiety Symptoms in the Transition to Motherhood

Project LREC reference: 11/EE/0394 (NRES Committee East of England – Cambridge Central)

Yours sincerely,

Elisabeth Felter
Trainee Clinical Psychologist
University of East Anglia

*GP Letter and Form regarding Patient Participation Version 2.0 25.04.12*

Appendix F: Postnatal GP Letter Prior to Time 2 Contact

Department of Psychological Sciences
Norwich Medical School
Elizabeth Fry Building
University of East Anglia
Norwich NR4 7TJ
(Tel: 07811 ******)

Date

Dear Dr

**Research Project:**
Anxiety Symptoms in the Transition to Motherhood

I wrote to you regarding this research project a couple of months ago. One of the participants in the above project is a woman who is registered at your practice.

I am aware that this woman delivered her child about 6-12 weeks ago and I would now like to contact her with some short questionnaires about her mood and her levels of anxiety in order to complete the final stage of the study. She consented to this when she was seen during pregnancy.

I would be very grateful if you could let me know whether there is any reason why I should not contact this woman for the second part of the research project. I enclose a brief confirmation sheet for you to tick and sign and I have also enclosed a stamped addressed envelope.

Please feel free to contact me on the number above if you have any questions or concerns about the research study. Thank you in advance with your help.

Yours sincerely,

Elisabeth Felter
Trainee Clinical Psychologist

*Postnatal GP letter prior to Time 2 Contact Version 1.0 21.07.11*

Appendix G: GP Confirmation Sheet

**Research Project:**

Anxiety Symptoms in the Transition to Motherhood

Name of participant: .....

Date of birth: .....

I can confirm that, as far as I am aware (*please tick a box as appropriate*)

☐ There are **no** reasons why this participant should not be contacted in order to continue her participation in the research study

☐ There **is** a reason why this participant should not be contacted. Her participation in the research study cannot continue.

Signed: ..... Date: .....

Please return this form in the stamped addressed envelope provided to: Elisabeth Felter, Department of Psychological Sciences, Norwich Medical School, Elizabeth Fry Building, University of East Anglia, Norwich NR4 7TJ

*GP Confirmation Sheet Version 1.0 21.07.11*

Appendix H: Letter to Inform GP about Low Mood and/or High Anxiety Levels

Department of Psychological Sciences
Norwich Medical School
Elizabeth Fry Building
University of East Anglia
Norwich NR4 7TJ
(Tel: 07811 ******)

Date

Dear Dr.

**Re:**
**Date of birth:**

I wrote to you several months ago to notify you that ..... was taking part in our research project examining the risk factors for developing anxiety symptoms in the transition to motherhood.

As part of the study I sent questionnaires to ..... in which she described her mood over the past week and her level of anxiety. I am writing to let you know that from the responses she has given, it seems that she may be feeling moderately (ANXIOUS and/or DEPRESSED).

She gave her consent at the start of the study for me to write to you if her mood became low or her anxiety levels high.

Yours sincerely,

Elisabeth Felter
Trainee Clinical Psychologist
University of East Anglia

Appendix I: Questionnaires

## Time 1 Background Information Questionnaire

*Firstly I'd like to ask you for a little background information.*

*What is your age?* ……

*What is the date you are due to give birth?* .....

*Are you currently in a relationship?*

1. Single….
2. Married or co-habiting …..
3. Separated ….
4. Divorced….
5. Widowed ….

*If currently in a relationship, how long have you been with your partner?*

*If you have worked regularly, what is your usual job?* (please specify)

(If in contact with partner) *What is your partner's usual job?*

*At what age did you leave school?*

*Did you leave school/higher education with any qualifications?* (please specify)

1. None
2. CSE (note how many)
3. GCSE or O Levels
4. A levels
5. Further qualification, not to degree level
6. Degree

*What is your ethnic group?*
White …. Indian …. Pakistani …. Bangladeshi …. Chinese ….
Caribbean …. African …. Mixed background …. Other ethnic group …….

*PLEASE TURN OVER FOR PAGE 2*

*Time 1 Background Information Questionnaire Version 2.0 02.11.11*

**Time 1 Background Information Questionnaire contd.**

*I'd like to ask about your mental health.*
*Have you ever been to your GP because of difficulties with mental health or trouble with your 'nerves'?*

*Have you ever had any therapy or treatment for emotional problems or for the way you were feeling?*
(please specify nature of illness and intervention, type of medication, duration of intervention)

1. None
2. Saw GP, and/or took prescribed medication
3. Referred to specialist service (e.g. psychiatry, psychology, counselling)
4. Inpatient admission

**DEPRESSION ANXIETY STRESS SCALE -21 (DASS-21)**
**(Lovibond & Lovibond, 1995)**

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you *over the past week*. There are no right or wrong answers. Do not spend too much time on any statement.

*The rating scale is as follows:*
0 Did not apply to me at all
1 Applied to me to some degree, or some of the time
2 Applied to me to a considerable degree, or a good part of time
3 Applied to me very much, or most of the time

| | | | | | |
|---|---|---|---|---|---|
| 1 | I found it hard to wind down | 0 | 1 | 2 | 3 |
| 2 | I was aware of dryness of my mouth | 0 | 1 | 2 | 3 |
| 3 | I couldn't seem to experience any positive feeling at all | 0 | 1 | 2 | 3 |
| 4 | I experienced breathing difficulty (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion) | 0 | 1 | 2 | 3 |
| 5 | I found it difficult to work up the initiative to do things | 0 | 1 | 2 | 3 |
| 6 | I tended to over-react to situations | 0 | 1 | 2 | 3 |
| 7 | I experienced trembling (e.g. in the hands) | 0 | 1 | 2 | 3 |
| 8 | I felt that I was using a lot of nervous energy | 0 | 1 | 2 | 3 |
| 9 | I was worried about situations in which I might panic and make a fool of myself | 0 | 1 | 2 | 3 |
| 10 | I felt that I had nothing to look forward to | 0 | 1 | 2 | 3 |
| 11 | I found myself getting agitated | 0 | 1 | 2 | 3 |
| 12 | I found it difficult to relax | 0 | 1 | 2 | 3 |
| 13 | I felt down-hearted and blue | 0 | 1 | 2 | 3 |
| 14 | I was intolerant of anything that kept me from getting on with what I was doing | 0 | 1 | 2 | 3 |
| 15 | I felt I was close to panic | 0 | 1 | 2 | 3 |
| 16 | I was unable to become enthusiastic about anything | 0 | 1 | 2 | 3 |
| 17 | I felt I wasn't worth much as a person | 0 | 1 | 2 | 3 |
| 18 | I felt that I was rather touchy | 0 | 1 | 2 | 3 |
| 19 | I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat) | 0 | 1 | 2 | 3 |
| 20 | I felt scared without any good reason | 0 | 1 | 2 | 3 |
| 21 | I felt that life was meaningless | 0 | 1 | 2 | 3 |

**EDINBURGH POSTNATAL DEPRESSION SCALE (EPDS)**
**J. L. Cox, J. M. Holden, R. Sagovsky (1987)**
***Department of Psychiatry, University of Edinburgh***

As you have recently had a baby, we would like to know how you are feeling. Please UNDERLINE the answer which comes closest to how you have felt IN THE PAST 7 DAYS, not just how you feel today. Here is an example, already completed.

I have felt happy:
Yes, all the time
Yes most of the time
No, not very often
No, not at all

This would mean that you have felt happy most of the time during the past week. Please complete the other questions in the same way.

In the past 7 days:
1. I have been able to laugh and see the funny side of things
As much as I always could
Not quite so much now
Definitely not so much now
Not at all

2. I have looked 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

3. I have blamed myself unnecessarily when things went wrong
Yes, most of the time
Yes, some of the time
Not very often
No, never

4. I have been anxious or worried for no good reason
No, not at all
Hardly ever
Yes, sometimes
Yes, very often

5. I have felt scared or panicky for no very good reason
Yes, quite a lot
Yes, sometimes
No, not much
No, not at all

*Edinburgh Postnatal Depression Scale contd.*

6. Things have been getting on top of me
    - Yes, most of the time I haven't been able to cope at all
    - Yes, sometimes I haven't been coping as well as usual
    - No, most of the time I have coped quite well
    - No, I have been coping as well as ever

7. I have been so unhappy that I have had difficulty sleeping
    - Yes, most of the time
    - Yes, sometimes
    - Not very often
    - No, not at all

8. I have felt sad or miserable
    - Yes, most of the time
    - Yes, quite often
    - Not very often
    - No, not at all

9. I have been so unhappy that I have been crying
    - Yes, most of the time
    - Yes, quite often
    - Only occasionally
    - No, never

10. The thought of harming myself has occurred to me
    - Yes, quite often
    - Sometimes
    - Hardly ever
    - Never

## SIGNIFICANT OTHERS SCALE
## (Power, Champion, & Aris, 1988)

Listed below are two sources of personal and social support on which you may be able to draw. For each person please **CIRCLE** a number from 1 to 7 to show how well support is provided.

The second part of each question asks you to rate how you would like things to be if they were exactly as you hoped for. As before, please put a **CIRCLE** around a number between 1 to 7 to show what your rating is.
**Please note:** If a particular source of support does not exist for you please **Substitute** the name of 'another' who acts to provide this support

**Person 1: Husband or Partner (Substitution please STATE THE RELATIONSHIP .....)**

| | **Never** | | | **Sometimes** | | | **Always** |
|---|---|---|---|---|---|---|---|
| 1a. Can you trust, talk to frankly and share your feelings with this person? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2a. Can you lean on and turn to this person in times of difficulty? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3a. Do they give you practical help? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4a. Can you spend time with them socially? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Person 2: Mother (Substitution please STATE THE RELATIONSHIP……...)**

| | **Never** | | | **Sometimes** | | | **Always** |
|---|---|---|---|---|---|---|---|
| 1a. Can you trust, talk to frankly and share your feelings with this person? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2a. Can you lean on and turn to this person in times of difficulty? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3a. Do they give you practical help? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4a. Can you spend time with them socially? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

*Significant Others Scale contd.*

Please list below TWO other people who are important in your life. Typical other relationships include brother, sister, close friend etc. As before for these people please **CIRCLE** a number from 1 to 7 to show how well support is provided.

Again, the second part of each question asks you to rate how you would like things to be if they were exactly as you hoped for. As before, please put a **CIRCLE** around a number between 1 to 7 to show what your rating is

**Person 3: (Please STATE THE RELATIONSHIP e.g. best friend or sister.....)**

| | **Never** | | | **Sometimes** | | | **Always** |
|---|---|---|---|---|---|---|---|
| 1a. Can you trust, talk to frankly and share your feelings with this person? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2a. Can you lean on and turn to this person in times of difficulty? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3a. Do they give you practical help? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4a. Can you spend time with them socially? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Person 4: (Please STATE THE RELATIONSHIP) e.g. best friend or sister.....)**

| | **Never** | | | **Sometimes** | | | **Always** |
|---|---|---|---|---|---|---|---|
| 1a. Can you trust, talk to frankly and share your feelings with this person? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 2a. Can you lean on and turn to this person in times of difficulty? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 3a. Do they give you practical help? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 4a. Can you spend time with them socially? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| b. What rating would your ideal be? | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**RELATIONSHIP ASSESSMENT SCALE**
**(Hendrick, 1988)**

Please mark on the answer sheet the number for each item which best answers that item for you.

How well does your partner meet your needs?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Poorly | | Average | | Extremely well |

In general, how satisfied are you with your relationship?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Unsatisfied | | Average | | Extremely satisfied |

How good is your relationship compared to most?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Poor | | Average | | Excellent |

How often do you wish you hadn't gotten in this relationship?

| 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|
| Never | | Average | | Very Often |

To what extent has your relationship met your original expectations:

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Hardly at all | | Average | | Completely |

How much do you love your partner?

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Not much | | Average | | Very much |

How many problems are there in your relationship?

| 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|
| Very few | | Average | | Very many |

**The Experiences in Close Relationships-Revised (ECR-R) Questionnaire**
**Fraley, Waller, and Brennan (2000)**

**Each item is rated on a 7-point scale where 1 = strongly disagree and 7 = strongly agree.**

The statements below concern how you feel in emotionally intimate relationships. We are interested in how you *generally* experience relationships, not just in what is happening in a current relationship. Respond to each statement by circling a number to indicate how much you agree or disagree with the statement

| | **Strongly Disagree** | | | | | | **Strongly Agree** |
|---|---|---|---|---|---|---|---|
| I'm afraid that I will lose my partner's love. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I rarely worry about my partner leaving me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I don't feel comfortable opening up to romantic partners. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I get uncomfortable when a romantic partner wants to be very close. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I feel comfortable depending on romantic partners. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| It helps to turn to my romantic partner in times of need. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I often worry that my partner will not want to stay with me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| My partner only seems to notice me when I'm angry. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| When my partner is out of sight, I worry that he or she might become interested in someone else. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I prefer not to be too close to romantic partners. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| When I show my feelings for romantic partners, I'm afraid they will not feel the same about me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I worry that I won't measure up to other people. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| It's easy for me to be affectionate with my partner. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| My romantic partner makes me doubt myself. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| It makes me mad that I don't get the affection and support I need from my partner. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I am very comfortable being close to romantic partners. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I usually discuss my problems and concerns with my partner. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I often wish that my partner's feelings for me were as strong as my feelings for him or her. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**PLEASE TURN OVER FOR PAGE 2**

**The Experiences in Close Relationships-Revised (ECR-R) Questionnaire continued**

| | **Strongly Disagree** | | | | | | **Strongly Agree** |
|---|---|---|---|---|---|---|---|
| It's not difficult for me to get close to my partner. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| My partner really understands me and my needs. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I find that my partner(s) don't want to get as close as I would like. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I talk things over with my partner. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I worry a lot about my relationships. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I find it relatively easy to get close to my partner. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I find it easy to depend on romantic partners. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I do not often worry about being abandoned. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| My desire to be very close sometimes scares people away. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I prefer not to show a partner how I feel deep down. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I often worry that my partner doesn't really love me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Sometimes romantic partners change their feelings about me for no apparent reason. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I feel comfortable sharing my private thoughts and feelings with my partner. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I tell my partner just about everything. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I worry that romantic partners won’t care about me as much as I care about them. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I'm afraid that once a romantic partner gets to know me, he or she won't like who I really am. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I find it difficult to allow myself to depend on romantic partners. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| I am nervous when partners get too close to me. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**PARENTAL BONDING INSTRUMENT**
**(Parker, Tupling, & Brown, 1979)**

**MOTHER FORM :** This questionnaire lists various attitudes and behaviours of parents. As you remember your MOTHER in your first 16 years would you place a tick in the most appropriate box next to each question.

| | Very like | Moderately like | Moderately unlike | Very unlike |
|---|---|---|---|---|
| 1. Spoke to me in a warm and friendly voice | | | | |
| 2. Did not help me as much as I needed | | | | |
| 3. Let me do those things I liked doing | | | | |
| 4. Seemed emotionally cold to me | | | | |
| 5. Appeared to understand my problems and worries | | | | |
| 6. Was affectionate to me | | | | |
| 7. Liked me to make my own decisions | | | | |
| 8. Did not want me to grow up | | | | |
| 9. Tried to control everything I did | | | | |
| 10. Invaded my privacy | | | | |
| 11. Enjoyed talking things over with me | | | | |
| 12. Frequently smiled at me | | | | |
| 13. Tended to baby me | | | | |
| 14. Did not seem to understand what I needed or wanted | | | | |
| 15. Let me decide things for myself | | | | |
| 16. Made me feel I wasn't wanted | | | | |
| 17. Could make me feel better when I was upset | | | | |
| 18. Did not talk with me very much | | | | |
| 19. Tried to make me feel dependent on her | | | | |
| 20. Felt I could not look after myself unless she was around | | | | |
| 21. Gave me as much freedom as I wanted | | | | |
| 22. Let me go out as often as I wanted | | | | |
| 23. Was overprotective of me | | | | |
| 24. Did not praise me | | | | |
| 25. Let me dress in any way I pleased | | | | |

**PARENTAL BONDING INSTRUMENT Continued**

**FATHER FORM**: This questionnaire lists various attitudes and behaviours of parents. As you remember your FATHER in your first 16 years would you place a tick in the most appropriate box next to each question.

| | Very like | Moderately like | Moderately unlike | Very unlike |
|---|---|---|---|---|
| 1. Spoke to me in a warm and friendly voice | | | | |
| 2. Did not help me as much as I needed | | | | |
| 3. Let me do those things I liked doing | | | | |
| 4. Seemed emotionally cold to me | | | | |
| 5. Appeared to understand my problems and worries | | | | |
| 6. Was affectionate to me | | | | |
| 7. Liked me to make my own decisions | | | | |
| 8. Did not want me to grow up | | | | |
| 9. Tried to control everything I did | | | | |
| 10. Invaded my privacy | | | | |
| 11. Enjoyed talking things over with me | | | | |
| 12. Frequently smiled at me | | | | |
| 13. Tended to baby me | | | | |
| 14. Did not seem to understand what I needed or wanted | | | | |
| 15. Let me decide things for myself | | | | |
| 16. Made me feel I wasn't wanted | | | | |
| 17. Could make me feel better when I was upset | | | | |
| 18. Did not talk with me very much | | | | |
| 19. Tried to make me feel dependent on him | | | | |
| 20. Felt I could not look after myself unless he was around | | | | |
| 21. Gave me as much freedom as I wanted | | | | |
| 22. Let me go out as often as I wanted | | | | |
| 23. Was overprotective of me | | | | |
| 24. Did not praise me | | | | |
| 25. Let me dress in any way I pleased | | | | |

## Time 2 Questionnaire

*I'd like to ask a few questions about the birth and your baby.*

*How old is your baby now?*

*Is it a boy or a girl?*

*Were there any complications during or after the birth?* (please specify)

*Would you consider your baby irritable or fussy?*
Yes/No

*Does your baby cry a lot?*
Yes/No

*Is your baby difficult to console or soothe?*
Yes/No

Appendix J: Letter to Participants Introducing Time 1 Questionnaire Pack

University of East Anglia

Department of Psychological Sciences
Norwich Medical School
Elizabeth Fry Building
University of East Anglia
Norwich NR4 7TJ

Telephone: 07811 ******

**Research Project: Anxiety Symptoms in the Transition to Motherhood**

Dear

Thank you for your interest in this research project.

Please find enclosed a consent form and the questionnaires for this first part of the project. It is important that you sign the consent form before you fill out the questionnaires. Please only fill out the questionnaires if you are happy to consent to all the items listed on the consent form. Remember that you are free to change your mind about taking part at any time, so if there is anything that concerns you please just let me know.

Once you have signed the consent form and filled out the questionnaires, please post them back to me. To protect confidentiality, place your signed consent from inside the small envelope and seal it. Then put it, and the questionnaires, in the big envelope they arrived in and stick the enclosed address label and stamp on the front.

When I have received your envelope, I will also sign your consent from and then return a copy to you in the post.

Your help with this research project is very much appreciated.

With very best wishes,

Elisabeth Felter

Appendix K: Letter to Participants Introducing Time 2 Questionnaire Pack

University of East Anglia

Department of Psychological Sciences
Norwich Medical School
Elizabeth Fry Building
University of East Anglia
Norwich NR4 7TJ

Telephone: 07811 ******

**Research Project: Anxiety Symptoms in the Transition to Motherhood**

Dear

I hope that everything is going well for you and the baby.

Please find enclosed the short questionnaires for the second part of the research project. I'm sure you have very little time at the moment, but it would be great if you could take just a few minutes to fill them out. This is the last thing to do as part of the research study, and you will not be asked for anything further after this. If you could post them back to me in the same envelope, using the enclosed address label and stamp, that would be great.

If you have any questions or concerns at all please feel free to give me a ring on the number shown.

Your help with this research project is very much appreciated and I would like to thank you again for agreeing to take part.

With very best wishes,

Elisabeth Felter

# Appendix L: Regression Analysis Output

Regression analysis with postnatal anxiety symptomatology as the dependent variable.

**Model Summary[c]**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 |
| 1 | .504[a] | .254 | .183 | 3.940 | .254 | 3.580 | 6 | 63 |
| 2 | .611[b] | .374 | .255 | 3.763 | .120 | 2.214 | 5 | 58 |

a. Predictors: (Constant), Infant_temperament_total, Previous mental health, Household_SEC_2Categories, Birth_complications, T1DASS21_Anxiety, T1DASS21_Depression

b. Predictors: (Constant), Infant_temperament_total, Previous mental health, Household_SEC_2Categories, Birth_complications, T1DASS21_Anxiety, T1DASS21_Depression, PBI_Mother_Care, PBI_Father_Overprotection, RAS_Total, Total_Actual_Support, ECRR_Anxiety

c. Dependent Variable: T2DASS21_Anxiety

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 95.0% Confidence Interval for B | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound |
| 1 | (Constant) | 1.497 | 1.341 | | 1.11 | .268 | -1.182 | 4.177 |
| | Household_ SEC_ 2Categories | -.607 | 1.039 | -.065 | -.58 | .561 | -2.683 | 1.470 |
| | Previous mental health | -.477 | 1.014 | -.052 | -.47 | .640 | -2.503 | 1.549 |
| | T1DASS21_ Anxiety | .449 | .130 | .395 | 3.44 | .001 | .188 | .710 |
| | T1DASS21_ Depression | .202 | .125 | .188 | 1.62 | .110 | -.047 | .451 |
| | Birth_ complications | -.228 | 1.047 | -.024 | -.21 | .828 | -2.320 | 1.864 |
| | Infant_ temperament_ total | .353 | .623 | .063 | .567 | .573 | -.892 | 1.598 |
| 2 | (Constant) | 3.963 | 9.889 | | .401 | .690 | -15.831 | 23.758 |
| | Household_ SEC_ 2Categories | -.280 | 1.057 | -.030 | -.26 | .792 | -2.396 | 1.837 |
| | Previous mental health | -1.131 | 1.001 | -.122 | -1.1 | .263 | -3.134 | .873 |
| | T1DASS21_ Anxiety | .421 | .134 | .370 | 3.14 | .003 | .153 | .688 |
| | T1DASS21_ Depression | .082 | .134 | .077 | .614 | .542 | -.186 | .350 |
| | Birth_ complications | .056 | 1.015 | .006 | .055 | .956 | -1.976 | 2.088 |
| | Infant_ temperament_ total | .293 | .623 | .052 | .470 | .640 | -.954 | 1.540 |
| | Total_Actual_ Support | -.085 | .066 | -.191 | -1.2 | .203 | -.217 | .047 |
| | RAS_Total | .051 | .194 | .036 | .262 | .794 | -.338 | .440 |
| | ECRR_Anxiety | .033 | .032 | .157 | 1.01 | .314 | -.032 | .098 |
| | PBI_Mother_ Care | .054 | .068 | .104 | .791 | .432 | -.082 | .190 |
| | PBI_Father_ Overprotection | .166 | .076 | .258 | 2.17 | .034 | .013 | .319 |

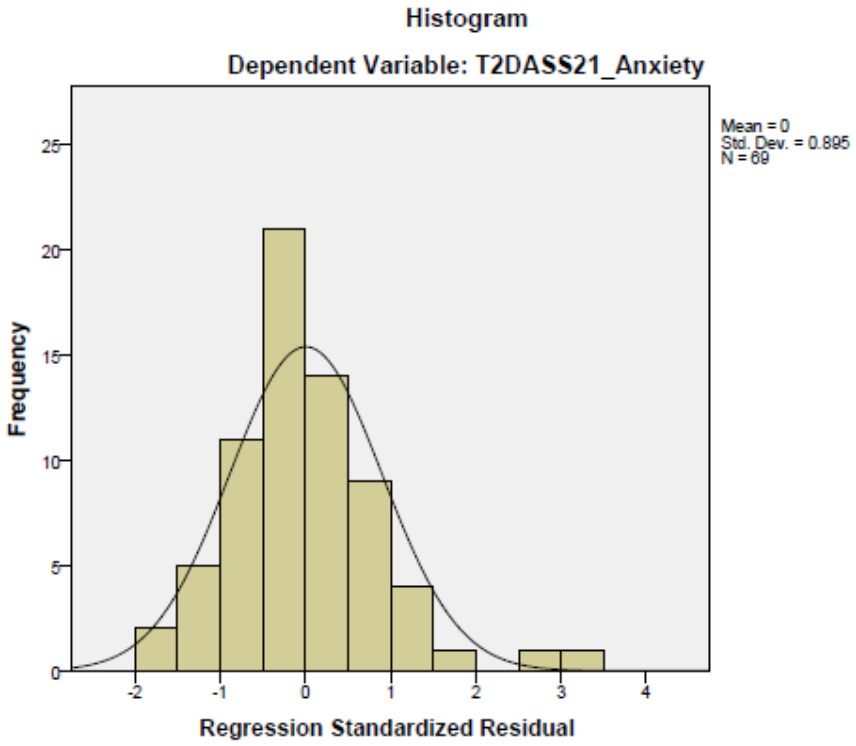
a. Dependent Variable: T2DASS21_Anxiety

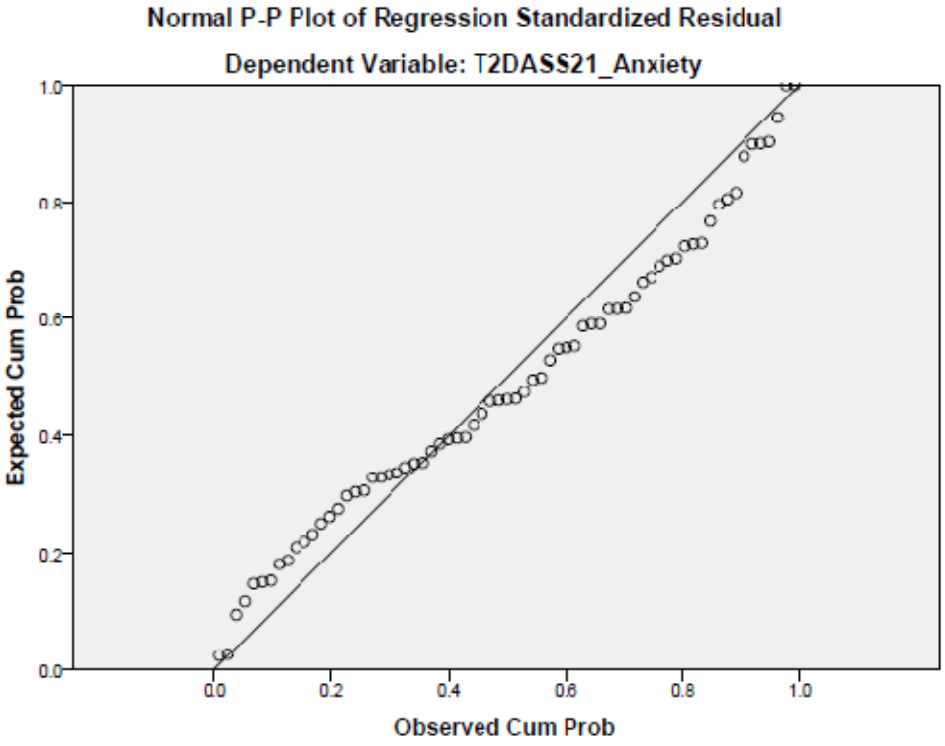
**Coefficients[a]**

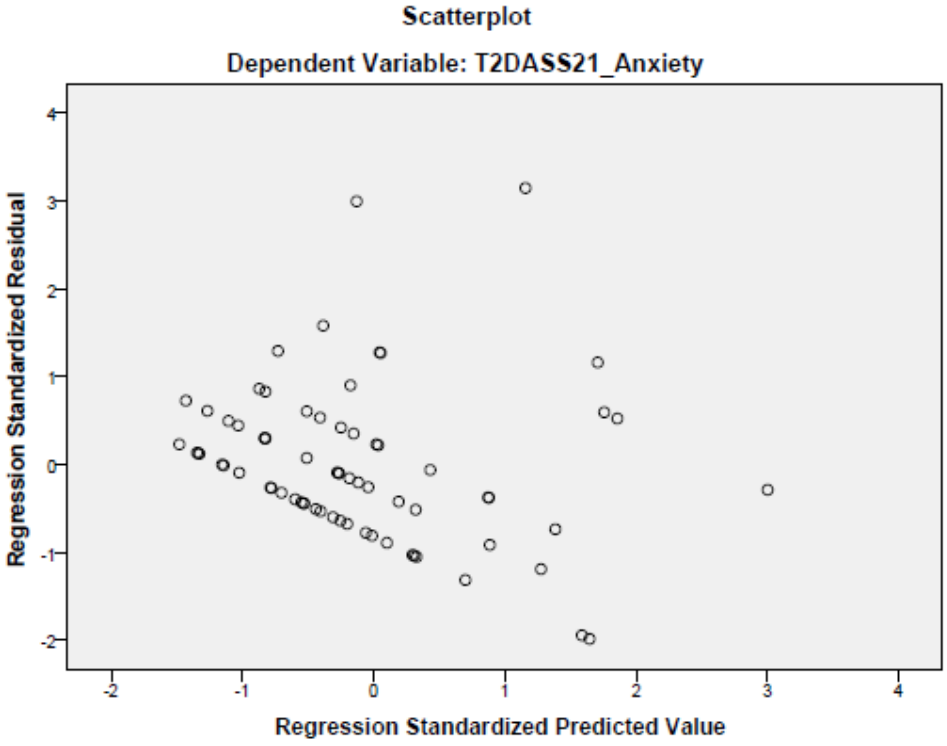
| Model | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|
| | | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | | | | | |
| | Household_SEC_2Categories | -.141 | -.073 | -.064 | .965 | 1.037 |
| | Previous mental health | -.098 | -.059 | -.051 | .985 | 1.015 |
| | T1DASS21_Anxiety | .453 | .398 | .374 | .897 | 1.115 |
| | T1DASS21_Depression | .312 | .200 | .176 | .878 | 1.139 |
| | Birth_complications | .025 | -.027 | -.024 | .973 | 1.028 |
| | Infant_temperament_total | .046 | .071 | .062 | .954 | 1.048 |
| 2 | (Constant) | | | | | |
| | Household_SEC_2Categories | -.141 | -.035 | -.027 | .850 | 1.177 |
| | Previous mental health | -.098 | -.147 | -.117 | .922 | 1.084 |
| | T1DASS21_Anxiety | .453 | .382 | .327 | .780 | 1.281 |
| | T1DASS21_Depression | .312 | .080 | .064 | .694 | 1.442 |
| | Birth_complications | .025 | .007 | .006 | .943 | 1.060 |
| | Infant_temperament_total | .046 | .062 | .049 | .870 | 1.150 |
| | Total_Actual_Support | -.214 | -.167 | -.134 | .489 | 2.043 |
| | RAS_Total | -.064 | .034 | .027 | .564 | 1.772 |
| | ECRR_Anxiety | .301 | .132 | .106 | .454 | 2.201 |
| | PBI_Mother_Care | -.109 | .103 | .082 | .620 | 1.613 |
| | PBI_Father_Overprotection | .345 | .275 | .226 | .769 | 1.300 |

a. Dependent Variable: T2DASS21_Anxiety

Histogram and normal probability plot of the residuals, and scatter plot of standardized residuals against standardized predicted values for regression analysis with postnatal anxiety symptomatology as the dependent variable.




Normal P-P Plot of Regression Standardized Residual
Dependent Variable: T2DASS21_Anxiety
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Scatterplot
Dependent Variable: T2DASS21_Anxiety
Regression Standardized Residual
Regression Standardized Predicted Value
-2
-1
0
1
2
3
4

Regression analysis with postnatal depression symptomatology as the dependent variable.

**Model Summary**[c]

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 |
| 1 | .453[a] | .206 | .130 | 5.496 | .206 | 2.716 | 6 | 63 |
| 2 | .513[b] | .264 | .124 | 5.515 | .058 | .913 | 5 | 58 |

a. Predictors: (Constant), Infant_temperament_total, Previous mental health, Household_SEC_2Categories, Birth_complications, T1DASS21_Anxiety, T1DASS21_Depression

b. Predictors: (Constant), Infant_temperament_total, Previous mental health, Household_SEC_2Categories, Birth_complications, T1DASS21_Anxiety, T1DASS21_Depression, PBI_Mother_Care, PBI_Father_Overprotection, RAS_Total, Total_Actual_Support, ECRR_Anxiety

c. Dependent Variable: T2DASS21_Depression

**Coefficients**[a]

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. | 95.0% Confidence Interval for B | |
|---|---|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | | Lower Bound | Upper Bound |
| 1 | (Constant) | .966 | 1.870 | | .516 | .608 | -2.772 | 4.703 |
| | Household_SEC_2Categories | -.884 | 1.449 | -.070 | -.61 | .544 | -3.781 | 2.012 |
| | Previous mental health | 1.376 | 1.414 | .110 | .973 | .334 | -1.450 | 4.202 |
| | T1DASS21_Anxiety | .193 | .182 | .126 | 1.06 | .293 | -.171 | .557 |
| | T1DASS21_Depression | .459 | .174 | .316 | 2.63 | .010 | .111 | .807 |
| | Birth_complications | 1.147 | 1.460 | .089 | .785 | .435 | -1.771 | 4.064 |
| | Infant_temperament_total | 1.147 | .869 | .152 | 1.32 | .192 | -.589 | 2.884 |
| 2 | (Constant) | -.134 | 14.493 | | -.00 | .993 | -29.145 | 28.877 |
| | Household_SEC_2Categories | -.866 | 1.550 | -.068 | -.55 | .579 | -3.968 | 2.236 |
| | Previous mental health | .757 | 1.467 | .061 | .516 | .608 | -2.180 | 3.693 |
| | T1DASS21_Anxiety | .164 | .196 | .107 | .837 | .406 | -.228 | .556 |
| | T1DASS21_Depression | .396 | .196 | .273 | 2.01 | .048 | .003 | .789 |
| | Birth_complications | 1.197 | 1.488 | .093 | .805 | .424 | -1.781 | 4.176 |
| | Infant_temperament_total | .858 | .913 | .114 | .939 | .351 | -.970 | 2.686 |
| | Total_Actual_Support | -.111 | .097 | -.184 | -1.1 | .257 | -.305 | .083 |
| | RAS_Total | .289 | .285 | .152 | 1.01 | .314 | -.281 | .859 |
| | ECRR_Anxiety | .039 | .047 | .137 | .821 | .415 | -.056 | .134 |
| | PBI_Mother_Care | .029 | .099 | .041 | .287 | .775 | -.171 | .228 |
| | PBI_Father_Overprotection | .050 | .112 | .057 | .443 | .659 | -.175 | .274 |

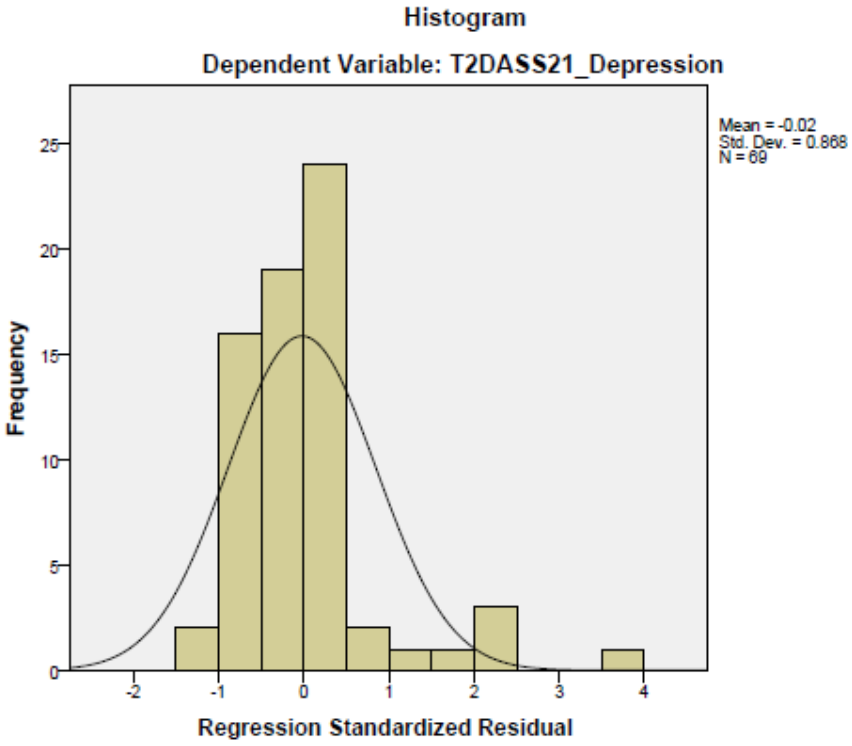
a. Dependent Variable: T2DASS21_Depression

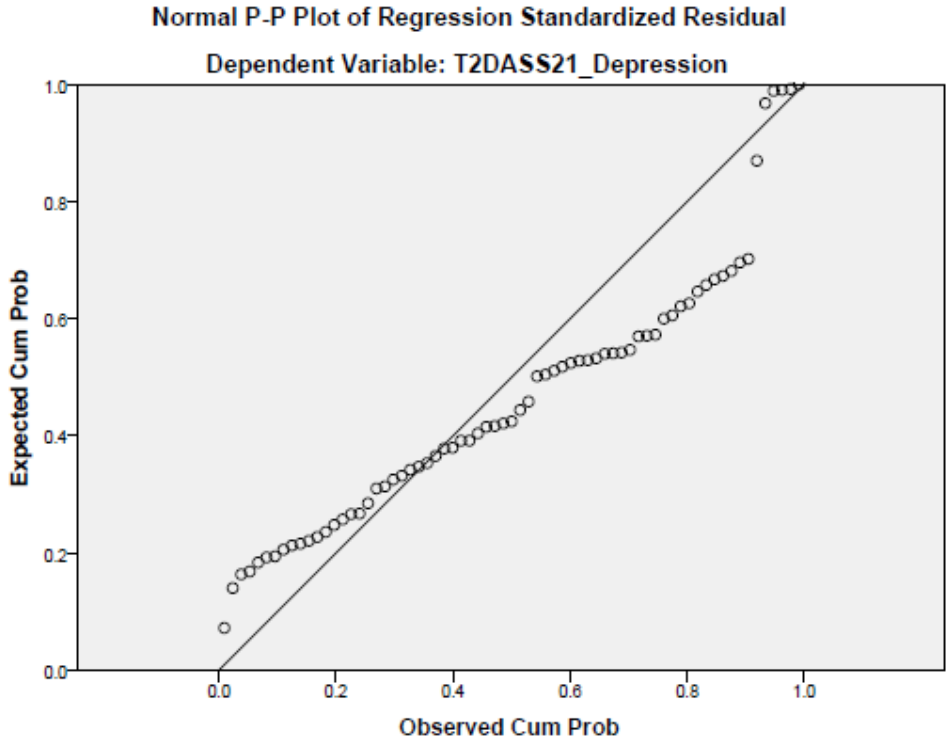
**Coefficients**[a]

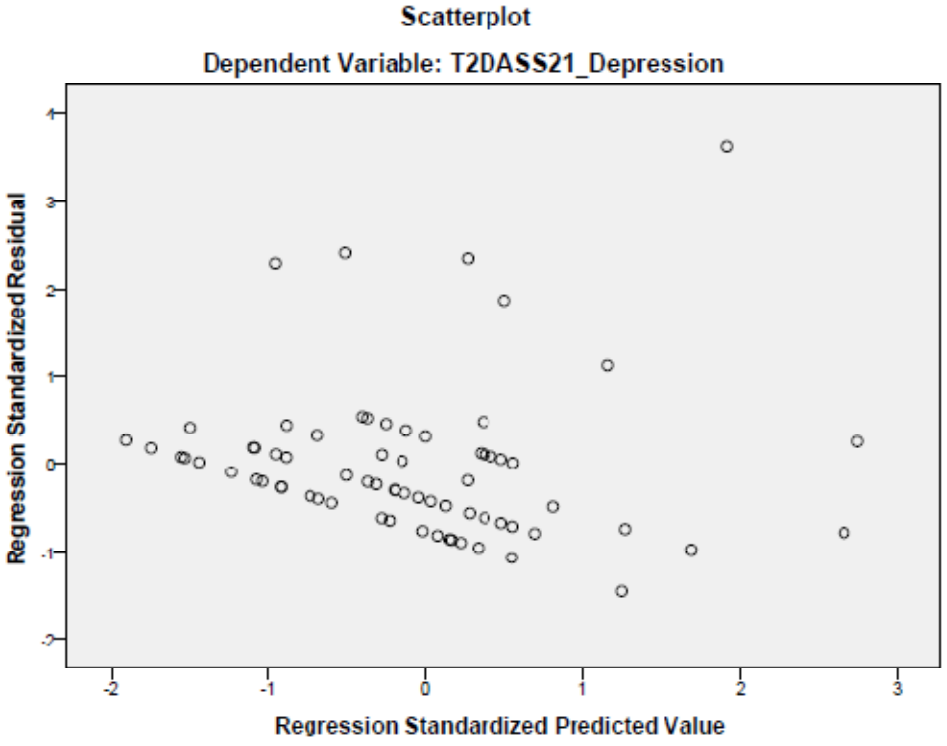
| Model | | Correlations | | | Collinearity Statistics | |
|---|---|---|---|---|---|---|
| | | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | | | | | |
| | Household_SEC_2Categories | -.121 | -.0 | -.06 | .965 | 1.0 |
| | Previous mental health | .076 | .12 | .10 | .985 | 1.0 |
| | T1DASS21_Anxiety | .200 | .13 | .11 | .897 | 1.1 |
| | T1DASS21_Depression | .386 | .31 | .29 | .878 | 1.1 |
| | Birth_complications | .144 | .09 | .08 | .973 | 1.0 |
| | Infant_temperament_total | .189 | .16 | .14 | .954 | 1.0 |
| 2 | (Constant) | | | | | |
| | Household_SEC_2Categories | -.121 | -.0 | -.06 | .850 | 1.1 |
| | Previous mental health | .076 | .06 | .05 | .922 | 1.0 |
| | T1DASS21_Anxiety | .200 | .10 | .09 | .780 | 1.2 |
| | T1DASS21_Depression | .386 | .25 | .22 | .694 | 1.4 |
| | Birth_complications | .144 | .10 | .09 | .943 | 1.0 |
| | Infant_temperament_total | .189 | .12 | .10 | .870 | 1.1 |
| | Total_Actual_Support | -.322 | -.1 | -.12 | .489 | 2.0 |
| | RAS_Total | -.070 | .13 | .11 | .564 | 1.7 |
| | ECRR_Anxiety | .287 | .10 | .09 | .454 | 2.2 |
| | PBI_Mother_Care | -.170 | .03 | .03 | .620 | 1.6 |
| | PBI_Father_Overprotection | .141 | .05 | .05 | .769 | 1.3 |

a. Dependent Variable: T2DASS21_Depression

Histogram and normal probability plot of the residuals, and scatter plot of standardized residuals against standardized predicted values for regression analysis with postnatal depression symptomatology as the dependent variable.




Normal P-P Plot of Regression Standardized Residual
Dependent Variable: T2DASS21_Depression
Expected Cum Prob
Observed Cum Prob
0.0
0.2
0.4
0.6
0.8
1.0


Scatterplot
Dependent Variable: T2DASS21_Depression
Regression Standardized Residual
Regression Standardized Predicted Value
-2
-1
0
1
2
3