The Role of Cognitive and Metacognitive Factors in Perinatal Depression and Anxiety

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Abstract

Identifying vulnerability to perinatal emotional distress is an important public health issue. According to Beck's Cognitive Theory (Beck, 1964; 2002), specific dysfunctional attitudes interact with specific stressors, such as pregnancy or childbirth, increasing risk for emotional distress. According to the Self-Regulatory Executive Functioning Model (Wells & Matthews, 1994; 1996), the appraisal and regulation of one's thoughts, known as metacognition, are more responsible for maintaining and exacerbating emotional distress than maladaptive cognitive content. This has yet to be explored in the perinatal period.

The aim of this thesis was to explore the role of cognitive and metacognitive factors in increasing risk for perinatal depression and anxiety. To accomplish this, a psychometric exploration into the Pregnancy Related Beliefs Questionnaire (Moorhead, Owens, & Scott, 2003) was conducted, which resulted in a valid and reliable measure of maladaptive attitudes specific to motherhood that was found to increase risk for the onset and severity of postnatal depression. Finally, the independent role of metacognitions in increasing risk for perinatal emotional distress was explored, outside of the contribution of dysfunctional attitudes specific to motherhood, which revealed that metacognitive beliefs about the uncontrollability and danger of one's thoughts independently predicted the onset and severity of antenatal emotional distress, after controlling for baseline emotional distress and maladaptive attitudes about motherhood; however metacognition did not independently predict postnatal emotional distress.

The results suggest, during the third trimester, when anxieties about the birth of the baby are high, beliefs that thoughts are uncontrollable and dangerous can lead to increased emotional distress. In the weeks after the baby is born, rigid attitudes about motherhood and what makes a good or a bad mother become more relevant, increasing risk for postnatal emotional distress. These results support the relevance of both cognitive and metacognitive approaches to understanding perinatal emotional distress and suggests that their strength as predictors is dependent on context. The limitations and implications are also discussed.

Declaration

I hereby declare that to the best of my knowledge and belief, no portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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Publications Derived from Thesis

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Chapter One: Introduction

1.1. Scope and Overview

The rate of presentation for perinatal depression is commonly reported at approximately 13% (Bennett, Einarson, Taddio, Koren, & Einarson, 2004) and although less researched, the prevalence of perinatal anxiety appears to be similar to depression (Heron, O'Connor, Evans, Golding, & Glover, 2004). Both perinatal depression and anxiety are associated with obstetric complications, adverse birth outcomes, and childhood developmental delays (Brouwers, van Baar, & Pop, 2001; Murray & Cooper, 1996), yet women do not tend to seek treatment during this time, often due to stigma, shame, and the perceived unacceptability of taking pharmaceutical drugs during pregnancy and while breast-feeding (Dennis & Chung-Lee, 2006; Goodman, 2009; Marcus, Flynn, Blow, & Barry, 2003; O'Mahen & Flynn, 2008). Identifying women at risk is essential for developing interventions that can help prevent the deleterious outcomes associated with perinatal depression and anxiety.

The focus of this project is to examine the role of cognitive and metacognitive factors in predicting emotional distress during the perinatal period. The goal is to expand our understanding about the risk factors associated with perinatal emotional distress in order to assist healthcare workers, psychologists, and other practitioners in identifying women at high risk of developing perinatal emotional distress and in developing cognitive and metacognitive interventions that may prevent adverse outcomes. In the first chapter, research examining the prevalence and impact of perinatal depression and anxiety is considered and a review of the key theoretical perspectives associated with perinatal depression and anxiety is explored.

1.2. Perinatal Depression and Anxiety: Prevalence and Impact

Emotional distress can occur either during the pregnancy (antenatal period), up to 12

months after the birth of the child (postnatal period), or both (perinatal period). There is less available research examining the prevalence and impact of perinatal anxiety, compared to depression. There is an ongoing debate amongst researchers as to whether perinatal depression and anxiety are more likely to be comorbid or non-comorbid, with some reporting they are more likely to be comorbid (Field et al., 2003) and others arguing they should not be assumed to be co-existing entities (Matthey, Barnett, Howie, & Kavanagh, 2003). Matthey and colleagues (2003) found that by including a diagnosis for generalised anxiety disorder and panic disorder, over and above depression diagnoses, the rates of perinatal psychopathology increased by 57-100%. This suggests that many women who do not suffer from perinatal depression, do suffer from perinatal anxiety and that it is equally as important to screen for postnatal anxiety as it is to screen for postnatal depression (Matthey et al., 2003).

1.2.1. Prevalence

The prevalence rates of both perinatal depression and anxiety range from 8% - 20%, commonly reported at an estimated 13% (Bennett et al., 2004; Heron et al., 2007; Josefsson, Berg, Nordin, & Sydsjö, 2001; Lee et al., 2007; O'Hara & Swain, 1996). Although the prevalence of perinatal emotional distress appears to be similar throughout pregnancy and into the postnatal period (Heron et al., 2004), researchers, clinicians, and health-care workers have put more emphasis on postnatal emotional distress, compared to antenatal emotional distress. In a large-scale longitudinal study, Heron and colleagues (2004) measured levels of depression and anxiety at 18 weeks gestation, 32 weeks gestation, 8 weeks postpartum, and 8 months postpartum. Prevalence rates for depression were 11.4%, 13.1%, 8.9%, and 7.8%, respectively, and incidence rates for depression from 32 weeks gestation were 8.2%, 4.3%, and 3%, respectively. The prevalence rates for perinatal anxiety were similar, reported at 14.6%, 15.6%, 8.2% and 9%, respectively, while incidence rates for perinatal anxiety from 32 weeks gestation were 8.6%, 3.1%, and 3%.

These rates suggest that antenatal depression and anxiety are equally as prevalent, and thus, equally as relevant to research, and to screen for and target for intervention, as postnatal emotional distress.

When examining prevalence rates, it is important to keep in mind how the variables are measured. Perinatal depression and anxiety are most often measured through self-report instruments, such as the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987), the Beck Depression Inventory (BDI; Beck, Ward, & Mendelson, 1961; Beck, Steer, & Brown, 1996), and the State-Trait Anxiety Inventory (STAI; Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983), although some researchers may use DSM-IV criteria to determine the presence of perinatal depression and anxiety. Prevalence rates are significantly, albeit slightly, higher when self-report measures are used, compared to interviews based on DSM-IV criteria (O'Hara & Swain, 1996).

Prevalence and incidence of perinatal depression and anxiety appear to be similar globally and amongst various cultures (O'Hara & Swain, 1996); however, it is important to note that because we are interested in learning more about factors that increase risk for perinatal depression and anxiety and risk factors appear to differ significantly between cultures and continents, we have chosen to focus on research conducted in North America, Europe, and Australia, so the results can be generalised to women, health care workers, and practitioners in the UK.

It is still unclear whether the perinatal period represents a period of increased risk for depression and anxiety. Some researchers report that the risk of perinatal depression is similar to depression in other stages of life (Brockington, 1996; Cox, Murray, & Chapman, 1993; O'Hara, 1994), while others report that the postpartum period is associated with an increased risk of psychiatric illness generally, and depression specifically (Eberhard-Gran, Eskild, Tambs, Samuelsen, & Opjordsmoen, 2002; Munk-Olsen, Laursen, Pedersen, Mors, & Mortensen, 2006). It has also been suggested that having a child constitutes a specific risk factor for some women, but not for others (Cooper & Murray, 1995). Cooper and

Murray (1995) followed a sample of women for five years after an initial episode of postnatal depression and reported that women whose first episode of depression occurred during the postpartum period were at increased risk for subsequent postpartum depression, but not depression unrelated to the perinatal period. Similarly, women with a history of non-postpartum depression were at increased risk of a future episode of general, but non-postpartum, depression.

1.2.2. Impact

Research shows there are a wide range of detrimental consequences of perinatal depression and anxiety for the women and their child's development (Goodman, 2004; Murray & Cooper, 1996). Obstetric complications, such as gestational hypertension and preeclampsia, and adverse birth outcomes, such as low Apgar scores and preterm deliveries, have been shown to be associated with untreated depression during pregnancy (Bonari et al., 2004; Henry, Beach, Stowe, & Newport, 2004). Depression during pregnancy has also been linked to harmful prenatal behaviours, such as poor nutrition, poor prenatal medical care, increases in smoking, alcohol, and other drug use, compromising the health of both the women and their foetuses (Bonari et al., 2004; O'Hara, Rehm, & Campbell, 1983). Poor nutrition and high body fat during pregnancy is also associated with an increased risk for obstetric complications, such as pre-eclampsia (O'Gorman et al., 2017), however, and although antenatal depression, poor nutrition, and obstetric complications appear to be inter-related, direct causal relationships are unclear.

Postnatal depression has been shown to negatively impact early mother-infant interactions, subsequently affecting long-term cognitive development and attachment (Murray & Cooper, 1996; Murray, Cowley, Hooper, & Cooper, 1996). Murray and Cooper (1996) suggest that postnatal depression impairs infant developmental progress through the disruption of normal infant-mother engagement, due to the impact that depression has on the mothers' interpersonal functioning and parenting ability.

Anxiety during pregnancy has been linked to uterine artery resistance, leading to reduced blood flow to the foetus, possibly explaining the intrauterine growth deprivation found in the foetuses of highly anxious pregnant women (Teixeira, Fisk, & Glover, 1999). Antenatal anxiety has also been associated with difficult infant temperament (Austin, Hadzi-Pavlovic, Leader, Saint, & Parker, 2005; Werner et al., 2007), developmental delays (Brouwers et al., 2001), and emotional and behavioural disturbances in childhood (O'Connor, Heron, Golding, & Glover, 2003: Van den Bergh & Marcoen, 2004). Barnett and Parker (1986) found that highly anxious women were more likely to be depressed, neurotic, and introverted. They had more delivery complications and their babies were more likely to be premature and slow to suckle, even after controlling for the neurotic personality trait (Barnett & Parker, 1986). Mothers who were highly anxious were also less confident about their parenting and coping abilities (Barnett & Parker, 1986). Barnett and Parker (1986) concluded that high anxiety during the perinatal period is associated with higher rates of depression, more delivery complications, and considerable difficulties managing the maternal role.

1.2.3. Treatment seeking

Despite the well-documented adverse consequences of untreated perinatal depression and anxiety on both the mother and infant (Bonari et al., 2004; Brouwers et al., 2001), a very low percentage of women with perinatal depression actually seek formal treatment, preferring to seek advice from family and friends (O'Mahen & Flynn, 2008). In a qualitative systematic review of the literature, Dennis and Chung-Lee (2006) sought to examine treatment seeking barriers for women from various countries, cultures, and backgrounds with postnatal depression. Some of their results were similar across cultures and countries of origin; specifically, women who experience perinatal emotional distress report feeling shame, stigma, fear of having their baby taken away, or being a burden to their family (Dennis & Chung-Lee, 2006). Amongst women in the Western world (Europe,

Australia, & United States), strong opinions about the unacceptability of receiving psychotropic medication during pregnancy and while breast feeding have also been reported as reasons why women do not seek professional treatment for depressive symptoms during the perinatal period (Chabrol, Teissedre, Armitage, Danel, & Walburg, 2004; Goodman, 2009; Holopainen, 2002). Goodman (2009) reported that 66% of women believe the use of psychotropic medicine during pregnancy is unacceptable and 64% believe it is unacceptable to take psychotropic medicine while breastfeeding. Approximately 12-13% of women in the U.S. and the U.K., who meet the criteria for depression seek formal treatment for their symptoms (Marcus et al., 2003; O'Mahen & Flynn, 2008), suggesting the majority of cases go untreated.

Due to the negative consequences of perinatal depression and anxiety for women and their children (Goodman, 2004; Murray & Cooper, 1996) and the tendency to not seek treatment for perinatal emotional distress (O'Mahen & Flynn, 2008), early intervention for perinatal depression has been advocated (NICE, 2007). Measures should be put into place to prevent the deleterious outcomes of perinatal depression and anxiety on women and their children. Expanding and refining knowledge about risk factors for perinatal depression and anxiety is crucial in order to identify high risk women and implement programs that target modifiable factors for change.

There are two theoretical perspectives commonly used to examine the aetiology of depression: the biological model and the psychosocial model. In the following sections the risk factors for perinatal depression and anxiety will be presented, within their relative theoretical frameworks. Because we are primarily interested in examining risk factors that increase a person's vulnerability for developing emotional distress and the majority of these factors are psychosocial factors (Beck, 2001; O'Hara & Swain, 1996), the biological model and the factors associated with perinatal depression and anxiety will only be reviewed briefly, followed by a more thorough review of the psychosocial model and psychosocial risk factors for perinatal depression and anxiety.

1.3. Biological Model of Psychopathology

The biological approach to psychopathology considers emotion and behaviour from a biological or physical perspective. These theorists (Fowles, 2002; Freeman, Sammel, Lin, & Nelson, 2006) believe psychological dysfunction can be explained by physiological factors, such as genetics, hormones, and changes in the structure and function of the brain. Due to changes in hormone levels immediately following birth, researchers have placed most of their focus, within the biological model, on the relationship between hormones and postnatal depression.

1.3.1. Hormones and perinatal depression and anxiety

Hormones, such as progesterone, oestrogen, and cortisol, tend to increase during pregnancy, due to placental production, and then decrease immediately after the birth, as the placenta is expelled. Research on whether or not these hormonal changes are significantly associated with postnatal depression is mixed (George & Sandler, 1988; Hendrick, Altshuler, & Suri, 1998). In a longitudinal study examining both depressed and non-depressed women, O'Hara, Schlechte, Lewis, and Varner (1991) found no significant differences in changes of progesterone, oestrogen, or cortisol levels from late pregnancy to the early postpartum period between depressed and non-depressed participants in the postpartum period, suggesting these hormone changes are not associated with an increase in depression levels. Multiple studies have shown support for the lack of association between progesterone (Heidrich et al., 1994; Lawrie, Herxheimer, & Dalton, 2002), oestrogen (Harris et al., 1989), cortisol (Harris et al., 1989) and decreases in postnatal depression. In fact, many of the studies that have reported an association between oestrogen, progesterone, cortisol, and postnatal depression have significant methodological limitations, including confounding variables (Gregoire, Kumar, Everitt, & Studd, 1996; Pedersen et al., 1993), very small sample sizes (Sichel, Cohen, Robertson, Ruttenberg, &

Rosenbaum, 1995), or they lack a control group (Dalton, 1985).

One exception was a double-blind study, conducted by Bloch and colleagues (2000), where researchers simulated the production and withdrawal of hormones experienced by women in the perinatal period. The researchers administered doses of oestrogen and progesterone to 16 non-pregnant women: eight women with a history of postnatal depression and eight without a history of postnatal depression, for eight weeks, then withdrew the hormones. Five of the eight women with a history of postpartum depression, compared to zero of the eight women without a history of depression, experienced an increase in low mood. Depressive symptoms peaked in the four-week withdrawal (postpartum simulation) phase.

This study (Bloch et al., 2000) suggests that a certain subset of women, perhaps those with a history of postnatal depression, may be vulnerable to mood changes after experiencing the sharp drop in progesterone and oestrogen experienced after birth, while others are not. There were no differences in mood between the two groups during the eight weeks when the hormones were being added, nor in the eight week follow-up stage, suggesting that the changes in hormones were not associated with antenatal depression and did not last longer than four weeks. Another point to note is that the depressive symptoms were reportedly not as severe in the group with a history of postnatal depression as their previous episodes of postnatal depression, with only three of the women scoring above 10 on the EPDS. This suggests that although this drop in progesterone and oestrogen may play a part in reducing mood directly after the birth, other factors may be necessary to increase vulnerability to more severe depression. Overall, this study provides evidence that hormone changes play a role, for some women, in developing mild depressive symptoms in the postnatal period, but not in the antenatal period, suggesting other factors may also play a role in increasing vulnerability to developing perinatal emotional distress.

Overall, there are mixed results in the literature examining the role that hormonal changes play in predicting perinatal depression. Researchers rarely consider how

psychosocial variables may interact with hormonal changes, influencing vulnerability to developing perinatal emotional distress after birth. There is not enough evidence to support the biological model, alone, as a framework for understanding factors that predict perinatal emotional distress. Future research examining the role of hormones in predicting perinatal emotional distress should control for psychosocial variables, which are more consistently shown to be associated with perinatal depression and anxiety. The psychosocial model of psychopathology, including environmental, social, and personal/psychological factors, will be explored in the next section as a wider frame of reference for understanding the multitude of factors involved in the development and maintenance of perinatal depression and anxiety.

1.4. Psychosocial Model of Psychopathology

There are a number of psychosocial models of mental health. All of them propose a diathesis-stress aetiology, suggesting that individuals possess, to varying degrees, inherent and often stable vulnerabilities, unique to that individual, which, combined with stress, lead to emotional distress (Brown & Harris, 1978). According to the psychosocial model, the greater a person's inherent vulnerability to developing depression, the less environmental stress will be necessary to trigger the disorder. Conversely, the less inherent vulnerabilities the person has, the more stress will be required to trigger an episode. Until that critical amount of stress has been reached to trigger the disorder, the vulnerability is latent.

Within the psychosocial model, the diathesis-stress framework asserts that the presence of certain psychosocial risk factors will interact with the stress of pregnancy and childbirth, increasing the likelihood that an individual will develop perinatal depression and anxiety. Psychosocial factors associated with perinatal depression and anxiety include environmental factors, such as the presence of uncontrollable, stressful life events prior to pregnancy (Rubertsson, Wickberg, Gustavsson, & Rådestad, 2005), social factors, such as

socioeconomic status, social support, and relationship satisfaction (Leigh & Milgrom, 2008), and personal/psychological factors, such as past history of mental health difficulties (Lee et al., 2007), personality traits, and dysfunctional cognitive style (Beck, 2001). A review of the literature on these risk factors will be presented in the following sections.

1.4.1. Environmental factors

Environmental factors include events and situations, which an individual has no control over, that occur in everyday life, such as trauma, death, and stress at home or at work. Many of these environmental factors may increase a woman's vulnerability to developing depression and anxiety under the added pressure of pregnancy and child-birth. The presence of unexpected and uncontrollable stressful life events has been shown to predict depression in the general public (Kendler, Karkowski, & Prescott, 1999) and research suggests that the occurrence of stressful life events leading up to the pregnancy predict both antenatal (Dennis, Ross, & Grigoriadis, 2007; Leigh & Milgrom, 2008; Rubertsson, Waldenstrom, & Wickberg, 2003; Rubertsson et al., 2005) and postnatal depression (Milgrom et al., 2008; O'Hara & Swain, 1996; Rubertsson et al., 2005). In a large scale longitudinal study, Rubertsson and colleagues (2005) found that not only does having two or more stressful life events occurring in the year prior to pregnancy predict both antenatal and postnatal depression, but they also identified a linear relationship between number of stressful life events that occur in the year prior to pregnancy and the severity of depressive symptoms.

Although the presence of stressful life events appear to increase risk of perinatal depression (Milgrom et al., 2008; O'Hara & Swain, 1996; Rubertsson et al., 2005), it should be noted that most of these studies have almost invariably measured stressful life events using self-report, and may be subject to bias, as more vulnerable women may be more likely to report a greater number of stressful life events compared to less vulnerable women.

Whilst there appears to be strong evidence for the association between the presence

of stressful life events and depression, less research has been conducted to examine the association between stressful life events and anxiety in the perinatal period. A meta-analysis exploring cross-sectional correlates of antenatal anxiety revealed there was a moderate association with the presence of stressful life events and antenatal anxiety (Littleton, Breitkopf, & Berenson, 2007). According to the psychosocial model, environmental stressors may interact with social and psychological factors, increasing the risk of developing perinatal depression and anxiety. Next, social factors commonly associated with perinatal depression and anxiety will be explored.

1.4.2. Social factors

Socioeconomic status (Lorant et al., 2003), social support, and quality of interpersonal relationships (Zlotnick, Kohn, Keitner, & Della Grotta, 2000) are significantly associated with mental health difficulties in the general population. These social and economic factors may represent a particular vulnerability to depression and anxiety in the perinatal period, due to the increased financial strain and relationship changes often experienced with the birth of a child (Røsand, Slinning, Eberhard-Gran, Røysamb, & Tambs, 2011). A review of the relationship between social factors and perinatal emotional distress is presented below.

1.4.2.1. Socio-demographic factors

Socio-demographic information, such as age, educational attainment, income, number of children, parity, and marital status are commonly explored as predictors of perinatal emotional distress (Beck, 2001; O'Hara & Swain, 1996). When socioeconomic status, as a whole, was examined in a meta-analysis by Beck (2001), the relationship between socioeconomic status and postnatal depression was small, albeit significant. When socioeconomic factors are examined as predictors for perinatal emotional distress, separately, the results are often mixed (Leigh & Milgrom, 2008; O'Hara & Swain, 1996; Robertson, Grace, Wallington, & Stewart, 2004), indicating that some socioeconomic

factors are stronger predictors of perinatal emotional distress than others. A brief overview of these factors is given below.

The relationship between age and perinatal emotional distress is commonly explored in the perinatal period, often with mixed results. Several researchers have found both older and younger maternal age are associated with perinatal depression and anxiety (Pope, 2000; Rubertsson et al., 2003; Sockol & Battle, 2015). Conversely, Robertson and colleagues (2004) conducted a large-scale synthesis of the literature on risk factors associated with postnatal depression and concluded that age (in samples of women aged 18 years and older) was not a significant risk factor for postnatal depression (Robertson et al., 2004); this is supported by a meta-analysis of predictors of postnatal depression (O'Hara & Swain, 1996), where the authors reported that a mother's age was not a significant predictor of postnatal depression. In summary, maternal age, as a predictor of perinatal emotional distress, is unreliable and its strength as a predictor is weak, at best. Perhaps the effects of maternal age interact with other psychosocial factors, such as income, marital status, and social support to increase one's vulnerability to perinatal depression and anxiety.

Educational attainment (O'Hara & Swain, 1996; Marcus et al., 2003; Rubertsson, WaldenstrÖm, Wickberg, Rådestad, & Hildingsson, 2005; Tammentie, Tarkka, Astedt-Kurki & Paavilainen, 2002), occupational status (Robertson et al., 2004), income (Bernazzani, Saucier, David, & Borgeat, 1997; Bolton, Hughes, Turton, & Sedgwick, 1998; Robertson et al., 2004), and unemployment (Rubertsson et al., 2003; Rubertsson et al., 2005) are the most commonly reported socioeconomic predictors of perinatal depression. However, again, there are contradictions in the literature, with a few researchers reporting that income and level of education were not associated with postnatal depression (Leigh & Milgrom, 2008; O'Hara & Swain, 1996; Pajulo, Savonlahti, Sourander, Helenius, & Piha, 2001). Robertson and colleagues (2004) found that low income and the mother's occupation were weak, but significant, predictors of postnatal

depression, but that lower levels of education and employment status were not significant predictors. Perhaps the overlap between income, education, occupational status, and unemployment, partially explains the mixed results in the literature. Overall, these socioeconomic variables seem to represent some vulnerability to perinatal emotional distress, however small. Factors such as parity, number of children, and marital status, are less frequently examined in the literature and do not appear to significantly increase vulnerability to perinatal emotional distress (O'Hara & Swain, 1996; Robertson et al., 2004).

In summary, socioeconomic factors appear to play a small, but significant role in predicting perinatal depression and anxiety, especially factors related to social ranking, such as income, education, and occupational status. These factors should be considered, in combination with other psychosocial variables, when attempting to identify women at high risk of perinatal emotional distress for intervention. Interpersonal factors, such as social support and relationship satisfaction should be considered in addition to socioeconomic status, as researchers have demonstrated that interpersonal resources may have a buffering effect on stressors associated with low socioeconomic status (Cohen & Wills, 1985). A review of interpersonal factors commonly associated with perinatal depression and anxiety is presented next.

1.4.2.2. Social support and relationship satisfaction

The role of interpersonal dynamics in the development and maintenance of perinatal depression and anxiety is often considered. Lack of social support, from partners and others, along with relationship dissatisfaction, are often associated with both perinatal depression and anxiety (Pajulo et al., 2001; Sockol & Battle, 2015; Sockol, Epperson, & Barber, 2014). Milgrom and colleagues (2008) conducted a large-scale prospective study examining antenatal risk factors for postnatal depression and, in line with results from a synthesis of longitudinal studies (Robertson et al., 2004), they found that lack of social

support during pregnancy, from the partner and others, was amongst the strongest risk factors for postnatal depression. Low levels of both antenatal and postnatal social support, as well as relationship satisfaction (especially in marriages), have been reliably identified as risk factors for perinatal depression in multiple studies (Brugha et al., 1998; Leigh & Milgrom, 2008; Milgrom et al., 2008; O'Hara & Swain, 1996; Robertson et al., 2004).

Although cross-sectional research suggests that social support and relationship satisfaction are associated with perinatal anxiety (Littleton et al., 2007; Sockol & Battle, 2015; Sockol et al., 2014), there is a lack of research examining this relationship prospectively, making causal inferences regarding the role of social support and relationship satisfaction in predicting perinatal anxiety impossible. Overall, the research suggests that social support and interpersonal relationship satisfaction are strongly associated with perinatal emotional distress. These interpersonal resources may be necessary to effectively manage the new demands related to having a child. These interpersonal resources may interact with socioeconomic factors and environmental factors to increase the likelihood of developing perinatal depression and anxiety. Personal and psychological factors often associated with perinatal depression and anxiety, presented next, such as aspects of personality and cognitive style, are often intertwined with difficulties in interpersonal relationships (Beck, 2002). Some of the personal and psychological risk factors associated with perinatal emotional distress are reviewed in the next section.

1.4.3. Personal and psychological factors

Personal and psychological factors, such as neuroticism, self-esteem, mental health difficulties, and cognitive style have all been found to be associated with increased emotional distress in both the general population (Hankin, Lakdawalla, Carter, Abela, & Adams, 2007) as well as the perinatal population (Beck, 2001; Littleton et al., 2007). In the following sections a brief review of the relationship between personality factors, such as

neuroticism and self-esteem, and perinatal emotional distress will be presented, followed by an exploration into the role of mental health difficulties as predictors of future perinatal emotional distress. Finally the cognitive factors that contribute to increased perinatal emotional distress will be explored.

1.4.3.1. Personality factors

Several researchers have explored the role of personality factors in the perinatal period (Boyce, Parker, Barnett, Cooney, & Smith, 1991; Verkerk, Denollet, VanHeck, VanSon, & Pop, 2005). High levels of neuroticism, characterised by emotional liability, tension, and insecurity, are consistently and positively associated with increased perinatal depression and anxiety (Littleton et al., 2007; Verkerk et al., 2005). In a prospective study exploring the association between psychosocial factors and antenatal depression across several stages of pregnancy, high neuroticism scores were independently associated with antenatal depression across the stages of pregnancy, independently from a variety of psychosocial variables, such as stressful life situations, history of depression, and socioeconomic factors (Bunevicius et al., 2009). The researchers (Bunevicius et al., 2009) did not control for baseline symptoms of depression, however, so it is unclear, based on these results, whether neuroticism is a by-product of increased antenatal depression or whether it precedes depression symptoms.

Neuroticism has also commonly been explored as a prospective predictor of postnatal depression (Boyce et al., 1991; Robertson et al., 2004; Verkerk et al., 2005). In a large scale synthesis of the research on antenatal factors that increase risk for postnatal depression predictors, neuroticism was identified as a weak to moderate predictor of postnatal depression (Robertson et al., 2004). High neuroticism, in combination with high introversion, strongly predicted the onset and severity of postnatal depression, after controlling for antenatal depression, past history of depression, familial history of depression, and high neuroticism and low introversion scores. These results suggest that the combination of these two personality factors can optimise the prediction of future

postnatal depression (Verkerk et al., 2005). Overall, there is convincing evidence that the neurotic personality trait plays a role in increasing risk for perinatal depression; however, there is less research exploring neuroticism as a predictor for perinatal anxiety.

The relationship between low self-esteem and perinatal emotional distress has also been well-documented (Beck, 2001; Leigh & Milgrom, 2008). Overall, research suggests that having low self-esteem during pregnancy can increase risk for both antenatal (Lee et al., 2007; Leigh & Milgrom, 2008) and postnatal depression (Beck, 2001). Leigh and Milgrom conducted a prospective evaluation of the predictors of antenatal and postnatal depression and found that self-esteem was the strongest prospective predictor of antenatal depression, after controlling for a variety of socioeconomic and psychosocial variables. However, Leigh and Milgrom (2008) found that after controlling for antenatal depression symptoms, self-esteem did not reach significance as a predictor of postnatal depression. In line with other findings (Milgrom et al., 2008), these results suggest that after controlling for baseline depression symptoms, self-esteem does not significantly predict postnatal depression (Leigh & Milgrom, 2008).

Again, there is less research examining the role of self-esteem as a predictor of perinatal anxiety, compared to depression. In a large-scale meta-analysis (Littleton et al., 2007) exploring the correlates of antenatal anxiety, low self-esteem/self-worth was significantly associated with increased antenatal anxiety. Although this study provides convincing evidence that increased antenatal anxiety is associated with low self-esteem, the cross-sectional design does not allow for conclusions to be made on whether low self-esteem leads to anxiety, or whether low-self-esteem is a by-product of increased anxiety.

In summary, these stable personality factors appear to be associated with increased emotional distress in the perinatal period (Beck, 2001; Littleton et al., 2007). Whether they predict future emotional distress, after taking into account baseline emotional distress is less clear. It is likely that individuals with the neurotic personality trait and low self-esteem have a history of mental health difficulties throughout their lives, which may explain much

of the variance in perinatal emotional distress. An exploration into the role of mental health difficulties, both before pregnancy and during the perinatal period, in increasing vulnerability for future perinatal emotional distress will be considered next.

1.4.3.2. History of mental health difficulties

Having a history of mental health difficulties, leading up to the pregnancy, plays a significant role in predicting future perinatal depression and anxiety (Lee et al., 2007; Leigh & Milgrom, 2008; Matthey et al., 2003; O'Hara & Swain, 1996; Robertson et al., 2004) and research suggests having a history of anxiety may be an even stronger predictor of perinatal emotional distress than a history of depression (Matthey et al., 2003). Matthey and colleagues (2003) interviewed 408 women expecting their first child, during pregnancy and six weeks postpartum, to determine the presence of depression and anxiety, using DSM-IV criteria. They found that of the women who reported a history of anxiety disorders in their lifetime (up until pregnancy), 65.6% developed either severe postpartum depression or anxiety. This is much higher than women who reported having a history of depression (up until pregnancy), of which only 29.4% developed severe postpartum depression or anxiety. These results suggest that women with a history of psychopathology are at an increased risk for developing perinatal depression and anxiety.

Experiencing depression and anxiety during the current pregnancy, particularly antenatal anxiety, also plays a role in predicting perinatal emotional distress (Beck, 2001; Heron et al., 2004; Leigh & Milgrom, 2008). Leigh and Milgrom (2008) conducted a longitudinal study examining previously identified risk factors of perinatal depression, to determine which of these factors was most predictive of antenatal and postnatal depression. Antenatal anxiety was identified as one of the strongest predictors of antenatal depression and antenatal depression was identified as one of the strongest predictors of postnatal depression (Leigh & Milgrom, 2008). Antenatal anxiety has also been shown to predict postnatal depression, while controlling for antenatal depression in two longitudinal studies

(Grant, McMahon, & Austin, 2008; Heron et al., 2004). It has also been shown to predict postnatal anxiety, after controlling for socio-demographic factors and antenatal depression (Grant et al. 2008). These results highlight the relevance of poor mental health during pregnancy, which often gets less consideration than postnatal mental health difficulties and suggest that experiencing antenatal anxiety may increase vulnerability to perinatal depression and anxiety more than antenatal depression. More research should be conducted to confirm these findings. Overall, the research suggests that women with mental health difficulties before and during pregnancy, should be considered vulnerable to developing perinatal depression and anxiety.

1.4.3.3. Dysfunctional cognitive style

Dysfunctional cognitive style is often observed in individuals with a history of depression (Alloy et al., 2000; Otto et al., 2007) and its role in increasing vulnerability to perinatal depression and anxiety should be explored, in addition to one's past history of mental health difficulties. A more comprehensive review of the cognitive style literature is necessary when exploring the relationship between cognitive style and perinatal depression and anxiety, due to the multiple theories and conceptualizations associated with the term dysfunctional cognitive style. Because this section requires a more detailed review of the literature and due to its relevance to the current project, the role of cognitive style as a predictor of perinatal depression and anxiety will be explored in a separate chapter. In the following chapter, two of the most commonly explored cognitive theories of depression will be outlined, with an emphasis on Beck's Cognitive Theory of Depression (Beck, 1964; 1967). The two theories will be presented along with a review of the instruments commonly used to measure each conceptualisation of cognitive style and their respective roles in predicting perinatal depression and anxiety. This chapter will highlight the multiple conceptualizations of the term cognitive style, the short-comings of current measures of dysfunctional cognitive style, and the need for more research on the role of maternal-

specific cognitive style versus general cognitive style.

Chapter Two: Cognitive Style

2.1. Cognitive Theories of Depression

The relationship between cognitive style and depression has been explored as far back as the 1960's and 70's (Abramson, Seligman, & Teasdale, 1978; Beck, 1967). The cognitive approach to emotional distress adopts the perspective that systematic negative biases, regarding thoughts and beliefs, are associated with emotional distress. Early on, two separate theories were developed explaining the relationship between cognitive style and depression, leading to two different conceptualizations of dysfunctional cognitive style and two different ways of measuring dysfunctional cognitive style. The majority of research on dysfunctional cognitive style and depression is based on two theories: 1) The Reformulated Learned Helplessness Model (Abramson et al., 1978) and 2) Beck's (1967) Cognitive Model of Depression. Both theories are presented below, along with evidence of their relevance in the perinatal population.

2.1.1. The Reformulated Learned Helplessness Model

The Reformulated Learned Helplessness Model (Abramson et al., 1978) states that when faced with an uncontrollable, aversive event, the deciding factor as to whether one becomes depressed or not is the causal attributions that one makes for the event. If the event is perceived as having been caused by something related to the person (internal attribution) then that person will be more likely to experience depressive symptoms, compared to if they believe the cause of the event was related to a situation (external attribution). If that aversive event is attributed to non-transient factors (stable attributions), compared to transient factors (unstable attributions), then the depressive symptoms are longer lasting. Lastly, if the aversive event is perceived as having been caused by a variety of different situations (global attributions), the depressive symptoms will be more pervasive than if the event was perceived as caused by a specific situation (specific

attribution).

2.1.1.1. Measuring attributional style

The Attributional Style Questionnaire (ASQ; Peterson et.al, 1982) is commonly used to measure dysfunctional cognitive style by measuring the extent to which people attribute positive and negative events to either internal or external circumstances, stable or unstable circumstances, and global or specific factors. The questionnaire is complex and time consuming, requiring participants to vividly imagine themselves in a variety of complex situations and express how they would hypothetically feel about the cause of the events. Evidence generally supports the relationship between depression in the general population and attributional style, as the ASQ is consistently moderately correlated with depressive symptoms (Seligman, Abramson, Semmel, Von Baeyer, 1979; Sweeney, Anderson, & Bailey, 1986), but the ASQ does not appear to prospectively predict depression in the general population (Hamilton & Abramson, 1983).

2.1.1.2. Attributional style in the perinatal population

A large number of studies have explored the relationship between attributional style and perinatal depression and anxiety, yet the results are equivocal (Cutrona, 1983). Some researchers report attributional style is a prospective predictor of perinatal depression (O'Hara, Rehm, & Campbell, 1982) and others have found no significant predictive relationship between attributional style and perinatal depression (Manly, McMahon, Bradley, & Davidson (1982). Leigh and Milgrom (2008) found that attributional style, as measured by the ASQ, significantly predicted antenatal depression, using a cross-sectional sample, but did not significantly predict postnatal depression after taking into account the contribution of antenatal depression. In a meta-analysis examining antenatal risk factors of postnatal depression, the researchers found that attributional style was weakly, albeit significantly, predictive of postnatal depression (O'Hara & Swain, 1996). There is no

research, to date, suggesting a predictive relationship between attributional style and perinatal anxiety. Overall, attributional style appears to be concurrently associated with perinatal depression, but the role of attributional style in predicting future perinatal depression appears to be weak.

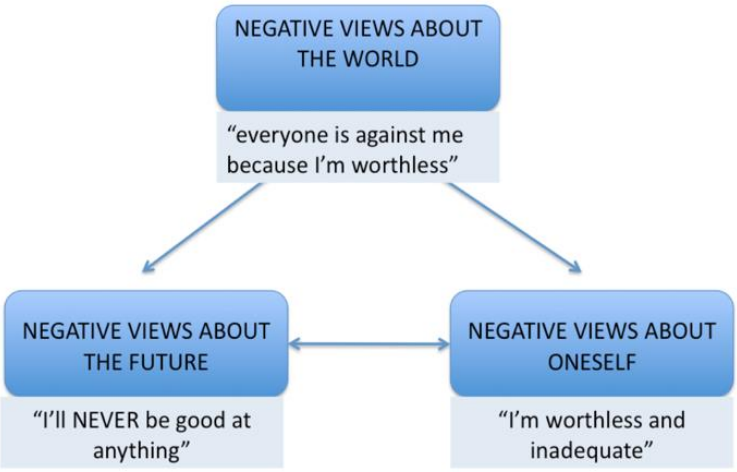
2.1.2. Beck's Cognitive Model of Depression

According to Beck's Cognitive Model of depression (Beck, 1967) many emotional problems arise from a person's views about him/herself, his/her irrational beliefs, and faulty assumptions about reality. Beck (1963, 1964) found that depressed patients were more likely to distort their experience and misinterpret neutral events as being related to personal failure, deprivation, or rejection, compared to non-depressed patients. Depressed patients also had a bias towards the exaggeration of events perceived as containing negative information about themselves. Based on these initial findings (Beck 1963, 1964), Beck developed Cognitive Therapy (Beck, 1964), a clinical approach targeted at changing negative beliefs and maladaptive information processing. His cognitive theory has been developed over time (Beck, 1967, 1976, 2002; 2008) and now includes other emotional disorders, including anxiety (Beck, 1976). Beck proposed that three hierarchical integrated processes form the Cognitive Model of Depression (Beck, 1967), including the "cognitive triad", faulty information processing, and dysfunctional attitudes

2.1.2.1. Cognitive triad

The cognitive triad (see Figure 1; Beck, Brown, Steer, Eidelson, & Riskind, 1987) includes general, surface level, easily accessible negativity, typical of individuals with depression. This triad includes negative interpretations about the self, the world, and the future (see Figure 1). Beck (1963, 1964) found that these variables accounted for the development of depressive symptoms, including hopelessness, loss of motivation, and self-criticism.

Figure 1: Beck's Cognitive Triad (Beck et al., 1987)



2.1.2.2. Intermediate beliefs

At the next level of processing, Beck found a systematic cognitive bias present in depressed patients (Beck, 1963, 1964). Depressed individuals tended to underestimate their personal attributes and performance and exaggerate the insolubility of their problems (Gotlib & Asarnow, 1979; Mathews & Macleod, 2005), based on mostly faulty, unarticulated attitudes, rules, or assumptions. These individuals were also likely to make illogical negative and self-defeating interpretations of reality that lead to hopelessness and low mood (Beck, Brown, & Steer, 1989; Weissman & Beck, 1978); specifically, paying selective attention to the negative aspects of a situation or event, while ignoring or disregarding any positive aspect of the experience. Systematic biases that tend to lead to emotional distress include, among others, selective abstraction, dichotomous thinking, self-attribution, and over-generalization (Beck, 2008).

2.1.2.3. Cognitive Schemas

Finally, Beck (1967) proposed that certain stable cognitive schemas, which lie at the deepest level of processing and are created in an early developmental period, become embedded into dysfunctional core beliefs (e.g. "I am unlovable"). Core beliefs develop

from experiences and interactions with significant others, such as parents, peers, teachers, and/or family members, and help individuals interpret their experiences and their environment. Core beliefs help process and organise incoming stimuli (Beck, 1996) and become dysfunctional when they distort reality and are inflexible, overgeneralised, and global.

These three hierarchical cognitive processes are integrated. Once dysfunctional core beliefs are established, dysfunctional attitudes develop, which are often dichotomous and have conditional aspects (if…then statements). Attitudes tend to influence our thinking, behaviour, and emotions and dysfunctional attitudes, which often precipitate depression, represent a latent vulnerability that can become activated in times of stress (Beck, 2002). Highly charged dysfunctional attitudes can affect one's perception during depressive episodes, dominating the thought process, and leading to cognitive distortions and faulty information processing (Beck, 1964). Ultimately, these core beliefs and resulting dysfunctional attitudes lead to the presence of automatic negative biases.

Beck (2002) suggests that if, on the most superficial level of processing, one holds pervasive negative biases towards the self, outside world, and the future (e.g. "These people do not like me"), there will be a corresponding modification in affect and behaviour, congruent with the faulty appraisals of the situation and not with the situation itself. Beck, Rush, Shaw, and Emery (1979) suggest that the modification of behaviour in this cycle, resulting from the negative biases, can lead to negative responses from friends, family, and significant others, also contributing to the escalation and maintenance of depression.

Research suggests that these dysfunctional attitudes and unrealistic cognitive appraisals are amenable to change (Zuroff, Blatt, Sanislow, Bondi, & Pilkonis, 1999) and that the modification of these thoughts and appraisals, through cognitive-behavioural therapy, for example, can interrupt the maintenance and reduce symptoms of depression (Butler, Chapman, Forman, & Beck, 2006).

2.1.2.4. Measuring dysfunctional attitudes

In order to assess dysfunctional attitudes, Weissman and Beck (1978) developed a measure, known as the Dysfunctional Attitudes Scale (DAS), based on Beck's Cognitive Model of Depression (1967). The DAS (Weissman & Beck, 1978) consists of two parallel 40-item scales (DAS-A and DAS-B), designed to measure general dysfunctional beliefs and assumptions underlying the cognitive content typically seen in depression. The purpose of the DAS was to identify relatively stable, and often latent, dysfunctional beliefs that may interact with a corresponding stressor to produce depressive symptoms.

Weissman and Beck (1978) found the scale had good internal and test-retest reliability in a non-clinical sample and that it was significantly associated with several measures of depression. Beck and colleagues (1991) conducted an exploratory and confirmatory factor analysis of the DAS in a clinical sample. The majority of the dysfunctional beliefs loaded on nine factors: vulnerability, approval, perfectionism, need to please others, imperatives, need to impress others, avoidance of weakness, control over emotions, and disapproval. In line with other studies (Oliver & Baumgart, 1985), Beck and colleagues (1991) concluded that the two forms of the DAS, used together, are best conceptualised to measure depressogenic cognitive content and are a valid and reliable measure of depressogenic dysfunctional attitudes both in the general population (Oliver & Baumgart, 1985), as well as in the clinical population (Beck, Brown, Steer, & Weissman, 1991).

Due to the length of the original scale and the demand it puts on participants, the 40-item DAS-A scale (rather than DAS-B) has become more widely used to measure dysfunctional cognitive style. A significant amount of research has shown that the scores obtained on the DAS-A are associated with depressive symptoms (Reilly-Harrington, Alloy, Fresco, & Whitehouse, 1999; Dent & Teasdale, 1988) and research suggests that dysfunctional attitudes are a stable trait that can predict future depression (Otto et al., 2007; Rude, Durham-Fowler, Baum, Rooney, & Maestas, 2010; Zuroff et al., 1999). In a

community sample of 730 women, Otto and colleagues (2007) found that the DAS-A predicted an episode of major depression three years later, after controlling for baseline depressive symptoms. The researchers found scores on the DAS-A remained stable during regular six month check-ups over the three year interval, regardless of severity of depression, and concluded that dysfunctional attitudes represent an enduring trait and an inherent vulnerability to developing depression (Otto et al., 2007). One limitation of this study is that when history of depression was controlled for, along with current depressive symptoms, the DAS-A was no longer predictive of future depression, suggesting that past history of depression was confounded with future depressive episodes and dysfunctional attitudes, challenging the assertion that high scores on the DAS-A increase vulnerability to developing future depression. Because the researchers found no difference in DAS-A scores between individuals with and without a history of depression, the researchers suggested that a third variable may mediate the relationship between DAS-A scores and past depression. They hypothesise that an Axis II disorder may be present in those with a past history of depression, increasing its strength as a predictor of depression and partially explaining the strong link between past history of depression and increased DAS-A scores.

The increased use of the DAS-A resulted in further psychometric development of the DAS-A. A large number of exploratory factor analyses conducted on the DAS-A have led to the development of several versions of the DAS-A, some with two-factor (Cane, Olinger, Gotlib, & Kuiper, 1986; Raes et al., 2005), three-factor (Power et al., 1994), and four-factor solutions (Chioqueta & Stiles, 2006). de Graaf, Roelofs, & Huibers (2009) investigated the factor structure of the DAS-A, by testing previously proposed factor models (Cane et al., 1986; Chioqueta & Stiles, 2006; Oliver & Baumgart, 1985) of the DAS-A in a large community sample (n = 8,930) and retained a 17-item two factor model of the DAS-A, consisting of “dependency” and “perfectionism/performance evaluation”, known as the Dysfunctional Attitudes Scale (form A) revised (DAS-A-17; de Graaf et al., 2009). The DAS-A-17 has been shown to be significantly associated with depressive

symptoms in both the general and perinatal population (de Graaf et al., 2009; de Graaf, Huibers, Cuijpers, & Arntz, 2010), but has yet to be explored prospectively. A review of the literature exploring the relationship between general dysfunctional attitudes and perinatal emotional distress will be presented next.

2.1.2.5. General dysfunctional attitudes in the perinatal period

The DAS-A, and various versions of it, have widely been used to examine the role of general dysfunctional attitudes in the perinatal period. Several studies have found a moderate association between general dysfunctional attitudes (GDA) and perinatal depression and anxiety (Jones et al., 2010; Sockol et al., 2014; Sockol & Battle, 2015). Sockol and Battle (2015) found that GDA contributed significant variance to perinatal depression and anxiety scores after controlling for socioeconomic factors, social support, and relationship satisfaction in multiparous perinatal women, however the cross-sectional design limits the conclusions one can make regarding directionality. Overall, it is generally accepted that GDA are positively associated with increased perinatal emotional distress (Jones et al., 2010; Sockol et al., 2014; Sockol & Battle, 2015). It is contestable, however, whether GDA predict future depression and anxiety in the perinatal period, and, hence, whether these dysfunctional attitudes represent a latent vulnerability to developing perinatal depression under the stress of pregnancy and childbirth.

Two prospective studies examining the role of general dysfunctional attitudes, measured by the DAS-A, as a predictor of postnatal depression found no significant predictive relationship between general dysfunctional attitudes and postnatal depression (Gotlib, Wallace, & Mount, 1991; O'Hara et al., 1982). Using a sample of 730 women, Gotlib and colleagues (1991) found that antenatal DAS-A scores failed to contribute to the prediction of postnatal depression one month after the birth, after controlling for the effects of socio-demographic status, antenatal depression, and interpersonal factors. They also found that scores on the DAS-A did not differentiate between depressed and non-depressed

women in the postpartum period, suggesting the DAS-A does not distinguish between depressed and non-depressed women in the postnatal period and is either not a very strong predictor of perinatal depression or it does not adequately represent dysfunctional attitudes typical of perinatal depression (Gotlib et al., 1991). The research suggests that dysfunctional attitudes, as measured by the DAS-A and associated scales, do not significantly increase vulnerability to developing future depression/anxiety in the perinatal period, after taking into account other psychosocial variables. Thus, its relevance is diminished compared to other psychosocial factors such as social support and past history of depression.

2.1.2.6. Specific vs. general dysfunctional attitudes

Research has shown that specific types of dysfunctional cognitions may interact with specific types of stressors leading to emotional disturbances (Hilsman & Garber, 1995), which is in line with Beck's development of a cognitive diathesis-stress theory (Beck, 2002), where he asserts that specific dysfunctional attitudes will interact with specific stressors, leading to emotional distress. For example, Hilsman and Garber (1995) conducted a study examining the effects of holding dysfunctional cognitions specific to academic competence, in response to a stressful academic event, on depressive symptoms in grade school children. They found that students with dysfunctional attitudes, specific to their academic competence, showed increased symptoms of depression after receiving unacceptable grades (stressful event), compared to students who also received unacceptable grades (stressful event), but held less dysfunctional attitudes about their academic competence. It is therefore reasonable to expect that women with dysfunctional attitudes specific to motherhood may have a specific vulnerability to perinatal depression, when experiencing stress related to pregnancy and childbirth. In the following section, a review of the literature examining the relationship between dysfunctional maternal cognitions and perinatal depression and anxiety will be explored.

2.2. Cognitive Style Specific to Motherhood

Cognitions related to motherhood were identified as early as 1970, when Rubin (1970) published a paper based on the idea that women perceive events differently during pregnancy than at other times in life, and that during pregnancy, they perceive, interpret, and judge events and situations relative to being pregnant. Initially, Rubin (1970) identified cognitive themes specific to pregnancy, such as beliefs about the maternal role, body image, and expectations of the baby's behaviour. Several of Rubin's (1970) cognitive themes were examined further and were found to be associated with adaptation to motherhood (Affonso & Sheptak, 1989; Kumar, Robson, & Smith, 1984). It wasn't until 1994, when Affonso, Mayberry, Lovett, and Paul were examining if these "adaptive" cognitive themes were positively associated with psychological coping during this stressful period of time, and unexpectedly found a positive linear association between the frequency with which a woman engages with these cognitive themes and psychological distress. This appears to be the first time researchers identified cognitive themes, specific to motherhood, that were associated with emotional distress. In the late 1990's the research on maternal cognitions grew rapidly. A number of questionnaires measuring dysfunctional cognitions specific to motherhood have since been developed, identifying a wide range of cognitive themes, specific to motherhood, that have been found to be associated with perinatal depression and anxiety. A review of these measures is presented in the next section.

2.2.1. Measures of dysfunctional maternal cognitions

Warner, Appleby, Whitton, and Faragher (1997) developed a 14-item measure of dysfunctional cognitions specific to the postnatal period called the Maternal Attitudes Questionnaire (MAQ). They identified three cognitive themes that they believed would be associated with postnatal depression, based on Kumar and colleagues' (1984) research on maternal adjustment and the researchers' clinical experience. Themes included: 1) expectations of motherhood, 2) expectations of the self, as a mother, and 3) role conflicts.

Questions included items such as “I am disappointed by motherhood,” “Having a baby has made me as happy as I expected,” and “I resent the way my life has been restricted since having my baby.” Good temporal reliability and internal validity were initially reported for this scale. This was the first measure of maternal cognitions shown to be associated with perinatal depression, demonstrating concurrent validity.

There were also significant limitations to this study. The researchers did not test the construct validity of the MAQ, leaving the MAQ’s theoretical connection to other cognitive style measures unclear. Another limitation was that the three identified cognitive themes of the MAQ were not examined separately, so the extent to which each factor was associated with depression is unknown. Finally, the MAQ was designed for use strictly in the postnatal period; recent research has shown that the internal reliability of the MAQ was quite low, especially amongst pregnant participants (Sockol et al., 2014), suggesting this scale may not be a reliable measure in the antenatal period. Despite these limitations, further evidence has emerged demonstrating the association between MAQ and postnatal depression is equivocal, with some researchers reporting a significant association (Church, Brechman-Toussaint, & Hine, 2005; Thompson & Bendell, 2014) and others reporting a non-significant association with postnatal depression (Madar, 2013). There has been no further research conducted exploring the psychometric properties of the MAQ.

In 2003, Moorhead, Owens, and Scott developed a questionnaire called the Pregnancy Related Beliefs Questionnaire (PRBQ), for use in both the antenatal and postnatal period that identified underlying beliefs associated with postnatal depression, based on Beck’s Cognitive Theory of Depression (1963). The researchers conducted a literature review of all the qualitative and quantitative literature on postnatal depression, as well as all postnatal depression questionnaires. Based on the existing literature on postnatal depression, interviews with women who had recently experienced postnatal depression, and experts in the field’s professional experience, 54 items that represent underlying beliefs associated with postnatal depression were identified. The PRBQ includes thoughts

about the maternal role, perceptions of changing body image, expectations about the behaviours of new-borns, and relationship insecurity. In a pilot study, the PRBQ was shown to have strong internal reliability. Construct validity was demonstrated, as PRBQ scores were correlated with scores on the DAS-A and Beck's Depression Inventory. This questionnaire appears to be the first measure of dysfunctional maternal beliefs associated with perinatal depression that was developed for use in both the antenatal and postnatal period. Limitations of this study include its small sample size and lack of psychometric development, due to its preliminary nature. The researchers called for more research to test the psychometric properties of this 54-item scale, using a larger sample size, in order to examine the underlying factor structure. No further research has been conducted on this scale, to date.

No further measures of dysfunctional cognitive style specific to motherhood were developed for ten years after the PRBQ, with the majority of researchers opting to use the MAQ when examining the relationship between perinatal depression and maternal cognitions, with mixed results. In 2013, Madar, highlighting the MAQ's lack of association with any of the cognitive theories of depression, developed and piloted a measure of underlying beliefs specific to postpartum depression, based on the Rational Emotive Behaviour Theory of Psychopathology (REBT; Ellis & Dryden, 1997), which suggests that a depressed person is more likely to hold irrational beliefs about themselves, other people, and/or the world in general. REBT core constructs, such as having more irrational beliefs, a higher need for achievement and approval, as well as demanding fairness and needing more comfort have been shown to be associated with postnatal depression (Milgrom & Beatrice, 2003).

The 55-item Maternal Attitudes and Beliefs Scale (MABS; Madar, 2013) was developed based on a literature review on cognitive risk factors associated with postnatal depression, items from both the MAQ (Warner et al., 1997) and the PRBQ (Moorhead et al., 2003), and interviews with six mothers with postpartum depression. The researchers

attempted to integrate the central constructs of the REBT: irrationality, rationality, demandingness, self-downing, frustration tolerance, and awfulizing, with previously identified maternal beliefs. The MABS was initially developed for use in the postpartum period and later the items were rephrased for use in the antenatal period. A pilot study demonstrated good internal reliability and good construct validity for both the antenatal and postnatal versions, correlating strongly with various cognitive style measures: DAS-A, ABS-2, and MAQ, as well as depression measures: EPDS and BDI-II.

Overall, there is preliminary evidence suggesting the MABS is a valid and reliable measure of dysfunctional maternal cognitions, but results should be treated with caution, as there were a number of limitations in this study. The first being the small sample size, with 36 participants in the antenatal period and 32 participants in the postnatal period and very few participants displaying depressive symptoms. Second, the MAQ, EPDS, BDI-II, and ABS-2, were strongly correlated with correlation coefficients ranging between .85 and .95, suggesting overlap between concepts; specifically, a lack of distinction between depression, general dysfunctional attitudes, and maternal-specific dysfunctional attitudes. Madar (2013) called for further research on this scale with a larger sample size for psychometric development. No further research on this scale has been conducted, to date.

2.2.1.1. Shortcomings of current measures of cognitive style

During the development of this project, inconsistencies and short-comings of the cognitive style measures, as they relate to perinatal depression and anxiety stood out; namely, the wide variety of measures, lack of conceptualization of the term "cognitive style", and the often inconsistent results regarding the relationship between cognitive style as a predictor of perinatal depression. A reliable and valid measure of cognitive attitudes, based on Beck's Cognitive Theory of Depression that is specific to motherhood had yet to be developed. The most approximate measure was Moorhead and colleagues' (2003) PRBQ.

Subsequent to the development and initiation of the current research project, many of the shortcomings of the 'old' measures of maternal attitudes were addressed with the development of two measures of dysfunctional maternal cognitions, which adopted more stringent definitions of maternal cognition, larger sample sizes, and more thorough psychometric development: The Attitudes towards Motherhood Scale (AToM; Sockol et al., 2014; Sockol & Battle, 2015) and the Rigidity of Maternal Beliefs Scale (RMBS; Thomason, Flynn, Himle, & Volling, 2015). Because of their more thorough psychometric development and stronger methodological designs, these two measures will be explored in more detail than the previous measures of maternal-specific dysfunctional cognitions.

2.2.1.2. Attitudes towards Motherhood Scale

Based on Beck's Cognitive Model of Depression (1963), Sockol and colleagues (2014) identified 62 items representing maternal dysfunctional attitudes by modifying items from the DAS-A to represent thoughts specific to motherhood, conducting a literature review on postnatal depression, and interviewing pregnant women and mothers with children under two. The researchers then recruited a cross-sectional sample of 104 first time mothers who were either pregnant or had given birth in the last six months, online, to complete the 62-items and conducted an exploratory factor analysis on the 31 items with the greatest score variance. Results revealed a three-factor, 12-item (four items per factor) structure, which the researchers' named the Attitudes toward Motherhood scale (AToM). Factor one represents beliefs about others' judgements, for example, "If my baby is crying, people will think less of me." Factor two represents beliefs about maternal responsibility, for example, "I should feel more devoted to my baby." Factor three includes statements about maternal role idealization, for example, "It is wrong to feel disappointed by motherhood."

Scores on the AToM were significantly associated with DAS-A and MAQ scores, demonstrating construct validity; however, individual examination of the three factors showed that only factors one (beliefs related to others' judgements) and three (beliefs

related to maternal role idealization) were significantly associated with DAS-A and MAQ scores. Factor two, representing beliefs about maternal responsibility, was not significantly associated with factor one of the AToM, nor the DAS-A, or MAQ. The authors do not offer any suggestions about why factor two does not correlate with the other variables of interest.

In a second study, using a separate cross-sectional sample of 211 first-time mothers, who were either pregnant or had given birth in the last six months, the AToM was significantly associated with the DAS-A-17 (de Graaf et al., 2009), the EPDS (Cox et al., 1987), and the STAI (Spielberger et al., 1987). In this study, all three factors were significantly associated with the DAS-A-17, the EPDS, and the STAI, demonstrating construct and convergent validity. In both studies, factor one, representing beliefs related to other's judgements, was most strongly associated with all variables of interest. The AToM also demonstrated good predictive validity, as it was found to be significantly associated with perinatal anxiety and depression symptoms, after taking into account demographic information, general dysfunctional attitudes, and interpersonal risk factors during the perinatal period. The researchers found that general dysfunctional attitudes assessed during the perinatal period, as measured by the DAS-A-17, were the strongest predictor of perinatal depression followed by social support, marital satisfaction, and finally the AToM, also assessed during the perinatal period

In 2015, Sockol and Battle set out to validate the AToM in a cross-sectional sample of multiparous women, as the initial questionnaire was validated for use with first-time mothers only. The researchers recruited 381 women, online, who were either pregnant or had given birth within the last six months, with at least one older child to complete the EPDS (Cox et al., 1987), DAS-A-17 (de Graaf et al., 2009), MSPSS (Zimet et al., 1988), DYAD (Spanier, 1976), BAI (Beck et al., 1988), and the AToM. The results showed that the AToM scores, of multiparous women, were significantly associated with all of their outcomes of interest. Results of a hierarchical regression analysis showed that the AToM

scores of multiparous women predicted perinatal depression after controlling for demographic information and general dysfunctional attitudes, but it no longer significantly predicted perinatal depressive symptoms, once interpersonal risk factors (social support and relationship satisfaction) were taken into account. Again, general dysfunctional cognitive attitudes were shown to be the strongest predictor of depressive symptoms, followed by the average age of their children, the age of the woman, and finally dysfunctional attitudes specific to motherhood. Another hierarchical regression analysis, with anxiety as the dependent variable, revealed the AToM predicted perinatal anxiety after controlling for demographic variables, but that it did not significantly predict perinatal anxiety when general dysfunctional attitudes were taken into account, and even less so when interpersonal risk factors were taken into account.

On the basis of these initial cross-sectional studies, the AToM scale appears to be a valid and reliable measure of dysfunctional attitudes specific to motherhood in both primiparous and multiparous women who are pregnant and have given birth within the last six months. This is the first measure of dysfunctional maternal cognitions that has been shown to be significantly associated with depressive symptoms, independently of GDA and the first time that dysfunctional maternal cognitions have been shown to be associated with perinatal anxiety.

One major limitation of this study was its cross-sectional nature. It was impossible to tell from Sockol's studies (2014, 2015) whether items from the AToM represent an inherent vulnerability that increase one's chances of developing future perinatal depression, or whether these attitudes develop as a consequence of perinatal depression. Future research should attempt to replicate these results and to determine the prospective predictive validity of the AToM on perinatal depression and anxiety.

2.2.1.3. Rigid maternal beliefs

Around the same time the AToM scale was being developed, Thomason and colleagues (2015) developed and validated an instrument that measures cognitive factors, specific to motherhood, called the rigidity of maternal beliefs scale (RMBS). The authors wanted to measure the rigidity of maternal beliefs in regards to three areas, which research suggests are associated with low mood: 1) anticipated maternal self-efficacy, based on the self-efficacy theory (Bandura, 1977), which is a woman's belief in her ability to be a successful and competent parent; 2) perceptions of child vulnerability, based on research that shows that maternal perceptions of child vulnerability are linked with postnatal depressive symptoms (Kerruish, Settle, Campbell-Stokes, & Taylor, 2005); and 3) perceptions of societal expectations of what a "good" mother should do, based on research that shows that unrealistic and rigid societal expectations about what makes a "good" and a "bad" mother affects women's mental health (Knudson-Martin & Silverstein, 2009). The researchers (Thomason et al., 2015) hypothesised that strongly endorsed dysfunctional beliefs about motherhood, for example, strongly agreeing with the statement "I should do everything for my baby myself," would be associated with increased depressive symptoms, compared to women who do not strongly agree with these dysfunctional beliefs about motherhood.

Thomason and colleagues (2015) identified 40 dysfunctional beliefs about motherhood, representing the three areas of interest, based on consultations with researchers and clinicians who specialise in women's mental health, a literature review, and interviews with depressed women about their experiences in the perinatal period. An exploratory factor analysis on these 40 items revealed a 24 item, four-factor measure, called the Rigidity of Maternal Beliefs Scale (RMBS). Factor one represents perceptions of societal expectations on what "good" mothers should do ("I should do everything for my baby myself"), factor two represents themes associated with role identity ("I would feel guilty if I did not enjoy being a mother"), factor three measures maternal confidence/efficacy ("I feel confident I can manage the responsibilities of motherhood"),

and factor four assesses maternal dichotomy, which focuses on the duality of being a good or a bad parent, based on the mother's parenting skills and the baby's resulting behaviour ("If I can't calm my baby when s/he cries, then I am not a good parent").

One hundred and thirteen women completed the RMBS at two time points: their second or third trimester of pregnancy and six to eight weeks postpartum. The RMBS demonstrated good internal consistency and antenatal RMBS scores prospectively predicted postnatal depression, while controlling for antenatal depression, demonstrating predictive validity. A hierarchical regression analysis, examining the unique contribution of each of the subscales of the RMBS revealed that only one of the four factors: the maternal dichotomy factor, prospectively predicted postnatal depressive symptoms, after controlling for antenatal depression. These results suggest that holding rigid beliefs about what makes a "good" or a "bad" mother during pregnancy predicts postnatal depression. The four questions in the maternal dichotomy factor of the RMBS represent the extent to which mothers categorize themselves as "good" or "bad," based on their child's behaviours and their ability to parent effectively.

These results showed that the RMBS was a reliable and valid measure of dysfunctional maternal cognitions. One major limitation of this study, was that the researchers did not differentiate between attitudes, expectations, and experiences, perhaps explaining the unexpected lack of significance as prospective predictors of postnatal depression of three out of the four factors. All four statements in the maternal dichotomy factor represent attitudes, each possessing an evaluative and affective aspect, similar to those described in Beck's Theory of Depression. Despite this limitation, its thorough psychometric development and longitudinal design stands out amongst previous measures of dysfunctional cognitive style specific to motherhood. The results emphasize the need for more research and attention on dichotomous attitudes and beliefs about what it means to be a good and a bad parent and how those attitudes may affect a woman's well-being in the postpartum period.

In summary, the majority of the developed measures of dysfunctional maternal cognitive style have multiple short-comings, including a lack of theoretical basis, conceptualization, and poor psychometric development. Out of the five maternal attitudes questionnaires, whose scores have been associated with depression, only two have had any significant psychometric development, such as exploratory or confirmatory factor analyses: the AToM (Sockol et al., 2014), and the RMBS (Thomason et al., 2015). The authors of both the PRBQ (Moorhead et al., 2003) and the MABS (Madar, 2013) have called for further psychometric development of their scales using larger sample sizes to examine the factor structure and refine the two scales. To date, no further research on these two scales have been carried out. The AToM scales stands out as a strong measure of dysfunctional maternal attitudes, based on its theoretical association with Beck's cognitive theory and its emphasis on maternal dysfunctional attitudes, compared to measures of maternal expectations and experiences, often seen in the maternal cognitive style literature. This is in line with the DAS-A-17 (de Graaf et al., 2010), which is a promising new measure of dysfunctional attitudes associated with depression in the general population.

2.3. Summary of Cognitive Style Literature Review

Overall, there appears to be an association between dysfunctional cognitive style and perinatal depression, but it is still contestable whether dysfunctional cognitive style represents a latent vulnerability for developing perinatal depression or whether dysfunctional cognitions co-occur with perinatal depression symptoms. This could be due to the past emphasis on general dysfunctional cognitions as a predictor of perinatal emotional distress, instead of focusing on dysfunctional cognitions specific to motherhood in the perinatal population. Longitudinal research, examining the independent role of both general and maternal-specific dysfunctional attitudes as prospective predictors of future depression and anxiety should be used to explore these concepts and further explore Beck's Cognitive theory of Depression in the perinatal period.

Apart from dysfunctional cognitive style, the reviewed psychosocial predictors of perinatal depression and anxiety are essentially unmodifiable or hard to modify, such as the presence of stressful life events, low socioeconomic status, lack of social support, and a history of mental health difficulties. The Cognitive Theories of Depression have focused on identifying dysfunctional cognitive content that maintains and exacerbates depressive symptoms. This is important because maladaptive cognitive content can be targeted for change, through cognitive therapies, for example, in women at high risk of developing perinatal depression or anxiety. Identifying latent dysfunctional attitudes that increase vulnerability to perinatal depression can help identify women at risk and lead to the implementation of therapies and interventions targeted at changing dysfunctional attitudes before or during pregnancy, perhaps preventing some of the harmful effects associated with perinatal depression and anxiety.

More recently researchers have started to move from exploring the cognitive content associated with emotional distress and have started to examine metacognitive process, such as the appraisal and regulation of cognition, which are also amenable to change (Normann, Emmerik, & Morina, 2014) and may contribute to depression and anxiety (Wells & Matthews, 1996; Wells & Cartwright-Hatton, 2004). Although research suggests that metacognitions are associated with emotional distress in the general and clinical population (Papageorgiou & Wells, 2003; Wells & Cartwright-Hatton, 2004), they have only just begun to be explored in the perinatal population. An overview of the metacognitive approach to understanding emotional distress and an argument for the need for more research on metacognitive factors in the perinatal population will be presented in the next chapter.

Chapter Three: Metacognitions and Emotional Distress

Over the last two decades, there has been a growing body of research exploring the role of metacognitions in increasing depression and anxiety in both the general and clinical population, based on the Self-Regulatory Executive Functioning (S-REF) Model of emotional distress (Wells & Matthews, 1994; 1996). The S-REF model (Wells & Matthews, 1994; 1996), is an information processing model that integrates unhelpful cognitive coping mechanisms with dimensions of metacognitive processing to explain how emotional distress is initiated and maintained. In the following section, the S-REF model will be presented and its relevance to increase risk for depression and anxiety will be explored.

3.1. S-REF Model of Emotional Disorders

The S-REF model (Wells & Matthews, 1994; 1996) is a generic information processing model, which states that individuals with depressive and anxious states tend to engage in repetitive, self-focused thinking due to underlying beliefs regarding the function and consequences of engaging in such processes. According to the S-REF model (Wells & Matthews, 1996), an intruding stimulus, typically a disturbing thought or image, is appraised (evaluated in regards to personal goals and social restraints) and the operations of the S-REF are led by the desire to reduce discrepancy between one's current state and one's target state. The person implements coping responses until the discrepancy is resolved. According to this theory, there are two types of coping mechanisms used to reduce the discrepancy: 1) emotion-focused coping, which is the processing and modification of thoughts and 2) problem-focused coping, which initiates action intended to change external reality (Matthews & Wells, 1996).

The processes of appraising stimuli and choosing a coping strategy depend on the person's access to self-relevant knowledge (Lazarus, 2006). With regard to appraisal, self-knowledge is used to determine the person's current state and their desired state. With

regard to coping, it is used to gain access to general procedures that one could use for coping. Both appraisal and coping strategies are influenced by metacognitive beliefs that determine 1) the personal significance of the intruding stimuli and 2) the implications of the coping strategy. For example, a person who is distressed about intruding thoughts that she is not a good mother, may appraise the intruding stimuli as disturbing and then choose to cope with the intrusion by concentrating on the purpose of those thoughts and figuring out a way to control those thoughts. Metacognition has been defined as the beliefs and appraisals about one's thoughts and one's ability to monitor and regulate those thoughts (Papageourgiou & Wells, 2001a).

3.1.1. Cognitive Attentional Syndrome

According to the S-REF model (Wells & Matthews, 1994, 1996), the maintenance of emotional disturbance is linked to the activation of a particular style of thinking known as the Cognitive Attentional Syndrome (CAS). The CAS consists of self-focused, repetitive thought in the form of worry and rumination, which is used as a way of coping with threat. Furthermore, it often also consists of an attentional strategy of excessively focusing on sources of threat, often internal (e.g. thoughts and feelings), and includes unhelpful coping behaviours, such as avoidance and thought suppression. Wells and Matthews (1994) propose that the CAS is a product of holding positive metacognitive beliefs about the benefits of engaging in the unhelpful coping strategies (e.g. excessively focussing on and monitoring the source of the threat); once the person engages in the CAS processes, negative metacognitive beliefs regarding the uncontrollability and danger of one's thoughts are activated and distress ensues. This CAS process and the subsequent negative metacognitive beliefs give rise to extended low mood and anxiety (Wells, 2000).

Vulnerability to depression and anxiety are linked to the ease with which a person activates the CAS in response to mood disturbances or stressful events, which is, in turn, dependent on the individual's metacognitive beliefs and their individual degree of

executive control over processing. If an individual lacks metacognitive awareness or the knowledge to facilitate effective control, perseverative thought can turn into a cycle of self-focused thinking and thought monitoring that the individual may believe s/he is unable to terminate (Wells et al., 2009; Wells & Matthews, 1994).

In summary, the counterproductive coping strategies that anxious and/or depressed individuals tend to engage in 1) elicit negative feedback from the outside world, 2) maintain negative self-referent cognitions, and 3) hinder one's ability to acquire more productive and effective skills (such as people and problem solving skills, etc.). Metacognitions are believed to play a very important role in influencing the coping strategies a person chooses under stress. According to the S-REF theory, certain metacognitive beliefs should be associated with emotional distress, such as positive beliefs about the benefits of engaging in perseverative thoughts in response to negative stimuli, negative beliefs about the uncontrollability and harmfulness of one's perseverative thoughts, beliefs about one's cognitive ability, attentional selection, and control strategies. A review of these metacognitive beliefs, their measurement, and their relationship with perinatal emotional distress is presented next.

3.2.2. Metacognitive beliefs

Metacognition, also known as cognition about cognition, is responsible for the monitoring, appraisal, and control of one's thoughts. A variety of metacognitions have been demonstrated to be associated with increased emotional distress, such as positive beliefs about the use of perseverative thinking as a coping strategy, negative beliefs about the uncontrollability and harmfulness of one's thoughts, beliefs about the need to control and monitor thoughts, and confidence in one's cognitive abilities, such as attention and memory have been shown to be distinct and relatively stable metacognitions associated with emotional distress (Cartwright-Hatton & Wells, 1997; Roelofs, Huibers, Peeters, Arntz, & van Os, 2010; Watkins & Moulds, 2005). Often these metacognitive beliefs

maintain negative thought processes and beliefs, and as a result, emotional distress, by increasing the availability and/or accessibility to negative self-knowledge, through the establishment of detailed and extensive sets of negative associations to various concepts and events (Wells & Davies, 1994). Metacognitions and their relationships with emotional distress have been explored using a variety of measurements. In the next section, these measures will be presented and their relationship with emotional distress will be considered.

3.2.2.1. Measuring metacognitions

The Metacognitions Questionnaire (MCQ-65; Cartwright-Hatton & Wells, 1997) is a 65-item valid and reliable multidimensional measure of metacognitive beliefs relevant to psychopathology. Item development was based on the S-REF theory. Themes include positive beliefs about worry, negative beliefs about thoughts being uncontrollable and consequently dangerous, beliefs about one's cognitive abilities, especially in regards to one's memory and attention, negative beliefs about superstition, responsibility, and punishment associated with certain thoughts, and finally beliefs about the importance of monitoring and being aware of one's thoughts. All five factors were associated with trait anxiety in the general population, demonstrating concurrent validity and all factors, except for positive beliefs about worry, showed discriminate validity between clinical OCD and GAD patients and controls. Due to its length and the potential burden on participants, a shorter version of this scale was developed and validated, known as the 30-item Metacognitions Questionnaire (MCQ-30; Wells & Cartwright-Hatton, 2004.

The MCQ-30 (MCQ-30; Wells & Cartwright-Hatton, 2004) is a valid and reliable widely-used multidimensional measure of metacognitive beliefs. The same five metacognitive factors from the original version were demonstrated to be relatively stable, empirically distinct factors associated with increased emotional distress, including 1) positive beliefs about the benefits of engaging in worry as a coping mechanism; 2)

negative beliefs about the uncontrollability and danger of one's thoughts; 3) cognitive confidence; 4) beliefs about the need to control thoughts; and 5) cognitive self-consciousness.

Overall, the revised scale demonstrated adequate psychometric properties (Wells & Cartwright-Hatton, 2004). Although the confirmatory factor analysis did not reveal an optimal fit to the data, as the chi-square score was significant, alternative fit indices suggest the five-factor structure was adequate. Another short-coming of this scale is that three of the six statements from factor four (beliefs about the need to control thoughts factors) loaded higher under factor two (negative beliefs about the uncontrollability and danger of one's thoughts) than factor four, suggesting that those three items may better represent negative beliefs about the uncontrollability and danger of one's thoughts than beliefs about the need to control thoughts. Despite these short-comings, its ability to measure a wide range of metacognitions associated with a variety of psychopathologies, including MDD, GAD, OCD (Sun, Zhu, & So, 2017) and emotional distress in the general population (Bailey & Wells, 2016a;b; Purewal & Fisher, 2018; Spada et al., 2011), has made it one of the most commonly used measures of metacognition.

Numerous studies have examined the relationship between the MCQ-30 factors and depression and anxiety (Cook et al., 2015; Purewal & Fisher, 2018; Spada et al., 2011); however, there appear to be differences between cross-sectional and prospective explorations of these factors and relationship with increased emotional distress. Cross-sectional research demonstrates that all five dimensions of the MCQ-30 are consistently associated with both depression and anxiety (Cook et al., 2015a; Spada, Nikčević, Moneta, & Wells, 2008; Spada et al., 2011). Due to the cross-sectional nature of these studies we are unable to determine whether these metacognitions lead to increased depression and anxiety or whether they are simply a by-product of increased emotional distress. Fewer studies have examined the MCQ-30 prospectively, to determine whether these dimensions can lead to future emotional distress (Cook et al., 2015b; Yılmaz, Gençöz, Wells, 2011).

Yılmaz and colleagues (2011) explored these dimensions separately using a convenience sample of 161 students and employees. Previously validated Turkish versions of the MCQ-30, stressful life events, and measures of depression and anxiety were administered. The results revealed that negative beliefs about the danger and uncontrollability of one's thoughts prospectively predicted depression and anxiety six months later, after controlling for baseline levels of emotional distress and the presence of stressful life events during the six month period. None of the other metacognitive factors reached significance.

A few limitations to this study are worth noting. First, this study was conducted using a Turkish version of the MCQ-30 and using a Turkish convenience sample of university employees and students. Whether these results are generalizable to western countries in Europe, the United States, and Australia is unknown. Second, the stress measure (Inventory of College Students Recent Life Experiences; ICSRLE; Kohn, Lafreniere, & Gurevich, 1990), was intended to measure college students' levels of daily hassles, which may not be relevant to the University staff participants used in this study. Third, in contrast to the majority of research which has demonstrated a significant linear relationship between the five MCQ-30 factors and increased depression and anxiety (Cook et al., 2015a; Spada, Nikčević, Moneta, & Wells, 2008; Spada et al., 2011), Yılmaz and colleagues (2001) found that neither positive beliefs about the benefits of engaging in perseverative thinking or cognitive self-consciousness, measured at time one, were associated with time one depression scores. This lack of association may be due to cultural differences between western and eastern countries, and generalisability should not be assumed. There was also a lack of association between cognitive confidence, and beliefs about the need to control thoughts with time two depression, as well as a lack of association between positive beliefs about perseverative thinking, cognitive confidence, cognitive self-consciousness and time two anxiety scores. In the regression model, however, all five factors of the MCQ-30 were entered as predictors, which due to their lack

of linear association with the dependent variable appears unjustified. Due to these shortcomings, these results should be treated with caution. Despite these short-comings, however, the results were in accordance with other researcher's findings that negative beliefs about the uncontrollability and danger of one's thoughts are predictive of increased emotional distress (Bailey & Wells, 2016; Cook et al., 2015b)

Cook and colleagues (2015b) explored the role of metacognitions in predicting emotional distress, following a diagnosis of cancer in 206 UK cancer patients. Cook and colleagues (2015b) found that negative beliefs about the uncontrollability and danger of one's thoughts and cognitive confidence significantly predicted future depression and positive beliefs about perseverative thinking, negative beliefs about the uncontrollability and danger of one's thoughts, and cognitive confidence significantly predicted future anxiety, after controlling for demographic information. In line with Yılmaz and colleagues (2011) study, Cook and colleagues (2015b) found that negative beliefs about the uncontrollability and danger of one's thoughts made the greatest contribution to variance of depression and anxiety severity, out of all the metacognitive factors. Once initial levels of depression, anxiety, and trauma, due to the recent diagnosis were controlled for; however, only cognitive confidence reached significance as a predictor for depression and anxiety. These results suggest that a lack of trust in one's memory and attentional skills in cancer patients can increase the likelihood for future depression and anxiety. Although cognitive confidence is commonly associated with emotional distress (Sun et al., 2017), it is also strongly associated with increased worry and intrusive thoughts (Cartwright-Hatton & Wells, 1997), perhaps individuals with lower confidence in their cognitive abilities are also more likely to experience worry and intrusive thoughts, which have acted as a confounding variable in this study.

The results of Cook and colleagues' (2015b) study suggest that at least some of the metacognitive beliefs may be by-products of increased emotional distress, or perhaps the trauma from the recent cancer diagnosis, as once baseline emotional distress and trauma

were taken into account, the independent contribution of positive beliefs about perseverative thoughts and negative beliefs about the uncontrollability and danger of one's thoughts on predicting increased emotional distress were no longer significant. Perhaps an association between trauma from the recent cancer diagnosis, time one emotional distress, and time one metacognitions, especially regarding the uncontrollability and danger of one's thoughts, which has been demonstrated previously in a cross-sectional sample (Cook et al., 2015a), led to the underestimation of the relevance of metacognitive beliefs in this population and the overestimation of the relevance of cognitive confidence.

The potential underestimation of the relevance of negative beliefs about the uncontrollability and danger of one's thoughts in cancer patients could partially be due to the use of a more general metacognitions questionnaire (MCQ-30) compared to a measure of metacognitions specific to cancer patients. Research suggests that specific metacognitions may be more relevant in increasing vulnerability for increased emotional distress under specific stressors than more general metacognitive beliefs (Bailey & Wells, 2015a). A number of studies have found that specific metacognitive beliefs predict specific outcomes, such as health anxiety (Bailey & Wells, 2015a; Bailey & Wells, 2016b) and major depression (Papageorgiou & Wells, 2001a; b). A brief review of these measures will be presented in the next section.

Metacognitive beliefs specific to health anxiety. Recently, a number of studies have been conducted exploring the role of metacognitions in increasing risk for health anxiety and hypochondriasis (Bailey & Wells, 2015a; b; Bailey & Wells, 2016a; b; Melli, Carraresi, Poli, & Bailey, 2016). Bailey and Wells (2015a) explored the contribution of health-specific metacognitive beliefs on increased health anxiety, independently from the more general metacognitive beliefs represented in the MCQ-30 and illness-specific maladaptive cognitive content. The MCQ-HA was developed based on the MCQ-30 factors and patients reports of metacognitions during treatment for health anxiety. The 14-item MCQ-HA

consists of three factors: 1) Beliefs that thoughts can cause illness, such as "thinking negatively can increase my chances of disease" 2) Beliefs about biased thinking, such as "Thinking the worst about symptoms will keep me safe" and 3) Beliefs that thoughts are uncontrollable, such as "I have no control over thinking about my health."

The results revealed that all three metacognitions specific to health anxiety, as measured by the metacognitive beliefs in health anxiety questionnaire (MCQ-HA), as well as negative beliefs about the uncontrollability and danger of one's thoughts from the MCQ-30, significantly predicted increased health anxiety, suggesting the specific measure of metacognitive beliefs may be particularly relevant to increasing vulnerability to health anxiety (Bailey & Wells, 2015a). They also demonstrated that the MCQ-HA contributed significantly to the variance in health anxiety scores, after taking into account the effects of the MCQ-30 factors, providing preliminary evidence for the utility of a scale that measures metacognitions specific to health anxiety (Bailey & Wells, 2015a). The cross-sectional nature of this study, however, limits the conclusions one can make regarding the cause of health anxiety and whether metacognitions lead to increased health anxiety or whether these metacognitive beliefs are a consequence of increased health anxiety.

Bailey and Wells (2016b) addressed this methodological shortcoming in a prospective evaluation of the contribution of metacognitive beliefs specific to health, independently from maladaptive illness-related beliefs, on increased future health anxiety. Based on the Cognitive Model of Health Anxiety (Salkovskis & Warwick, 1986; Warwick & Salkovskis, 1990), a variety of health-related cognitions are responsible for the development and maintenance of health anxiety including four maladaptive illness-related beliefs which have been demonstrated to be predictive of health anxiety, including beliefs about the 1) likelihood of contracting or having an illness, 2) awfulness of illness, 3) inability to cope with illness, and 4) inadequacy of medical services for treating illness (Salkovskis & Warwick, 2001). Once these dysfunctional beliefs are triggered, theoretically, this leads to catastrophic misinterpretations of one's symptoms (Marcus,

Gurley, Marchi, & Bauer, 2007; Norris & Marcus, 2014). Cognitive perceptual models (Barsky, 1992) assert that individuals with health anxiety tend to be hypervigilant and selectively aware of their symptoms and that this somatosensory amplification is also associated with health anxiety (Barskey & Wyshak, 1990; Barsky, Wyshak, & Klerman, 1990). Finally, neuroticism has been shown to be strongly associated with increased health anxiety (McClure & Lilienfeld, 2001).

The authors explored the independent contribution of metacognitive beliefs about health-related thoughts in increasing risk for health anxiety, after taking into account the effects of baseline emotional distress and the above mentioned cognitive factors. The results revealed that besides baseline emotional distress severity, the only significant predictors of increased health anxiety six months later were metacognitive beliefs about biased thinking and beliefs that health-related thoughts are uncontrollable.

In support of the S-REF theory (Wells & Matthews, 1994; 1996), these results suggest that health-related metacognitive beliefs may be more relevant to increasing vulnerability to future health anxiety than maladaptive cognitive content. These results also support the relevance of exploring the role of metacognitive beliefs specific to the population of interest. Metacognitive beliefs specific to individuals with major depression disorder have also been identified (Papageorgiou & Wells, 2001a; b). A brief overview of metacognitive beliefs specific to depression will be presented next.

Metacognitive beliefs specific to depression. In two separate studies, Papageorgiou and Wells (2001a; b) developed and validated two measures of metacognitions specific to depression that focus on metacognitions about ruminative thoughts: The Positive Beliefs about Rumination Scale (PBRS; Papageorgiou & Wells, 2001b) and the Negative Beliefs about Rumination Scale (NBRS; Papageorgiou & Wells, 2001a). Researchers have demonstrated that engaging in ruminative thought as a response to negative stimuli is a stable trait displayed in individuals vulnerable to depression (Just & Alloy, 1997; Kuehner

& Weber, 1999; Nolen-Hoeksema & Davis, 1999). However, according to the S-REF theory, positive metacognitive beliefs about the benefits of rumination should activate the use of rumination as a coping strategy and negative beliefs about the uncontrollability and harmfulness of rumination should maintain and exacerbate depressive symptoms. A review of these two measures and their relationship between emotional distresses is presented next.

The PBRS (Papageorgiou & Wells, 2001b) is a valid and reliable one factor measure of positive beliefs about the benefits of engaging in rumination, typical of individuals with depression. Results revealed that participants with major depression had elevated PBRS scores, compared to participants with panic disorder, social phobia, and non-clinical participants. A major limitation of this measure is that statements in the PBRS refer to "my depression." For example, "I need to ruminate about my problems to find answers to my depression." This makes the questionnaire irrelevant to participants without depression and potentially confounds the results. Watkins and Moulds (2005) developed and validated an adapted version of the PBRS (PBRS-A) that is relevant to depressed and non-depressed samples, using a larger sample size (n =32 for each group) of participants with current major depression, those who have recovered from major depression, and never depressed participants. They found that never depressed participants had significantly lower levels of positive beliefs about rumination compared to currently depressed participants and those who are not currently depressed, but have recovered from a previous depressive episode, suggesting that positive beliefs about rumination remain constant even after depression has subsided.

Only one study, to date, has examined the relationship between positive beliefs about rumination and perinatal depression (Alfaraj, Spada, Nikčević, Puffett, & Meer, 2008). The researchers (Alfaraj et al., 2008) found that depressed pregnant women reported significantly higher levels of positive beliefs about rumination than a non-depressed group of pregnant women. They also found that positive beliefs about rumination predicted

depression after taking into account social support, although due to the cross-sectional nature of the study, a causal relationship cannot be determined. Although cross-sectional studies suggest that positive beliefs about associated with depression (Alfaraj et al., 2008; Watkins & Moulds, 2005), it remains unclear whether positive beliefs about rumination precede symptoms of depression or whether they are a by-product of increased depression. To date, no prospective research has been conducted to examine whether positive beliefs about rumination can predict future depression.

The NBRS (Papageorgiou & Wells, 2001a) is a 13-item measure of negative beliefs about rumination, based on metacognitive beliefs identified by individuals with recurrent major depression disorder. The NBRS consists of two factors: negative beliefs regarding the uncontrollability and harm of rumination and negative beliefs regarding the interpersonal and social consequences of rumination. The cross-sectional nature of this study did not allow for conclusions regarding the causal relationship between NBRS and major depression.

To address this shortcoming, Papageorgiou and Wells (2009) examined the relationship between depression and negative beliefs about rumination prospectively, in a non-clinical sample, and found that factor one of the NBRS, representing the uncontrollability and harm associated with rumination, at time one, predicted depression 12 weeks later, after controlling for initial depressive symptoms and ruminative response style. Unexpectedly, factor two of the NBRS, representing negative beliefs about harmful social and interpersonal effects of rumination, did not significantly predict depression at time two, after taking into account the effects of initial depression and ruminative response style. This suggests that metacognitions regarding the uncontrollability and harm associated with engaging in rumination is independently predictive of depression, even after taking into account ones' tendency to engage in rumination as a coping strategy.

Overall, these results provide further evidence that metacognitive beliefs about the uncontrollability and harm of one's thoughts can increase vulnerability to emotional

distress. Although preliminary evidence suggests that depressed pregnant women hold more positive beliefs about rumination than non-depressed pregnant women (Alfaraj et al., 2008), the role of negative beliefs about the uncontrollability and harm of one's thoughts has yet to be explored in the perinatal period. Similarly, no dimensions of the MCQ-30 and their role in perinatal distress have been examined to date. Future research is necessary to confirm the generalisability of the findings reported in other samples in the perinatal period and build on the S-REF theory, by exploring the role of metacognitions in increasing vulnerability to perinatal depression and anxiety outside of the contribution of dysfunctional cognitive content.

3.1. The Aims of the Project

The aims of this project are to examine the role of cognitive and metacognitive factors in predicting perinatal depression and anxiety. An exploration into the role of maladaptive attitudes specific to motherhood compared to more general dysfunctional attitudes in increasing vulnerability to perinatal emotional distress will be examined, based on Beck's Cognitive Theory of Depression (Beck, 1964; 2002), which asserts that dysfunctional attitudes should increase vulnerability to future depression. However, as presented in the literature review, the role of GDA in prospectively predicting perinatal depression is contentious. Dysfunctional attitudes specific to motherhood may be more relevant to depression in the perinatal period; however, existing measures of dysfunctional cognitions specific to motherhood have a number of shortcomings. The PRBQ was identified as a possible instrument that can be further refined and used to measure dysfunctional attitudes specific to motherhood.

The relevance of the S-REF theory (Wells & Matthew, 1994; 1996) in the perinatal period will also be explored in order to address the lack of research exploring the role of metacognitions in the perinatal period and to determine whether metacognitions can increase vulnerability to perinatal emotional distress. Specifically, this will be the first

study to explore the contribution of metacognitive beliefs in predicting perinatal emotional distress, outside of the contribution of dysfunctional attitudes. These aims will be explored using two rounds of data collection (one cross-sectional and one longitudinal). The results from the two rounds of data collection are not presented in chronological order, and instead will be presented across four studies, which are outlined below and presented in full in the following two chapters.

3.1.1 Study one: Questionnaire Development, Exploratory Factor Analysis, and Cross-sectional Exploration of the Validity and Reliability of the Pregnancy Related Beliefs Questionnaire-8 (PRBQ-8)

The aim of study one is two-fold:

1) To refine the psychometric properties of dysfunctional cognitive style specific to motherhood (the PRBQ);

2) To examine the distinct contribution of general dysfunctional cognitive style vs the maternal-specific dysfunctional cognitive style to perinatal depression.

3.2.2. Study two: Confirmatory Factor Analysis and Prospective Predictive Validity of the PRBQ-8

The aim of study two is two-fold:

1.) To confirm the factor structure of the revised PRBQ scale;

2.) To explore the predictive validity of the revised PRBQ scale prospectively

3.2.3. Study three: The Contribution of Metacognitive Beliefs in Predicting Perinatal Depression: A Cross-Sectional Study

The aim of study three is to explore the association between metacognitions, as measured by the MCQ-30, and perinatal depression, using a cross-sectional sample

3.2.4. Study four: The Contribution of Metacognitions in Predicting Perinatal Depression and Anxiety: A Prospective Exploration

The aim of study four is to prospectively examine the role of cognitive and metacognitive factors in predicting perinatal depression and anxiety, while controlling for recognised predictors, such as socio-demographic factors, baseline emotional distress, social support and dysfunctional attitudes.

4.1. Anticipated Contribution to Knowledge

With the further validation of the PRBQ it is hoped that a briefer instrument could be developed that could be used to screen for latent dysfunctional attitudes specific to motherhood that increase risk of developing emotional distress in the perinatal period. This information will contribute to Beck's Cognitive Model of Depression (1967) by exploring the role of maternal-specific dysfunctional cognitive themes that increase vulnerability to perinatal depressive episodes.

We will also examine the independent role of metacognitions, over and above cognitive content, in predicting perinatal depression and anxiety, exploring the relevance of the S-REF theory in the perinatal population. The independent role of metacognitions in predicting perinatal emotional distress has yet to be explored, outside of the contribution of maladaptive cognitive content. The results from this study will help healthcare workers and therapists to a) help identify women who may be at an increased risk for perinatal emotional distress and b) develop psychological interventions/treatments for women in the perinatal period, to reduce the deleterious outcomes associated with perinatal emotional distress on mothers, children, and their families.

Chapter Four: An Examination of the Psychometric Properties of an Attitudes Specific to Motherhood Scale

4.1 Study One: Questionnaire Development, Exploratory Factor Analysis, and Cross-sectional Exploration of the Validity and Reliability of the Pregnancy Related Beliefs Questionnaire-8 (PRBQ-8)

4.1.1. Introduction

According to Beck's Cognitive Model of Depression (Beck, 1967, 2008), individuals vulnerable to depression have maladaptive core beliefs, which are relatively stable and lay dormant, until triggered by stressful life events. Dysfunctional attitudes reflect the content of these relatively stable schemas, initially conceptualised by Beck as a general cognitive vulnerability factor. As outlined in Chapter Three, a significant body of work has demonstrated an association between elevated general dysfunctional attitudes (GDA) and depression in both the general population, as well as the perinatal population (Church et al., 2005; Jones et al., 2010; Reilly-Harrington et al., 1999; Sockol et al., 2014). However, cross-sectional samples limit the conclusions one can make regarding causation and make it impossible to determine whether GDA are a by-product of increased depressive symptoms or whether they precede the depressive symptoms.

Prospective research on the role of GDA in predicting future emotional distress is contentious. Although a number of researchers have demonstrated that GDA can predict the onset and severity of future depression in the general population, even after controlling for baseline depression severity (Otto et al., 2007; Rude et al., 2010; Zuroff et al., 1999), research exploring the prospective role of GDA in the perinatal period, using the DAS-A, or various derivatives of it, is less conclusive (Gotlib et al., 1991; Grazioli & Terry, 2000; O'Hara et al., 1982). Results of studies employing a longitudinal design suggest that

antenatal GDA do not prospectively predict postnatal depression, once antenatal symptoms of depression, social support, and other interpersonal factors, such as marital distress, are taken into account (Gotlib et al., 1991; Grazioli & Terry, 2000; O'Hara et al., 1982). These results suggests GDA are either not a very strong predictor of perinatal emotional distress or that other psychosocial factors, such as social support and interpersonal factors are more relevant in increasing vulnerability to depression the perinatal period.

GDA have been found to differentiate between depressed postnatal samples and healthy controls (Jones et al., 2010) and were found to be significantly higher in postnatal women with a previous history of depression, compared to those with no previous depression history (Church et al., 2005). However, GDA do not differentiate between women with a history of major depression and those with a history of postnatal depression (Jones et al., 2010). In line with evidence suggesting that postnatally depressed women are cognitively heterogeneous (Church et al., 2005; Cooper & Murray, 1995; Warner et al., 1997), it could be that GDA contribute to vulnerability to postnatal depression in some women, but that there is also a further subset of women in whom having a child acts as a specific stressor, which triggers maladaptive cognitions related to being, or becoming, a mother, increasing their risk for postnatal depression.

Researchers have demonstrated that individuals at risk of depression may have dysfunctional attitudes in some, but not all, areas of their lives (de Graaf et al., 2009; Dyck, 1992; Hilsman & Garber, 1995). These results are in line with more recent developments of Beck's Theory (2002), which asserts that particular stressors in individuals' lives may interact with specific dysfunctional beliefs, increasing the risk for depression. Perhaps during the perinatal period, under the stress of pregnancy and child-birth, holding maladaptive attitudes about motherhood, may be more likely to increase vulnerability to perinatal depression than GDA. As such, dysfunctional attitudes specific to motherhood can both, independently or additively (together with GDA), and in interaction with other background factors, increase the chances of postnatal depression.

4.1.1.1. Measuring dysfunctional attitudes specific to motherhood

Various beliefs about motherhood have been demonstrated as maladaptive, including beliefs about the role of motherhood, body image, and expectations about child-birth, the child's behaviour, and the self as a mother. A literature review on the topic, presented in Chapter Three, revealed there were several measures of maladaptive beliefs and attitudes specific to motherhood; however, there were significant short-comings associated with each of the measures.

The limited psychometric development of many of these measures stood out as problematic. Some of the questionnaires were developed with small sample sizes (Madar, 2013; Moorhead et al., 2003), no factor analyses (Kumar et al., 1984; Madar, 2013; Warner et al., 1997), and had low internal reliability (Thomason et al., 2015), or failed to report reliability entirely (Kumar et al., 1984). There was also a lack of construct validity, as some of the factors of these measures were not associated with similar, previously validated measures or with the other factors in the scale (Thomason et al., 2015). Other researchers failed to report the concurrent validity of the scale (Affonso et al., 1994; Kumar et al., 1984) or the validity of the factors of the scale (Sockol & Battle, 2015). There was also a lack of conceptual clarity in regards to what these maternal cognitions actually assess. Many of these questionnaires assess a combination of attitudes, expectations, and experiences specific to motherhood (Affonso et al., 1994; Moorhead et al., 2003) and item development does not appear to be based on any theoretical framework (Affonso et al., 1994; Kumar et al., 1984). This conceptual lack of clarity is a significant short-coming, which will be discussed in more detail in the following section. See Table 1 for a list of the current measures and their shortcomings.

Table 1. Summary of the Psychometric Development of Maternal Cognition Instruments

No	Measure	Design & Sample	Items, factors themes	Validity	Reliability	Limitations
1.	Maternal Adjustment & Maternal Attitudes (MAMA; Kumar et al., 1984)	Cross-sectional; 119 primiparous women in early pregnancy	60-items representing beliefs regarding body image, somatic symptoms, marital relationship, attitudes towards sex, attitudes towards pregnancy/the baby	Criterion validity	Test-retest and split half reliability were acceptable	No factor analysis; no information relating to concurrent or predictive validity; internal reliability was not reported; Long questionnaire
2.	Cognitive Adaptation to Stressful Events during Pregnancy (CASE; Affonso et al., 1994)	Longitudinal; 202 women from early pregnancy to postpartum	37-items; one factor: items assess cognitive adaptation to threatening events using dimensions of meaning, mastery and self-esteem	Factor analysis; Predictive, discriminant, and convergent validity	High internal reliability	The scale assesses the frequency of engagement in self-questioning relating to adaptation to pregnancy and postpartum rather than attitudes related to motherhood

3.	Maternal Attitudes Questionnaire (MAQ: Warner et al., 1997)	Cross-sectional; 483 post-partum women	14 items representing expectations of motherhood, expectations of the self, as a mother, and role conflicts	Concurrent and discriminant validity	High internal reliability	No factor analysis; Restricted to use in the postnatal period
4.	Pregnancy Related Beliefs Questionnaire (PRBQ; Moorhead et al., 2003)	Cross-sectional; 41 pregnant women	54 items representing beliefs about the maternal role, perceptions of changing body image, expectations about the behaviours of new-borns, and relationship insecurity	Concurrent and criterion validity	High internal reliability	Small sample size; No factor analysis; Long questionnaire
5.	Maternal Attitudes & Beliefs Scale (MABS; Madar, 2013)	Cross-sectional; 36 pregnant & 32 postnatal women	55 items, themes of irrationality, rationality, demandingness, self-downing, frustration tolerance, & awfulizing	Concurrent and convergent validity	High internal reliability	Small sample sizes; No factor analysis; Long questionnaire; High correlations (.70 - .95) between MABS and EPDS and BDI-II, suggest conceptual overlap

6.	Attitudes towards Motherhood Scale (AToM;Sockol et al., 2014; Sockol & Battle, 2015)	Cross-sectional; 381 pregnant & postnatal women	12 items, EFA and CFA confirmed three factors: beliefs about other's judgements, beliefs about maternal responsibility, and maternal role idealization	Concurrent and convergent validity	High internal reliability	Concurrent validity was not reported for each factor
7.	The Rigidity of Maternal Beliefs Scale (RMBS; Thomason et al., 2015)	Longitudinal; 113 women from early pregnancy to postpartum	24 items; EFA four factor solution: perceptions of societal expectations, role identify, maternal confidence/efficacy, and maternal dichotomy	Discriminant, convergent, and predictive validity	Good internal and test-retest reliability	Role identity factor had low internal reliability in postnatal sample ($\alpha = .51$)

4.1.1.2. Conceptual issues related to measuring maladaptive maternal attitudes

Attitudes are defined as a "psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour" (Eagly & Chaiken, 1993, p. 1). Expectations represent our beliefs that something will happen or is likely to happen in the future. Experiences represent beliefs about an individual's reality. For example, in the MAQ (Warner et al., 1997), agreeing with the statement "I think my baby is very demanding," may represent an accurate appraisal of the situation and not an attitude. Items from the PRBQ (Moorhead et al., 2003) include a mixture of both expectations and attitudes regarding motherhood. Expectations, such as "I expect my baby will be happy, if I am around a lot" or "After my baby is born, I will never be lonely in my life again," lack the evaluative component present in attitudes. Items such as "If I can't look after my baby properly it shows I am useless" or "If I do not feel maternal it means I am bad" represent attitudes. Although optimistic expectations about motherhood have been associated with better adjustment postnatally (Coleman, Nelson, & Sundre, 1999; Green & Kafetsios, 1997), when real-life experiences are not as positive as one's expectations, optimistic expectations are no longer associated with well-being and the discrepancy may lead to increased symptoms of depression (Harwood, McLean, & Durkin, 2007).

The development of the most recent measures of maternal attitudes addressed many of these shortcomings. Sockol and colleagues (2014) addressed conceptual issues by distinguishing between attitudes, expectations, and experiences, in their Attitudes towards motherhood scale (AToM) and Thomason and colleagues (2015) adopted a longitudinal design to test the predictive validity of their Rigidity of Maternal Beliefs Scale. These measures were not without limitations (discussed in more detail in Chapter Three), however, their development highlights a gap in the literature and the need for more research exploring the maladaptive maternal attitudes that increase vulnerability to developing perinatal depression.

4.1.1.3. Current project

As outlined in Chapter Three, the PRBQ was developed to reflect themes that represent underlying cognitive content identified in antenatally and postnatally depressed women, such as concern about the maternal role, perceptions of coping ability, expectations about the behaviours of the new born, issues related to self-esteem, and relationship insecurity. These themes were designed to represent vulnerability beliefs /attitudes, similar to those identified by the DAS, but more specific to motherhood. Internal reliability for the scale was good ($\alpha = .85$). The authors found evidence of construct validity, as the PRBQ was found to be (positively, moderately) significantly associated with both DAS and the Beck Depression Inventory (Beck, Ward, & Mendelson, 1961) scores in an antenatal sample of women. Women who met the criterion for moderate depression (scored 19 or more on the BDI) also had significantly higher PRBQ scores than the non-depressed sample of women, demonstrating criterion validity.

The length of the PRBQ and the range of maternal beliefs covered in the 54-item instrument is ideal for psychometric exploration, but limits its wider use in perinatal populations. The PRBQ also lacks conceptual clarity, as it incorporates a combination of attitudes, expectations, and real-life experiences related to pregnancy/motherhood. In addition, the small sample size ($n = 42$) hinders the generalisability of the results. Despite the authors' call for further refinement and testing of the PRBQ, no further studies were conducted. Therefore, the principal aim of the current study was to revise the 54-item PRBQ to ensure the items represent attitudes, and not expectations or experiences, and to examine its psychometric properties, using a large, diverse sample of women in the perinatal period, in order to reduce the number of items, identify the factor structure, and explore its relationship with perinatal depression.

4.1.1.4. Aims of study one

There were several aims for the current cross-sectional study:

1.) To examine the original 54-item PRBQ and exclude items that represent expectations, experiences, and general dysfunctional attitudes, leaving only items that represent attitudes specific to motherhood;

2.) To conduct an exploratory factor analysis on the PRBQ items that represent maternal-specific maladaptive attitudes;

3.) To examine the psychometric properties of the revised PRBQ, including the following dimensions: internal and temporal reliability, convergent and concurrent validity;

4.) To examine cross-sectionally the predictive validity of the revised PRBQ and its independent contribution in predicting perinatal depression, controlling for the contribution of demographic information, history of mental health difficulties, and GDA;

5.) To examine the psychometric properties of the AToM, including internal reliability, convergent, concurrent, and predictive validity and to compare the predictive power of the revised PRBQ with the AToM.

4.1.2. Methods

4.1.2.1. Participants

A total of 344 participants, aged 19-47 years old, completed questionnaires at one time point. A convenience community sample was recruited online (n = 199, 57.8%) and a consecutive antenatal sample was recruited through St. Michael's Hospital, NHS North Bristol Trust's antenatal clinic waiting room (n = 145, 42.2%). Participants were included if they were 18 years of age or older, residing in the UK, could complete the questionnaires in English, and were either pregnant or had given birth in the last six months. Demographic characteristics of the participants are listed in Table 2.

In order to examine test-retest reliability of the revised PRBQ questionnaire, a further, randomly selected sample of 84 women were mailed the second version of the PRBQ 10 weeks after the first administration. Sixty-six participants (79% response rate) completed this second version of the PRBQ (mean time difference between sets = 12.49 weeks, SD = 1.92 weeks); of these, 13 were pregnant (19.7%) and 53 (80.3%) had given birth within the last six months.

Table 2. Demographic Characteristics of Study One Participants (N = 344)

	N	%
Ethnicity		
Caucasian	310	90.1
Hispanic	11	3.2
Asian	10	2.9
Black	5	1.5
Mixed	5	1.5
Other	2	.6
Far East Asian	1	.3
Education		
O levels/GCSE or equivalent	35	10.2
A levels or equivalent	70	20.4
University degree	136	39.7
Postgraduate degree	101	29.4
No answer	1	.3
Employment status		
Employed full time	199	57.8
Employed part-time	71	20.6
Homemaker	50	14.5
Student	5	1.5
Unemployed	4	1.2
Other	15	4.4
Marital status		
Married	220	64
Not married	124	36
PHMHD		
Yes	146	42.4
No	198	57.6
Pregnancy status		
Pregnant	213	61.9
Postpartum	131	38.1
Children		
Primiparous	167	48.5
Multiparous	177	51.5

Note: N = 344, PHMHD = Past history of mental health difficulties

4.1.2.2. Instruments

Measure of depression. The Edinburgh Postnatal Depression Scale (EPDS; Cox et al., 1987) is a 10-item questionnaire that measures women's depressive symptoms and can be used as a screening tool to identify women at risk for perinatal depression (see Appendix 2). Respondents are given 10 questions and asked to choose the answer (scored 0-3) that most closely represents how they have been feeling over the last seven days. The range of scores varies from 0-30, with higher scores indicating higher depression levels. Reported Cronbach's alpha score for the EPDS is $\alpha = .87$; Cox et al., 1987) and test-retest reliability ranges from $r = .55 - .63$ (Bergink et al., 2011). The scale has been validated for use in both the antenatal (Murray & Cox, 1990) and postnatal period (Cox, Chapman, Murray, & Jones, 1996; Bergink et al., 2011) and has been used widely in perinatal samples.

The EPDS is not designed as a diagnostic instrument, but rather as an instrument to be used for screening. Empirically determined cut-off scores should be used when reporting the rates of perinatal depression. A cut-off score of 10 or more is recommended to determine the presence of minor postnatal depression, with high sensitivity (90%) and specificity (78%) demonstrated (Cox et al., 1987; Harris, Huckle, Thomas, Johns, & Fung, 1989; Murray & Carothers, 1990). A score of 13 or more is necessary to determine a high probability of major postnatal depression (Boyce, Stubbs, & Todd, 1993; Cox et al., 1987; Harris et al., 1989; Murray & Carothers, 1990); it demonstrates high sensitivity (86%), specificity (79%), and positive predictive power (73%; Cox et al., 1987; Harris et al., 1989; Murray & Carothers, 1990). To determine the probability of minor antenatal depression a cut-off score of 13 or more is recommended (Murray & Cox, 1990); sensitivity is reported at 64%, specificity at 90%, and positive predictive value is 50%. In order to identify major antenatal depression a cut-off score of 15 or more is recommended; sensitivity is 100%, specificity is 96%, and positive predictive value is 60% (Murray & Cox, 1990).

Measure of general dysfunctional attitudes. The Dysfunctional Attitudes Scale (Form A) Revised (DAS-A-17; de Graaf et al., 2009) is a 17-item measure of the presence and severity of general dysfunctional cognitive style, with two factors: perfectionism/performance evaluation and need for approval by others (see Appendix 3). Respondents are asked to rate the extent to which they agree or disagree with 17 statements representing beliefs and attitudes that people sometimes hold, using a 7-point Likert-style scale. Scores range from 17-119 and higher scores indicate more dysfunctional attitudes. The DAS-A-17 has good internal consistency ($\alpha = .91$) and moderate mean item-total correlation between factors: $r = .64$ for the perfectionism/performance evaluation factor and $r = .58$ for the dependency factor (de Graaf et al., 2009). Convergent construct validity was also demonstrated, as the DAS-A-17 correlated strongly with depression severity ($r = .60$) and the depressed group (M = 68.1, SD = 18.5) scored significantly higher on the DAS-A-17 than the non-depressed group (M = 46.3, SD = 14.7), $t(799) = -30.7$, $p < .001$ (de Graaf et al., 2009). The DAS-A-17 accounted for 25% of the variance in depressive symptoms, after taking into account the variance explained by demographic variables.

Measures of dysfunctional beliefs specific to the perinatal period. The Pregnancy Related Beliefs Questionnaire (PRBQ; Moorhead et al., 2003) is a 54-item questionnaire that measures dysfunctional beliefs about motherhood and pregnancy (see Appendix 4). Respondents are asked to read each of the 54 statements provided and indicate how much they agree or disagree with each statement using a 7-point Likert-style scale, with answer options ranging from totally agree (1) to totally disagree (7). Scores range from 54-378. Higher scores indicate greater levels of dysfunctional beliefs about motherhood/pregnancy.

The Attitudes towards Motherhood Scale (AToM; Sockol et al., 2014) is a 12-item questionnaire measuring women's attitudes towards motherhood, with three factors: beliefs related to others' judgments, beliefs related to maternal responsibility, and beliefs related

to maternal role idealization (see Appendix 5). Respondents are given a series of statements about motherhood and asked to indicate the extent to which they agree or disagree with each statement using a six-point Likert-style scale. Scores range from 0-60, with higher scores representing more dysfunctional attitudes.

The AToM has been tested with both primiparous and multiparous perinatal samples and possesses good psychometric properties (Sockol et al., 2014; Sockol & Battle, 2015). In the primiparous perinatal sample, Cronbach's alpha was .81. The scale possesses convergent validity, as it was correlated with DAS (r = .50), EPDS (r = .41) and STAI (r = .41) scores as well as predictive validity, as it was shown to predict perinatal depression and anxiety, in a cross-sectional sample, after controlling for demographic variables, social support, marital satisfaction, and GDA (β = .18, p < .05). In the multiparous perinatal sample, internal reliability was .86, convergent validity was demonstrated, as the AToM was significant associated with DAS-A-17 (r = .57), EPDS (r = .43), and BAI (r = .34). The AToM also predicted perinatal depression, in a cross-sectional sample, after controlling for demographic variables and GDA (β = .14, p < .05). The AToM predicted perinatal anxiety, after controlling for demographic variables (β = .29, p < .01).

Study-developed questionnaire. Questions were developed by the researchers to examine demographic factors, such as age, education, ethnicity, marital status, and parity (see Appendix 6). Past history of mental health difficulties was assessed via a single question asking participants to state whether they have ever consulted their GP or a mental health specialist for emotional difficulties and what problem it was. Those who answered "yes" and listed a problem were deemed to have a past history of mental health difficulties (PHMHD).

4.1.2.3. Procedure

Participants were recruited online through a brief advertisement posted on social media sites for mothers (e.g. Facebook groups for Bristol mothers) and mumsnet.com (see Appendix 7). The advertisement invited women, aged 18 and above, who were pregnant or had given birth within the last six months, to participate in a study on "women's beliefs concerning motherhood, general thinking style, and their link with maternal emotional states;" those interested were invited to follow a hyperlink to view the information sheet and complete the questionnaires. Recruitment at the NHS North Bristol Trust St. Michael's Hospital took place in the antenatal clinic waiting room. All patients aged 18 years or older and attending the clinics were given an information sheet (see Appendix 8) by the researcher. The information sheet outlined the purpose of the study, the anonymity of responses, and explained that consent would be assumed when participants submitted their responses. Women who expressed interest in participating were given the option to complete the questionnaire online or via hard copy. Participants who chose to complete the questionnaires online were emailed a hyperlink, directing them to the study's website, which contained the battery of questionnaires. Participants who chose to complete a hardcopy were provided with a copy of the questionnaires and were asked to complete and return them in the provided stamped and addressed return envelope at their leisure. All participants were given the option to enter into a draw to win one of two £50 Amazon vouchers.

The questionnaire set took approximately 15-20 minutes to complete. To reduce the chances of survey fraud from individuals who were recruited online, participants were not allowed to complete the survey more than once, using the same IP address. To eliminate data from individuals who may have completed the survey online solely for the incentive, data from individuals who completed the questionnaire in less than six minutes were removed. Conditional questions were also included, such as "Are you currently pregnant"?

If participants answered “no,” the next question was “Have you given birth within the last six months”? If participants answered “no” again, they would be directed straight to the end of the survey.

Once the initial data had been collected and analysed, a random sample of women, who entered the draw and provided their contact details, were invited via email to follow a hyperlink to complete an eight-item version of the PRBQ (PRBQ-8). Participants who completed the PRBQ-8 were entered into a draw to win a £10 Amazon voucher. Participants were included if they were still pregnant or had given birth within the last six months and if they completed the PRBQ-8 within four months after completing the first set of questionnaires.

This research project was approved by both the National Health Service (NHS) Ethics Committee Board and the Kingston University research ethics committee (see Appendix 9).

4.1.3. Results

4.1.3.1. Prevalence of antenatal and postnatal depression

Empirically determined cut-off scores were used to explore the prevalence of problematic antenatal and postnatal depression. In our antenatal sample, 11.7% (*n* = 25/213) met the required standards (15 or more on the EPDS; Murray & Cox, 1990) for major antenatal depression and 18.3% *(n* = 39/213) met the requirements for minor antenatal depression (13 or more; Murray & Cox, 1990). In our postnatal sample, 26.7% (*n* = 35/131) of participants met the requirements for major postnatal depression (13 or more; Boyce et al., 1993; Cox et al., 1987; Harris et al., 1989; Murray & Carothers, 1990) and 45% (*n* = 59/131) met the requirements for minor postnatal depression (10 or more; Cox et al., 1987; Harris et al., 1989; Murray & Carothers, 1990). These results revealed that in this sample,

prevalence of postnatal depression is higher than the prevalence of antenatal depression (see Table 3).

Table 3. Point Prevalence Rates of Antenatal and Postnatal Depression

	Antenatal Period (*N* = 213)	Postnatal Period (*N* = 131)
Minor Depression	39 (18.3%)	59 (45%)
Major Depression	25 (11.7%)	35 (26.7%)

Antenatal cut off point for minor depression ≥ 13 and major depression is ≥ 15
Postnatal cut-off point for minor depression ≥ 10 and major depression is ≥ 13

4.1.3.2. Differences between antenatal and postnatal sample

In order to explore background differences between our antenatal and postnatal subsamples we conducted a series of chi-square tests, to examine differences in our categorical variables. The assumptions of the Chi-Square tests were met, with less than 25% of the cells having an expected count less than five. Because our continuous variables are not normally distributed (see Appendix 10 for results of the normality tests), which violates the assumptions of an independent samples t-test, Mann-Whitney U tests were conducted to explore differences in our continuous variables between our antenatal and postnatal subsamples. All assumptions of Mann-Whitney U tests were met. Out of our socio-demographic variables, only marital status significantly differed between groups, as our postnatal sample were more likely to be married than our antenatal sample. Women in the postnatal period also had higher EPDS and DAS-A-17 scores (See Table 4 for differences between participants in the antenatal vs postnatal period).

Table 4. Differences between Antenatal and Postnatal Subsamples (N = 344)

	Antenatal (n = 213)	Postnatal (n = 131)		
	%	%	χ^2 (df)	Sig.
Ethnicity			2.16 (1)	.14
White	88.3	93.1		
Non-white/minority	11.7	6.9		
Education			8.11 (4)	.09
O-levels /equivalent	13.6	4.6		
A-levels/equivalent	20.2	20.6		
University degree	38.0	42.7		
Postgraduate degree	27.7	32.1		
Marital Status			4.55 (1)	.03
Married	59.6	71		
Not married	40.4	29		
Parity			1.44 (1)	.23
Primiparous	46.0	52.7		
Multiparous	54.0	47.3		
PHMHD			2.07 (1)	.15
Yes	39.4	47.3		
No	60.6	52.7		
	Mean (SD)	Mean (SD)	*U*-stat	Sig.
Age	32.32 (4.98)	32.56 (4.46)	13,565.00	.67
EPDS	8.03 (5.07)	9.34 (5.79)	12,164.00	.05
DAS-A-17	45.97 (17.98)	54.05 (17.33)	10,363.50	<.001

4.1.3.3. Differences between recruitment groups

In order to explore differences between participants who were recruited through online communities compared to consecutively recruited participants from St. Michael's hospital, we conducted a series of Chi-Square and Mann-Whitney *U* tests. Because our consecutive sample contained women recruited at various stages during pregnancy (n = 145, 100%) and our online community sample contained a combination of women who were both pregnant (n = 68, 34.2%) and had already given birth (n = 131, 65.8%), we decided to compare differences between the two recruitment groups using only women in the antenatal period

(n = 213), in an attempt to avoid confounding the results with differences between pregnant and postnatal women.

The assumptions of the chi-square tests were met with less than 25% of the cells having an expected count less than five, except for with the ethnicity factor, where 60% had an expected count less than five. Once the ethnicity factor was entered as a dichotomous variable (white and non-white, minority), then assumptions were met for all variables. All assumptions were also met for Mann-Whitney U analyses.

Results revealed that out of the socio-demographic variables, only education levels differed significantly between recruitment groups. Participants recruited through online communities had higher levels of education than those recruited consecutively through St. Michael's hospital. Women recruited through online communities also had significantly higher EPDS scores and DAS-A-17 scores. No other differences were identified (See Table 5 for sample differences).

Table 5. Differences between Antenatal Community and Consecutive Samples (N = 213)

	Community (n = 68)	Consecutive (n = 145)		
	%	%	χ^2 (df)	Sig.
Ethnicity			.00 (1)	.99
White	88.2	88.3		
Non-white/minority	11.8	11.7		
Education			22.70 (4)	<.001
O-levels/equivalent	2.9	18.6		
A-levels/equivalent	10.3	24.8		
University degree	44.1	35.2		
Postgraduate degree	42.6	20.7		
Marital Status			.02 (1)	.89
Married	60.3	59.3		
Not married	39.7	40.7		
Parity			.14 (1)	.70
Primiparous	44.1	46.9		
Multiparous	55.9	53.1		
PHMHD			2.43 (1)	.12
Yes	47.1	35.9		
No	52.9	64.1		
	Mean (SD)	Mean (SD)	*U*-stat	Sig.
Age	32.32 (3.87)	32.32 (5.45	4,810.50	.78
EPDS	9.04 (5.01)	7.56 (5.05)	3,984.00	.02
DAS-A-17	56.76 (17.77)	40.91 (15.75)	2,521.00	<.001

4.1.3.4. Systematic elimination of PRBQ items

A stepped approach was adopted in order to reduce the number of items of the 54-item PRBQ. First, all items with a facility index equal to or approaching either of the extreme scores of the scale (≤ 2.20 and ≥ 5.80) were removed. Second, all items that were weakly correlated (< .3) with other items on the PRBQ were removed. As the primary aim of the study was to develop a maternal dysfunctional attitudes scale, in the third step all items of the original PRBQ that did not represent attitudes, but rather expectancies, or were tapping

into general attitudes rather than attitudes specific to motherhood, were removed, leaving only items that represent attitudes about motherhood. Finally, the one item that participants commonly reported to be difficult to understand was eliminated (see Table 6 for eliminated items).

Table 6. Items Eliminated from the Original 54-Item PRBQ

Items where the facility index is at the extreme end of the answer options

10. During the time following childbirth, my partner has as much responsibility as I have to make our relationship work.
14. I can't keep my baby safe from all sources of infection.
18. People who cry for no reason are just being hysterical.
22. If I ask for help with mothering my baby, it is not a sign that I am failing

Items excluded due to weak inter-item correlations (<0.3)

5. If people criticise my baby, it is not a criticism of me.
9. My independence is very important to me.
11. I expect my baby will be happy if I am around a lot.
16. It is important for me to get back to my normal activities as soon as possible after the birth.
24. I have a very clear picture in my mind of what it will be like to have a newborn baby.
30. Sometimes it is necessary to put my own needs before those of my baby.
32. It is selfish to get upset in front of my family.
33. I expect to just be able to see more of people as a result of this pregnancy.
34. I should be able to just cope, like everyone else does.
35. I expect my relationship with my partner might become very different after this pregnancy.
36. It is important for me to make sure I look my best.
37. People know what kind of person I am by the activities I do.
44. If I do not have lots of interesting news it shows I am a dull person.
45. I should be cheerful and entertaining for people when they come to visit.
46. My sense of worth entirely depends on my achievement at work.
48. Even if I really let myself go, my partner would not leave me or have an affair.
50. Feeling continually tired is an unpleasant experiences I could not bear.

Items tapping into expectations

3. I can cope with my baby on my own.
27. I expect that my life will be generally improved as a result of this pregnancy.
29. Being a mother will be the most fulfilling experience I can ever have.
49. If my baby loves me back (s)he will play with me better than anyone else.
53. After my baby is born, I will never be lonely in my life again.

Items representing general statements (not specific to motherhood)

4. If I do not keep up my appearance, people will reject me.
6. If my home does not look absolutely right, I feel a failure.
13. I should be able to control how I feel.
19. I feel frustrated if I am prevented from doing the things I want to do.
21. My wishes are no less important than those of other people in my life.
26. I have to be able to plan my day.
31. My immediate family should be the only ones I need.

Difficult to understand

20. I should be able to bring on milk if I want to.

4.1.3.5. Principal component analysis

A principal component factor analysis (PCFA), using SPSS v. 23 (SPSS, 2015) was conducted on the remaining 20 items of the PRBQ (see Table 7). An oblique rotation method (direct oblimin) was used because, theoretically, our factors should be related and may correlate with one another. The Kaiser-Meyer-Olkin test confirmed the sampling adequacy of the remaining items of the PRBQ (KMO = .86). Because the KMO statistic is well above the minimum criterion of .5 (Kaiser, 1970), and falls within the "meritorious" range, according to a guideline developed by Hutcheson and Sonfroniou (1999), we can be confident that the sample size was adequate for a factor analysis.

Table 7. Twenty-Item PRBQ used for Principal Components Analysis

1.	I should not have to ask for help with my baby.
2.	I am as enthusiastic as I should be about my future role as a mother.
7.	If I do not feel maternal it means I am bad.
8.	I do not have to be a perfect mother.
12.	If people only see me as a mother or wife I would feel diminished as a person.
15.	I should appreciate every single moment of the early part of my baby's life.
17.	I have to do all it takes to make my baby completely happy.
23.	I should try hard to keep my figure during pregnancy.
25.	Motherhood is an instinctive and natural state for a woman.
28.	If my baby was unhappy it would be because of something I had not done.
38.	If my baby is unhappy I will feel that it is my fault.
39.	If someone important pays me less attention after the birth it is because the baby is more important to them than I.
40.	If someone else's baby is happier than mine it is probably because I am an inadequate mother.
41.	If I am unable to satisfy my baby I am a bad mother.
42.	I have got to do regular exercise after the birth to get my figure back.
43.	I welcome the changes in my body, even those like odours (not including any illnesses).
47.	If I do not feel completely emotionally attached to my baby I should worry about what this means.
51.	If my baby is able to rule my activities it is because I am too weak.
52.	If I can't look after my baby properly it shows I am useless.
54.	Motherhood is a time when I should be calm and serene.

Based on an analysis of the scree plot, three factors were retained, accounting for 46.73% of the cumulative variance. Because questions 28 and 38 were very similar ("If my baby was unhappy, it would be because of something I had not done" and "If my baby is unhappy, I will feel that it is my fault"), the item with the lower factor loading, item 28, was removed, and the PCFA with oblique rotation (direct oblimin) method was repeated on the scale with 19 items. The Kaiser-Meyer-Olkin test confirmed the sampling adequacy of

the remaining items of the PRBQ (KMO = .86). Based on an analysis of the scree plot, three factors were retained, with eigenvalues of 5.19, 2.21, and 1.51, accounting for 46.87% of the cumulative variance. Items that loaded less than .4 on any of the factors were discarded. If an item loaded more than .4 on one factor, and also loaded on another factor within approximately .2 of the loading on the first factor, it was also discarded. This procedure led to the removal of five items, leaving a 14-item, three-factor structure scale. Table 8 shows the factor loadings, after rotation.

Table 8. Rotated Factor Loadings from 19-item PRBQ Exploratory Factor Analysis

	Factor 1	Factor 2	Factor 3
1. If some else's baby is happier than mine, it is probably because I am an inadequate mother	**.88**		
2. If I am unable to satisfy my baby, I am a bad mother	**.88**		
3. If I can't look after my baby properly, it shows I am useless	**.83**		
4. If I do not feel maternal, it means I am bad	**.74**		
5. If my baby is unhappy, I will feel that it is my fault	**.68**		
6. If I do not feel completely emotionally attached to my baby, I should worry about what this means	**.55**		
7. If someone important pays me less attention after the birth, it is because the baby is more important to them than I am	**.52**		
8. I am as enthusiastic as I should be about my role as a mother	**.51**		
9. I should appreciate every single moment of the early part of my baby's life		**.69**	
10. I have to do all it takes to make my baby completely happy		**.69**	
11. Motherhood is an instinctive and natural state for a woman		**.62**	
12. I should try hard to keep my figure during pregnancy			**.82**
13. I have got to do regular exercise after the birth to get my figure back			**.78**
14. I welcome the changes in my body, even those like odours (not including any illnesses)			**.58**

4.1.3.6. Reliability and validity

Cronbach's alpha (Cronbach, 1951) was used to calculate internal reliability. The first factor, representing dysfunctional attitudes specific to motherhood and consisting of eight items (α = .86) demonstrated good reliability. The reliability analysis of the second factor (α = .57), representing idealistic attitudes towards motherhood, showed that if item 25 were removed, reliability would be slightly improved. After removing item 25, the remaining

two items in factor two, still possessed a low reliability coefficient ($\alpha = .63$). The three items in the third factor, representative of attitudes towards changes in one's body, also had a weak reliability coefficient ($\alpha = .60$).

A series of Shapiro-Wilks tests of normality were conducted on the data, which suggested that our variables were significantly different than normal (see Appendix 10). As a result, a series of non-parametric, Spearman's Rho correlation analyses were conducted to examine the association between the three factors of the PRBQ and EPDS, AToM, and DAS-A-17 scores. Results of the correlation analyses, along with the means, standard deviations, and ranges for our variables of interest are presented in Table 9. Factor one (eight items) was strongly associated with our outcomes of interest: EPDS, DAS-A-17, and AToM. Factor two (two items) was not significantly correlated with either the EPDS or the DAS-A-17, and was only weakly associated with the AToM. Factor three (three items) also revealed weak associations with EPDS, DAS-A-17, and AToM scores.

Because of the poor reliability indices of the two factors, the lack of meaningful relationship with our outcomes of interest, and the lack of theoretical association with attitudes specific to motherhood that are linked to depression, these factors were discarded from the final version of the PRBQ. Subsequent analyses were carried out on the first factor, labelled dysfunctional attitudes specific to motherhood, which formed the PRBQ-8.

Temporal stability of the PRBQ-8 was examined using a test-retest reliability analysis. Mean PRBQ-8 scores between time one and time two were highly correlated ($r_s = .70$, $p < .001$), suggesting that the PRBQ-8 is reliable over time. Spearman's Rho analyses showed the PRBQ-8 was significantly correlated with the EPDS, DAS-A-17, and the AToM (see Table 9), demonstrating convergent and concurrent validity.

Table 9. Correlation Coefficients and Descriptive Statistics for Study One Variables (*N* = 344)

Descriptive statistics of study variables				
	Mean	SD	Range	Cronbach's α
EPDS	8.53	5.38	0-29	.89
DAS-A-17	49.05	18.14	17-96	.93
PRBQ factor 1	25.44	9.14	8-54	.86
PRBQ factor 2	11.68	3.68	3-20	.63
PRBQ factor 3	11.17	2.39	4-14	.60
AToM	24.99	10.93	0-59	.88

Spearman's Rho Correlations						
	EPDS	DAS-A-17	PRBQ-8 Factor 1	PRBQ Factor 2	PRBQ Factor 3	AToM
DAS-A-17	.52**	1				
PRBQ factor 1	.49**	.75**	1			
PRBQ factor 2	.07	.01	.11*	1		
PRBQ factor 3	.19**	.34**	.26**	.02	1	
AToM	.41**	.57**	.71**	.33**	.18**	1

*$p < .05$ **$p < .01$
Note: *N* = 344, EPDS = Edinburgh Postnatal Depression Scale; DAS-A-17 =Dysfunctional Attitudes Scale (Form A) Revised; PRBQ = Pregnancy Related Beliefs Questionnaire; AToM = Attitudes towards Motherhood Scale

4.1.3.7. Predictive utility of the PRBQ-8 and the AToM

Two hierarchical regression analyses were conducted in order to examine and compare the predictive utility of the maternal attitudes scales, after controlling for demographic variables, history of mental health difficulties, and general dysfunctional attitudes. The Durbin Watson statistic was used to ensure the assumption of independence was met for each regression analysis. As a conservative rule, Field (2013) suggests values less than 1 or greater than 3 may be indicative of a violation of this assumption. Field also suggests that the closer to two the value is, the more certain it is that the assumption has been met. The

Durbin Watson statistic was between 1.85-1.86 in all of the regression analyses suggesting the assumption of independence was met in all of the analyses conducted.

Data were also examined for signs of collinearity between predictors. First, the correlation matrix was inspected to establish whether any predictors correlated highly, above .8 or .9, which researchers have suggested is a good "ball park" method (Field, 2013) of identifying collinearity. No evidence of multicollinearity was identified. Second, the variance inflation factor (VIF) and tolerance statistic were inspected for evidence of collinearity. VIF scores fell much below 10 and tolerance scores were much above .2. Researchers have suggested that if the largest VIF is greater than 10, there may be an issue with multicollinearity (Myers, 1990) and if tolerance scores are below .2 this is indicative of a potential problem (Menard, 1995). On the basis of the above scrutiny, it was concluded that there were no problems with multicollinearity in the data.

A normal probability plot was used to test for normality violations (see Appendix 11). The results showed that the distribution was normal, as the dots lie almost exactly along the diagonal line. A plot of predicted values versus residuals were examined for homoscedasticity in the data. There were no obvious outliers on our plot and the dots were evenly spaced, indicating the assumption of homoscedasticity was met.

Predictive validity of the PRBQ-8. In order to test predictive validity of the PRBQ-8, we ran a hierarchical regression analysis in which the EPDS scores were the dependent variable and the predictor variables were entered stepwise in the following order: demographics, PHMHD, DAS-A-17 scores, and PRBQ-8 scores. The results showed that the regression model was significant: $F(9, 334) = 25.04$; $p < .001$; $R = .64$, explaining 40.3% of the variance in depression scores. The PRBQ-8 was the strongest predictor of depression, followed by GDA, and PHMHD (see Table 10).

Table 10. Hierarchical Regression Analysis Assessing the Incremental Predictive Validity of the PRBQ-8 on Perinatal Depression Severity

Block of variables			
Model	R^2	$F(df)$	Sig of F
1	.04	2.01 (337)	.06
2	.15	8.63 (336)	<.001
3	.36	24.00 (335)	<.001
4	.40	25.04 (334)	<.001
Individual variables in each model			
	β	t	p
Model 1			
Age	-.12	-2.11	.04
Education	.03	.57	.57
Ethnicity	-.07	-1.27	.20
Marital status	.05	.88	.38
Pregnant vs postpartum	.13	2.44	.02
Parity	.07	1.14	.26
Model 2			
Age	-.13	-2.37	.02
Education	.06	1.13	.26
Ethnicity	-.09	-1.73	.09
Marital status	.04	.66	.51
Pregnant vs postpartum	.10	1.97	.05
Parity	.04	.83	.41
PHMHD	-.35	-6.83	<.001
Model 3			
Age	-.02	-.34	.73
Education	-.10	-2.07	.04
Ethnicity	-.06	-1.48	.16
Marital status	.03	.69	.49
Pregnant vs postpartum	.01	.27	.79
Parity	.02	.38	.70
PHMHD	-.22	-4.88	<.001
DAS-A-17	.51	10.57	<.001
Model 4			
Age	-.01	-.12	.91
Education	-.10	-2.02	.04
Ethnicity	-.06	-1.48	.14
Marital status	.02	.39	.69
Pregnant vs postpartum	.00	.03	.97
Parity	.02	.44	.66
PHMHD	-.22	-4.88	<.001
DAS-A-17	.28	4.10	<.001
PRBQ-8	.31	4.64	<.001

Note: N = 344, Age and Education were entered as continuous variables; Ethnicity: Non-white = 1, White = 2; Marital status: Married = 1, Not married = 2; Pregnant vs postpartum: Currently pregnant = 1, Given birth in the last six months = 2; Parity: First child = 1, Not first child = 2; PHMHD = Past history of mental health difficulties: Yes = 0, No = 1; EPDS = Edinburgh Postnatal Depression Scale; DAS-A-17 = Dysfunctional Attitudes Scale (Form A) Revised; PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised

Predictive validity of the AToM. We conducted the same analysis as described above with the AToM scale, instead of the PRBQ-8, with the EPDS scores as the dependent variable. The hierarchical regression analysis showed that this regression model was also significant: $F(9, 334) = 23.41$; $p < .001$; $R = .62$ and it explains 38.7% of the variance in depression scores. With this model, GDA was the strongest predictor of depression, followed by PHMHD, and finally scores on the AToM (See Table 11).

Table 11. Hierarchical Regression Analysis Assessing the Incremental Predictive Validity of the AToM on Perinatal Depression Severity

Block of variables			
Model	R^2	$F(df)$	Sig of F
1	.04	2.01 (337)	.06
2	.15	8.63 (336)	<.001
3	.36	24.00 (335)	<.001
4	.39	23.41 (334)	<.001
Individual variables in each model			
	β	t	p
Model 1			
Age	-.12	-2.11	.04
Education	.03	.57	.57
Ethnicity	-.07	-1.27	.20
Marital status	.05	.88	.38
Pregnant vs postpartum	.13	2.44	.02
Parity	.07	1.14	.26
Model 2			
Age	-.13	-2.37	.02
Education	.06	1.13	.26
Ethnicity	-.09	-1.73	.09
Marital status	.04	.66	.51
Pregnant vs postpartum	.10	1.97	.05
Parity	.04	.83	.41
PHMHD	-.35	-6.83	<.001
Model 3			
Age	-.02	-.34	.73
Education	-.10	-2.07	.04
Ethnicity	-.06	-1.48	.16
Marital status	.03	.69	.49
Pregnant vs postpartum	.01	.27	.79
Parity	.02	.38	.70
PHMHD	-.22	-4.88	<.001
DAS-A-17	.51	10.57	<.001
Model 4			
Age	-.00	-.05	.96
Education	-.05	-1.04	.30
Ethnicity	-.04	-.99	.32
Marital status	.01	.30	.76
Pregnant vs postpartum	-.01	-.22	.83
Parity	.02	.45	.66
PHMHD	-.23	-5.17	<.001
DAS-A-17	.38	6.27	<.001
AToM	.20	3.50	.00

Note: N = 344, Age and Education were entered as continuous variables; Ethnicity: Non-white = 1, White = 2; Marital status: Married = 1, Not married = 2; Pregnant vs postpartum: Currently pregnant = 1, Given birth in the last six months = 2; Parity: First child = 1, Not first child = 2; PHMHD = Past history of mental health difficulties: Yes = 0, No = 1; EPDS = Edinburgh Postnatal Depression Scale; DAS-A-17 = Dysfunctional Attitudes Scale (Form A) Revised; AToM = Attitudes towards Motherhood Scale

4.1.4. Discussion

4.1.4.1. Prevalence of Perinatal Depression and Participant Differences

The results from the current study suggest that postnatal depression is more prevalent than antenatal depression. The percentage of women presenting with postnatal depression was over double that of those with antenatal depression. The prevalence rates from the current study also appear to be higher than rates of perinatal depression reported in the literature (Heron et al., 2004; Johanson, Chapman, Murray, Johnson, & Cox, 2000; Joseffson et al., 2001) and this is especially true with rates of postnatal depression. The results from a large-scale longitudinal study exploring the rates and incidence of perinatal depression from 18 weeks gestation to eight months postpartum, revealed that the rates of depression peaked in the third trimester (Heron et al., 2004). Perhaps the observed increase in prevalence rates in the current study are due to differences in recruitment style, as the majority of participants (and 100% of our postnatal participants) were recruited through online community support sites for mothers and mums to be.

Results revealed that individuals recruited from online community websites were more educated, more depressed, and held more GDA than women recruited consecutively from St. Michael's hospital. Perhaps, individuals with higher education levels, who are more depressed, and hold stronger beliefs about perfectionism and need for approval are engaging more with support groups for mums, where the advertisements for this study were placed, such as mumsnet.com and Facebook groups for mothers. In contrast, participants who were recruited consecutively during their routine antenatal appointments, may not have been actively seeking emotional support, and therefore were less likely to be depressed and less likely to hold GDA. In the current study, the entire postnatal sample was recruited via online community websites, which may also explain the much higher rates of postnatal depression, compared to antenatal depression. It remains unclear whether

the reason for the higher prevalence of postnatal depression, compared to antenatal depression is due to differences in recruitment style, or whether postnatal depression is more prevalent than antenatal depression.

4.1.4.2. Psychometric Properties of the PRBQ-8

The principal aim of this study was to revise the original PRBQ, developed by Moorhead and colleagues (Moorhead et al., 2003), so that its content reflects dysfunctional maternal attitudes and to examine the psychometric properties of the revised PRBQ. An exploratory factor analysis supported a one-factor, eight-item measure of dysfunctional maternal attitudes (PRBQ-8). The PRBQ-8 demonstrated strong internal and temporal consistency and was significantly associated with the EPDS, the DAS-A-17, and the AToM, demonstrating convergent and concurrent validity. The PRBQ-8 also demonstrated strong predictive validity; it was the strongest predictor of perinatal depression, after taking into account demographic variables, PHMHD, and general cognitive style.

An additional goal of the study was to independently examine the predictive utility of the AToM scale (Sockol et al, 2014). Our findings suggest the AToM is a reliable and valid measure of attitudes specific to motherhood, yet GDA were a stronger predictor of perinatal depression than the AToM. When comparing the predictive utility of the two scales, the PRBQ-8 appears to be a stronger predictor of perinatal emotional distress than the AToM, after controlling for demographic variables, PHMHD, and GDA.

4.1.4.3. Predictors of perinatal depression: GDA and maternal attitudes

Our findings suggest that amongst demographic variables only, lower educational status was significantly associated with perinatal depression symptoms, a finding commonly reported by other researchers in the field (O'Hara & Swain, 1996; Rubertsson et al., 2005). A reported history of mental health difficulties was also associated with perinatal

depression, and this has previously been reported to be a risk factor for both antenatal and postnatal depression (Leigh & Milgrom, 2008).

Our results revealed a significant association between GDA and perinatal depression, in accordance with previous research that suggests themes of perfectionism and need for approval are associated with depression in the general population (de Graaf et al., 2009), as well as the perinatal population (de Graaf et al., 2010; Sockol & Battle, 2015). In line with evidence that suggests that women who are postnatally depressed may be cognitively heterogeneous (Cooper & Murray, 1995; Warner et al., 1997), our results revealed that GDA contributed to variance in perinatal depression severity independently from and in addition to variance accounted for through maladaptive attitudes specific to motherhood.

Consistent with Beck's theory, in particular with later developments of his theory (Beck, 2002), specific dysfunctional beliefs may be more relevant in predicting depression compared to GDA, as they will interact with particular stressors, such as childbirth/motherhood. Our results demonstrated that maternal attitudes add incrementally to the explained variance in perinatal depression scores after GDA were taken into account. These results suggest that, in the context of parenting-related stressors during pregnancy and the postnatal period, dysfunctional beliefs that focus on themes of motherhood and what it means to be a good or bad mother may be of greater importance compared to perfectionism and attitudes relating to the need for approval by others, which represent more general dysfunctional attitudes.

4.1.4.4. Cognitive content of the PRBQ-8

A closer examination into the content of the PRBQ-8 reveals that all of the items appear to tap into attitudes relating to motherhood that are of a conditional nature, "if.. then," which Beck termed conditional assumptions. These "if ..then" propositions give rise to 'rules' of

how one must or should be. Overly rigid and inflexible cognitions regarding what makes a good or a bad mother, will likely give rise to negative evaluations of oneself as a mother. Feelings of inadequacy may be triggered which, in turn, may activate ruminative thinking concerning one's own competency as a mother, which may further undermine the woman's confidence in her own mothering ability and trigger low mood. Similar themes of dichotomous attitudes and judgements by the self and others stand out as particularly important in previously-developed measures of dysfunctional attitudes specific to the perinatal period: the AtoM (Sockol et al., 2014) and the more recently developed RMBS scale (Thomason et al., 2015). In both of these scales, items that tap into dichotomous thinking and judgments of what constitutes a good or bad parent were more strongly associated with perinatal depression than other items tapping into maternal role idealisation or role identity, for example.

4.1.4.5. Limitations

There are a number of limitations to note. First, data are based on self-report questionnaires, which may be subject to social desirability, self-report errors, and poor recall. Future research could use more objective measures of mood problems, such as diagnostic interviews based on DSM-IV criteria, and obtain more objective records of PHMHD, such as official records from a GP or other health care professional. Second, the use of a snowball recruitment method, used in our community sample recruited online may have led to a selective sample that is not representative of the general population, as this sample has a disproportionately higher level of education and higher scores on depression and GDA measures. For the current study, recruiting a large sample of individuals quickly was important and the benefits of this sampling technique outweighed the limitations. Third, the results of this study were limited by the cross-sectional design, which does not allow causation to be determined. Instead, it is possible that maladaptive maternal attitudes

may be by-product of increased perinatal emotional distress. Future research could explore the predictive role of the PRBQ-8 prospectively. Finally, an exploratory factor analysis does not determine whether the factor structure is a good fit to the data, it only provides information regarding how many factors are needed to represent the data. A confirmatory factor analysis is necessary to confirm the factor structure of the PRBQ-8.

4.1.4.6. Future Directions

Only one study, to date, has explored the role of antenatal maladaptive maternal attitudes in predicting postnatal depression, while controlling for the effects of antenatal depression symptoms (Thomason et al., 2015). Although, Thomason and colleagues (2015) found that one of their dichotomous attitudes sub-factors prospectively predicted postnatal depression, no prospective research, to our knowledge, has explored the unique contribution of antenatal maternal-specific attitudes compared to GDA in predicting both the onset of an episode of postnatal depression or severity of postnatal depression symptoms. If maternal-specific attitudes are demonstrated to independently increase risk for the development of postnatal depression, these attitudes may be targeted for change in early pregnancy to prevent or reduce some of the deleterious outcomes associated with perinatal emotional distress. In the next study we will address some of the limitations of study one, first, by conducting a confirmatory factor analysis on the PRBQ-8 to determine whether the one-factor, eight-item structure is a good fit to the data; finally, we will prospectively explore the independent role of these maternal attitudes in predicting the onset and severity of postnatal depression.

4.2. Study Two: Confirmatory Factor Analysis and Prospective Predictive Validity of the PRBQ-8

4.2.1. Introduction

The cross-sectional exploration of the PRBQ-8 demonstrated that the one factor, eight-item questionnaire had strong internal and temporal consistency, as well as convergent and concurrent validity, as it was significantly associated with alternative measures of depression and both GDA and dysfunctional attitudes specific to motherhood. The PRBQ-8 also demonstrated strong predictive validity, as it was the strongest predictor of perinatal depression, after taking into account the effects of demographic variables, PHMHD, and GDA; however, this was established using a cross-sectional sample.

In order to fully validate the PRBQ-8, it was necessary to examine its construct validity using confirmatory factor analysis (CFA). Furthermore, predictive validity needed to be established using a longitudinal study design, as our cross-sectional analysis enables only correlational association and it is impossible to determine whether these dysfunctional attitudes causally increase perinatal depression or whether they are symptoms of perinatal depression. Specifically, it was of interest to determine whether antenatal PRBQ-8 scores can predict the onset of an episode of postnatal depression as well as severity of postnatal depression symptoms, after controlling for antenatal depressive symptoms and GDA.

4.2.1.1 Hypotheses

There were four hypotheses for the current study:

1. The CFA will support our one factor, eight-item model;
2. The PRBQ-8 will be significantly correlated with depression and GDA, demonstrating its convergent and concurrent validity;

3. Antenatal PRBQ-8 scores will prospectively predict the onset of an episode of postnatal depression, in a non-depressed antenatal sample, after controlling for the effects of baseline depression and GDA;
4. Antenatal PRBQ-8 scores will prospectively predict the severity of postnatal depression, after controlling for demographic information, baseline depression, and GDA.

4.2.2. Methods

4.2.2.1. Participants

A consecutive sample of participants were recruited from St. Michaels Hospital, NHS North Bristol Trust for a larger, longitudinal study, presented in Chapter Five (characteristics of the entire sample are described in Chapter Five, page 147). Participants included the first 210 women (aged 19-41 years) of the 303 total, who had completed a battery of questionnaires at two time points: early in the second trimester (M =14.43 weeks gestation; SD = 1.65 weeks) and postnatally (M = 7.21 weeks after birth; SD = 1.97 weeks). See Table 12 for demographic characteristics of our study sample. For the CFA, we randomly selected PRBQ-8 antenatal (n = 104) and postnatal responses (n = 106), ensuring a cross-sectional sample.

Table 12. Demographic Characteristics of Study Two Participants (*N* = 210)

	N	%
Ethnicity		
Caucasian	195	92.9
Asian	5	2.4
Mixed	4	1.9
Hispanic	3	1.4
Black	2	1.0
Far East Asian	1	.5
Education		
O levels/GCSE or equivalent	26	12.4
A levels or equivalent	47	22.4
University degree	80	38.1
Postgraduate degree	57	27.1
Employment status		
Employed full time	132	62.9
Employed part-time	45	21.4
Homemaker	15	7.1
Student	3	1.4
Other	15	7.1
Marital status		
Married	141	67.1
Not married	69	32.9
PHMHD		
Yes	77	36.7
No	133	63.3
Children		
Primiparous	110	52.4
Multiparous	100	47.6

Note: *N* = 210, PHMHD = Past history of mental health difficulties

4.2.2.2. Instruments

Measure of depression. The EPDS, described in Chapter 4, page 77, was used to measure perinatal depressive symptoms (see Appendix 2). Empirically determined cut-off scores were used to determine the likely presence of an episode of perinatal depression. To determine the likely presence of an episode of minor (including major) antenatal depression a cut-off score of 13 or more was used (Murray & Cox, 1990). Sensitivity for this cut-off criteria is reported at 64%, specificity at 90%, and positive predictive value is 50%. A cut-off score of 10 or more was used to determine the likely presence of an episode of minor (including major) postnatal depression, with high sensitivity (90%) and specificity (78%) demonstrated (Cox et al., 1987; Harris, Huckle, Thomas, Johns, & Fung, 1989; Murray & Carothers, 1990).

Measure of general dysfunctional attitude. The Dysfunctional Attitudes Scale-Revised (DAS-A-17) was used to measure GDA (see Appendix 3). See Chapter 4, page, 78 for information about the psychometric properties of this scale.

Measure of maternal attitudes. The PRBQ-8 is an eight-item, one factor instrument used to measure maladaptive attitudes about motherhood. Each of the eight statements is rated on a seven-point Likert-style scale, ranging from (1) totally agree to (7) totally disagree. Total scores range from 8-56; higher scores indicate greater levels of maladaptive attitudes towards motherhood (see Appendix 12). The psychometric properties of this scale, as reported in study one, show preliminary promise.

Study-developed questionnaire. Questions were developed by the researcher to examine demographic factors, such as age, education, ethnicity, marital status, and parity (see Appendices 13-15).

4.2.2.3 Procedure

Participants were recruited at the NHS North Bristol Trust St. Michael's Hospital in the Ultrasound department waiting room. All patients who were 18 and older and attending their routine 12-week scan were offered an information sheet by the researcher (see Appendix 16), outlining the purpose of the study, expectations of participants, and anonymity of responses. Women who wanted to participate signed the consent form (see Appendix 17) and were given the option to complete the questionnaire online or via hard copy. Participants who chose to complete the questionnaires online were emailed a hyperlink, directing them to the study's website, which contained the battery of questionnaires. Participants who chose to complete a hardcopy were provided with a copy of the questionnaires via post and were asked to complete and return them in the provided stamped and addressed return envelope. Participants who returned completed questionnaires within the required time frame, were offered a £5 Amazon voucher after completion of the first and the last set of questionnaires.

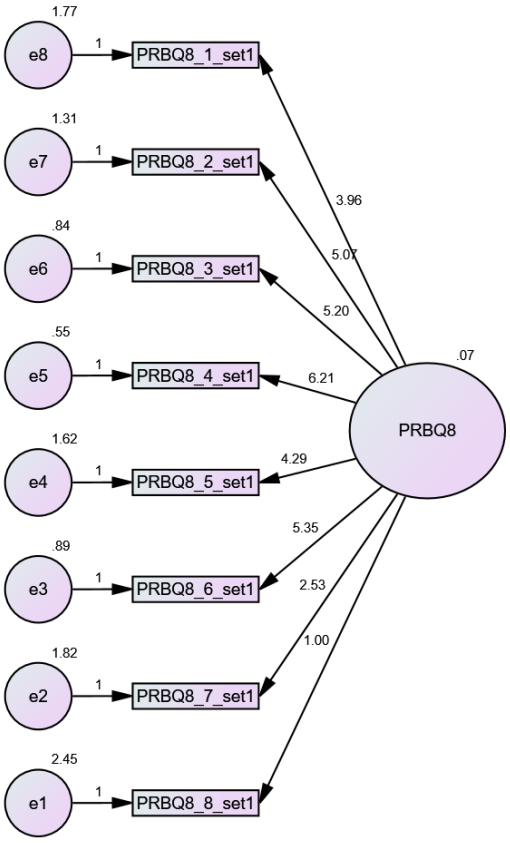
The questionnaires took approximately 15-20 minutes to complete. In order to eliminate the possibility of completing the questionnaire more than once, participants were emailed a personalised link with their participation number and were only able to complete the questionnaire once. To eliminate data from individuals who may have completed the survey online solely for the incentive, data from individuals who completed the questionnaire in less than six minutes were removed. This research project was approved by both the National Health Service (NHS) Ethics Committee Board and University Ethics Committee (see Appendix 9).

4.2.3. Results

4.2.3.1. Confirmatory Factor Analysis

A Confirmatory Factor Analysis (CFA) was performed to test the fit of the model using AMOS v. 23 (Arbuckle, 2014). Five indices were utilised to evaluate the fit of the model: Chi-square measure of fit, the Comparative Fit Index (CFI), the Standardised Root Mean Square Residual (SRMR), the Root Mean Square Error of Approximation (RMSEA), and *p* of Close Fit (PCLOSE). The following criteria were adopted in the interpretation of the findings (Lei & Wu, 2007): A non-significant chi-square p-value indicates a failure to reject the null hypothesis, suggesting the model fits the data. The CFI is a goodness of fit index that is used to supplement Chi-square, adjusting for the effect of sample size; a CFI value greater than .95 indicates a good fit. For the SRMR and RMSEA, as absolute fit indices that measure the extent to which the model reproduces the sample covariance matrix, lower values indicate better model-data fit. Hu and Bentler (1999) suggest the following criteria for good data-model fit: SRMR less than or equal to .08 and RMSEA less than or equal to .06. PCLOSE is used to test whether the RMSEA is greater than .05. A non-significant PCLOSE value indicates a close-fitting model (Lei & Wu, 2007). The confirmatory factor analysis performed on our data confirmed the single factor structure of the PRBQ-8 and showed that the eight item, one factor model, is a good fit to the data, $x^2(20) = 23.64$, p = .26, CFI = 1.00, SRMR = .03, RMSEA = .03, PCLOSE = .76. See figure two for the path diagram of the one factor, eight item PRBQ-8.

Figure 2: Path Diagram of the One-Factor, Eight-Item PRBQ-8



4.2.3.2. Descriptive statistics

Cronbach's alpha (Cronbach, 1951) was used to calculate reliability (see Table 13). A series of Kolmogorov-Smirnov tests suggested that the majority of the study variables significantly differed from normality (see Appendix 18). The means, standard deviations, and ranges for our variables of interest are presented in Table 13.

Table 13. Descriptive Statistics for Study Two Variables (*N* = 210)

Descriptive statistics of study variables				
	Mean	SD	Range	Cronbach's α
Antenatal PRBQ-8	26.16	9.14	8-53	.85
Antenatal DAS-A-17	46.40	16.89	17-102	.92
Antenatal EPDS	6.68	4.83	0-23	.86
Postnatal PRBQ-8	24.87	9.80	8-53	.87
Postnatal EPDS	6.94	4.73	0-25	.87

4.2.3.3. Correlation analyses

In order to explore convergent and concurrent validity of the PRBQ-8, a series of non-parametric, Spearman's Rho correlation analyses were conducted to examine the association between the PRBQ-8 scores and EPDS and DAS-A-17 scores. Spearman's Rho correlation analyses showed the PRBQ-8 was significantly correlated with both the EPDS and the DAS-A-17, demonstrating convergent and concurrent validity. Antenatal DAS-A-17 scores were also significantly associated with antenatal and postnatal depression, however they did not correlate as strongly with perinatal depression as the PRBQ-8 scores did. See Table 14 for correlation analyses.

Table 14. Correlation Coefficients for Study Two Variables (*N* = 210)

Spearman's Rho Correlations				
	Antenatal DAS-A-17	Antenatal EPDS	Postnatal PRBQ-8	Postnatal EPDS
Antenatal PRBQ-8	.64	.45	.66	.38
Antenatal DAS-A-17	1	.37	.50	.36
Antenatal EPDS		1	.37	.59
Postnatal PRBQ-8			1	.54
Postnatal EPDS				1

All coefficients are significant ($p < .01$)

4.2.3.4. Predictive validity of the PRBQ-8

In order to explore the predictive validity of the PRBQ-8, after controlling for baseline depressive symptoms and GDA, two regression analyses were conducted. First, a binary logistic regression analysis was conducted to explore the role of maladaptive antenatal attitudes about motherhood in a non-depressed group of women during their second trimester, in predicting the onset of an episode of postnatal depression (minor or major). Secondly, a further hierarchical regression analysis was conducted to explore the role of maladaptive antenatal attitudes about motherhood in predicting the severity of postnatal depressive symptoms.

Assumptions of binary logistic regression analysis. Assumptions for the logistic regression analysis were met, as our dependent variable was binary (classification met for the likely presence of an episode of postnatal depression: yes or no), and our observations were independent. Peduzzi, Concato, Kemper, Holford, and Feinstein (1996) developed a

formula (N = 10 k / p) to determine the minimum number of participants to include for a binary logistic regression analysis. In this suggested formula, p represents the smallest of the proportions of negative or positive cases in the population and k represents the number of independent variables. For the current study, we had three independent variables and the proportion of positive cases was 24% (n = 45/186). Based on these criteria, the minimum number of cases required was N = 10 x 3 / .24 = 125, and our non-depressed antenatal sample size (n = 186) was adequate.

Antenatal PRBQ-8 as a predictor of the onset of an episode of postnatal depression. In order to determine whether second trimester PRBQ-8 scores significantly predicted the onset of an episode of postnatal depression, in a non-depressed sample of pregnant women (*N* = 186), after controlling for variance accounted for through baseline antenatal depression symptoms and GDA, a binary logistic regression analysis was conducted. Second trimester EPDS scores were entered into the first step, followed by second trimester DAS-A-17 scores in the second step, and second trimester PRBQ-8 scores in the third step. The final logistic regression model was statistically significant, $\chi^2(3) = 45.01$, $p < .001$. The model explained 32.1% (Nagelkerke R^2) of the variance in detecting the presence of an episode of postnatal depression and correctly classified 78.5% of the 45 new cases (See Table 15). Antenatal EPDS scores were the strongest predictor of the onset of an episode of postnatal depression, followed by antenatal PRBQ-8 scores. DAS-A scores were not significant.

Table 15. Logistic Regression Analysis Assessing Antenatal PRBQ-8 Scores as a Prospective Predictor of the Onset of an Episode of Postnatal Depression

Block of variables				
Model	R^2		Chi-square (*df*)	Sig of *F*
1	.28		38.37 (1)	<.001
2	.29		40.50 (2)	<.001
3	.32		45.01 (3)	<.001
Individual variables in final model				
	B	Wald statistic	*p*-value	Odds ratio
Model 1				
Antenatal EPDS	.35	28.50	<.001	1.42
Model 2				
Antenatal EPDS	.33	23.77	<.001	1.39
DAS-A-17	.02	2.13	.14	1.02
Model 3				
Antenatal EPDS	.32	21.68	<.001	1.38
DAS-A-17	-.00	.02	.89	1.00
PRBQ-8	.07	4.41	.04	1.07

Note: *N* = 186, Antenatal EPDS = Edinburgh's Postnatal Depression Scale administered during the second trimester; DAS-A-17 = Dysfunctional Attitudes Scale-Revised; PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised

Assumptions of hierarchical regression analyses. The Durbin Watson statistic was used to ensure the assumption of independence was met for each regression analysis. As a conservative rule, Field (2013) suggests values less than 1 or greater than 3 may be indicative of a violation of this assumption. He also suggests that the closer to two the value is, the more certain it is that the assumption has been met. The Durbin Watson statistic was 1.85 for the following regression analysis, suggesting the assumption of independence was met.

A correlation matrix was examined for signs of collinearity between predictors. Researchers have suggested that correlations of above .8 or .9 is a good "ballpark" method (Field, 2013) of identifying collinearity. There was no evidence of multicollinearity between predictor variables, as correlations among the variables all fell below .64. The variance inflation factor (VIF) and tolerance statistic was also examined for evidence of collinearity. VIF scores fell much below 10 and tolerance scores were much above .2.

Researchers have suggested that if the largest VIF is greater than 10, there may be an issue with multicollinearity (Myers, 1990) and if tolerance scores are below .2 this is indicative of a potential problem (Menard, 1995). Results suggest there are no problems with multicollinearity in our data. A normal probability plot was examined to check for normality violations (see Appendix 19). The plot revealed that the distribution was normal, as the dots lie almost exactly along the diagonal line. A plot of predicted values versus residuals was explored for evidence of homoscedasticity in our data. There were no obvious outliers on our plot and the dots were evenly spaced, indicating the assumption of homoscedasticity was met.

In regard to sample size, a commonly recommended "rule of thumb" is to use at least 10-20 cases per independent variable. Tabachnick and Fidell (2007) suggest a formula of N = 104 + k for a minimum sample size, with k representing the number of predictors used. These sample size suggestions are based on detecting a medium effect size ($\beta \geq .20$), with critical $\alpha \leq .05$, with power of 80%. With eight predictors, our sample size of 210 is larger than the recommended sample size for a hierarchical regression analysis.

Antenatal PRBQ-8 scores as a predictor of severity of postnatal depression symptoms. A hierarchical regression analysis was conducted to examine the incremental predictive validity of the PRBQ-8, after controlling for demographic variables, antenatal depressive symptoms, and GDA. Postnatal EPDS scores were the dependent variable and the predictor variables were entered in the stepwise fashion. The final regression model was significant: $F(8, 201) = 16.14$; $p < .001$; $R = .62.5$, explaining 39.1% of the variance in postnatal depression scores. After taking into account demographic variables, antenatal depression, and GDA, only antenatal EPDS scores and the PRBQ-8 significantly predicted severity of postnatal depression (see Table 16).

Table 16. Hierarchical Regression Analysis Assessing the Incremental Predictive Validity of Antenatal PRBQ-8 Scores on Postnatal Depression

Block of variables			
Model	R^2	$F(df)$	Sig of F
1	.04	1.55 (204)	.18
2	.37	19.82 (203)	<.001
3	.38	17.47 (202)	<.001
4	.39	16.14 (201)	<.001
Individual variables in final equation			
	β	t	p
Model 1			
Age	.03	.36	.72
Education	.17	2.20	.03
Ethnicity	-.08	-1.11	.27
Marital status	.11	1.42	.16
Parity	.04	.47	.64
Model 2			
Age	.08	1.24	.22
Education	.09	1.41	.16
Ethnicity	-.03	-.61	.55
Marital status	.01	.21	.84
Parity	-.03	-.50	.62
Antenatal EPDS	.59	10.35	<.001
Model 3			
Age	.06	.91	.37
Education	.08	1.25	.21
Ethnicity	-.04	-.65	.52
Marital status	.02	.28	.78
Parity	-.02	-.35	.73
Antenatal EPDS	.55	8.86	<.001
DAS-A-17	.10	1.58	.12
Model 4			
Age	.06	-.06	.96
Education	.07	-1.52	.13
Ethnicity	-.04	-1.38	.17
Marital status	.02	.47	.64
Parity	-.01	-.16	.88
Antenatal EPDS	.50	7.59	<.001
DAS-A-17	.01	.17	.86
PRBQ-8	.17	2.16	.03

Note: N = 210, Age and Education were entered as continuous variables; Ethnicity: Non-white = 1, White = 2; Marital status: Married = 1, Not married = 2; Pregnant vs postpartum: Currently pregnant = 1, Given birth in the last six months = 2; Parity: First child = 1, Not first child = 2; Antenatal EPDS: Second trimester scores of Edinburgh Postnatal Depression Scale; DAS-A-17 = Dysfunctional Attitudes Scale-Revised; PRBQ-8 = Pregnancy Related Beliefs Questionnaire-revised trimester.

4.2.4. Discussion

4.2.4.1. Psychometric Properties of the PRBQ-8

Our psychometric examination of the revised version (PRBQ-8) of the PRBQ (Moorhead et al., 2003) offers further evidence that PRBQ-8 is a valid and reliable instrument of maladaptive maternal attitudes. The confirmatory factor analysis conducted on the PRBQ-8 supported a one-factor, eight-item measure. The PRBQ-8 once again demonstrated strong internal consistency and was significantly associated with both antenatal and postnatal depression and a measure of GDA, demonstrating convergent and concurrent validity. The PRBQ-8 also demonstrated strong predictive validity, as antenatal PRBQ-8 scores significantly predicted the onset of an episode of postnatal depression, using a non-depressed antenatal sample, after controlling for the effects of baseline severity of depression and GDA, and also predicted severity of postnatal depressive symptoms, after taking into account demographic variables, antenatal depression scores, and GDA.

4.2.4.2. Predictors of Perinatal Depression: GDA and maternal attitudes

Antenatal depression symptoms were the strongest predictors of both the onset of an episode of postnatal depression, as well as increased severity of postnatal depression. This is in line with findings from previous studies that have demonstrated that antenatal depression is one of the most significant predictors of postnatal depression (Biaggi, Conroy, Pawlby, & Pariante, 2016; Leigh & Milgrom, 2008; O'Hara & Swain, 1996). After antenatal depression, the only other significant predictor was maladaptive attitudes about motherhood (PRBQ-8). These results supported the hypothesis that maladaptive antenatal maternal attitudes would add incrementally to the explained variance in detecting the onset of an episode of postnatal depression, after GDA were taken into account.

Although GDA were significantly correlated with both antenatal and postnatal depression severity, our results revealed that GDA did not predict either the onset or severity of postnatal depression, after taking into account the contribution of antenatal depression. These findings support previous research (de Graaf et al., 2010; Gotlib et al., 1991), which suggests that although GDA are commonly associated with perinatal depression, their role in predicting future perinatal depression was less certain. A number of researchers have reported that antenatal GDA do not prospectively predict postnatal depression, once antenatal symptoms of depression are controlled for (Gotlib et al., 1991; Grazioli & Terry, 2000; O'Hara et al., 1982). These results suggest that GDA may either simply be a by-product of emotional distress or, in the context of motherhood/childbirth, holding general attitudes regarding perfectionism and need for approval does not increase vulnerability for future distress during the perinatal period.

Consistent with Beck's theory (Beck, 2002), specific dysfunctional beliefs activated by relevant stressors, appear to be more relevant in predicting symptoms of depression than GDA. Holding dysfunctional beliefs about motherhood and, specifically, what it means to be a good or bad mother in the antenatal period, appears to independently predict both the onset of an episode of postnatal depression, as well as the severity of postnatal depressive symptoms, suggesting these maladaptive cognitions may be of greater relevance in the perinatal period than holding GDA, such as perfectionism and attitudes relating to the need of approval by others. This is a novel finding, as no study, to date, has demonstrated the importance of maternal-specific attitudes in predicting the onset or severity postnatal depression prospectively, whilst taking into account background factors, antenatal depression symptoms, and GDA.

4.2.4.3. Limitations

There are a number of limitations to consider. The use of self-report data may be subject to social desirability, self-report errors, and poor recall. For the current study, the benefits of using self-report questionnaires, such as the ability to quickly and cheaply collect replicable data from large samples, outweighed the limitations. More objective measures of mood, such as clinical diagnostic interviews could be used in future research. Second, the results may not be generalizable to the general population, as there was a disproportionately higher level of Caucasian participants present in the sample, as well as those who were educated to a degree level. Future research, using a more diverse sample specifically targeting more ethnically diverse women and those of lower socio-demographic status is required in order to ascertain cultural and linguistic generalisability of our findings.

4.2.4.4. Implications

Despite the above limitations, the current study extends our understanding of the role of dysfunctional maternal attitudes in predicting symptoms of perinatal depression and offers a new, brief assessment tool, i.e. the PRBQ-8, as a valid and reliable instrument for the assessment of such attitudes. The brevity and ease of completion of the PRBQ-8 make it particularly suitable for use as a screening instrument for identification of unhelpful maternal attitudes during the antenatal period. Women identified as holding such attitudes could be offered cognitive interventions aimed at attitude modification, which, in turn, may reduce their risk of developing depression postnatally. If the PRBQ-8 is to be used in routine care as a tool for identifying pregnant women at an increased risk of developing postnatal depression, normative data and cut-off scores for the likely occurrence of a future episode of postnatal depression should be established.

4.3. Conclusions and Future Directions

The results from the above two studies suggest that the PRBQ-8 is a valid and reliable measure of dysfunctional attitudes specific to motherhood, which is the only cognitive factor that independently predicts the onset and severity of postnatal depression after taking into account the effects of demographic variables, baseline depression severity, and GDA. In line with Beck's Cognitive Theory of Depression (Beck, 1967; 2002), our results demonstrate that holding overly rigid and inflexible cognitions regarding what makes a good or a bad mother during pregnancy can increase vulnerability for future postnatal depression.

According to the metacognitive approach to psychological dysfunction, based on the S-REF theory (Wells & Matthews, 1994; 1996), metacognitive beliefs, which control our responses to stressful thoughts or situations may lead to increased emotional distress. The metacognitive approach to understanding psychological dysfunction (outlined in Chapter Three, pages 51 to 54) asserts that holding certain maladaptive beliefs about the regulation of cognition may be more relevant in predicting perinatal emotional distress than holding maladaptive cognition/beliefs, such as attitudes about motherhood, perfectionism, or beliefs regarding the need for approval by others (Hjemdal, Stiles, & Wells, 2013; Myers, Fisher, & Wells, 2009a;b).

Research examining the independent contribution of cognitive and metacognitive processes in predicting perinatal depression, outside of the contribution of maladaptive cognitive content, would examine the utility of the S-REF theory in the perinatal period, and help to determine which of these amenable cognitive processes may increase risk for emotional distress during the perinatal period. In the next chapter the role of both cognitive and metacognitive processes in contributing to perinatal depression and anxiety will be explored.

Chapter Five: An Exploration of the Role of Cognitive Beliefs about Motherhood and Metacognitive Beliefs in Perinatal Depression and Anxiety

5.1. Study Three: The Contribution of Metacognitive Beliefs in Predicting Perinatal Depression: A Cross-Sectional Study

5.1.1. Introduction

Research has shown that cognitive style and, in particular, dysfunctional attitudes, increases vulnerability to depression in both the general and perinatal population (Leigh & Milgrom, 2008). In cross-sectional studies, both general and maternal-specific dysfunctional attitudes have been shown to independently contribute to the severity of perinatal depression symptoms (Sockol et al., 2014; Sockol & Battle, 2015); however, longitudinal research suggests that GDA do not prospectively predict postnatal depression, once antenatal symptoms of depression are taken into account (Gotlib et al., 1991; Grazioli & Terry, 2000; O'Hara et al., 1982). There is a lack of research exploring the role of dysfunctional attitudes specific to motherhood in predicting future perinatal emotional distress, but preliminary evidence suggests that holding rigid dichotomous cognitions regarding what makes a good or a bad mother during pregnancy can increase vulnerability to future postnatal depression (Thomason et al., 2015).

5.1.1.1. Cognitive vs Metacognitive Approaches

While the majority of cognitive theoretical approaches focus on identifying maladaptive cognitive content that increases risk for emotional distress, more recently, researchers have proposed the need for a more integrative cognitive model of emotional disorders that looks beyond cognitive content, such as dysfunctional attitudes, and incorporates cognitive

processing, such as metacognitive appraisals of the significance of cognitions, as a mechanism for the development and maintenance of emotional distress. Metacognitions are conceptualised within Wells & Matthews' (1994, 1996) S-REF theory. According to the metacognitive approach, beliefs about one's thoughts plays a greater role in the development and maintenance of emotional distress than non-metacognitive beliefs, such as dysfunctional attitudes about motherhood, need for approval, or perfectionism.

5.1.1.2. Contribution of metacognitions in predicting emotional distress

Several researchers have explored the independent contribution of maladaptive cognitions, compared to metacognitions in predicting emotional distress in the general population (Bailey & Wells, 2016; Hjemdal et al., 2013; Melli et al., 2016). Cross-sectional research suggests that metacognitive beliefs independently contribute to emotional distress, including anxiety (Baily & Wells, 2015), depression (Cook et al., 2015a), OCD (Myers, Fisher, & Wells, 2009a), and PTSD (Cook et al., 2015a) symptoms, after taking into account variance due to maladaptive cognitive content (Bailey & Wells, 2013; Bailey & Wells, 2016; Melli et al., 2016), providing support for the S-REF model. Due to the cross-sectional nature of these studies, it is impossible to know whether holding metacognitions actually precedes emotional distress, as the S-REF theory suggests, or whether they are by-products of symptoms of emotional distress.

Only a few researchers have explored the relevance of the metacognitive approach compared to the cognitive approach in predicting increased emotional distress prospectively (Bailey & Wells, 2016b; Cook et al., 2015b; Myers et al., 2009b). Bailey and Wells (2016b) found, amongst a sample of nursing students (n = 105), that along with baseline health anxiety severity, metacognitive beliefs about the uncontrollability of health-related thoughts ("I have no control over thinking about my health") and metacognitive beliefs about biased thinking ("I will be punished for thinking I am in good

health"), were the only significant predictors of health anxiety six months later, after controlling for maladaptive non-metacognitive health-related beliefs, personality factors, and baseline health anxiety. These results suggest metacognitions play a causal role in the development of future increases in health anxiety and that it may be more relevant to target metacognitive beliefs about health-related thoughts for change in individuals with health anxiety than dysfunctional beliefs specific to health.

5.1.1.3. Relationship between maladaptive attitudes, metacognitions, and emotional distress

According to the S-REF model (Matthews & Wells, 1994; 1996), under certain circumstances, such as pregnancy or child-birth, self-discrepancy between one's current state and one's desired state may develop due to the presence of dysfunctional attitudes specific to one's current circumstance. If thoughts are appraised negatively, this can lead to coping strategies, such as increased thought control or worry, which are associated with increased emotional distress. Therefore, metacognitive appraisals of one's thoughts may influence (either directly or indirectly) the relationship between dysfunctional attitudes and increased emotional distress. Metacognitive beliefs may moderate the relationship between dysfunctional attitudes and emotional distress, by directly influencing the strength or direction of the relationship between dysfunctional attitudes and emotional distress. Alternatively, metacognitive beliefs may act as an intermediary variable (a mediator), through which dysfunctional attitudes influence emotional distress, forming an indirect relationship between dysfunctional attitudes and increased emotional distress. Only a few researchers have explored the interplay between these three variables and the influence that metacognitive beliefs may have on the relationship between dysfunctional attitudes and emotional distress (Bailey & Wells, 2015; 2016).

Bailey and Wells (2015b; 2016b) explored the role of metacognitive beliefs as a moderator in the relationship between maladaptive health-related attitudes and increased health anxiety in both cross-sectional (Bailey & Wells, 2015b) and prospective (Bailey & Wells, 2016b) samples. They hypothesised that although certain health-related attitudes, such as negative beliefs about bodily signs and symptoms of illness (catastrophic misinterpretation), are associated with increased health anxiety and hypochondriasis in the literature (Fergus, 2014, Norris & Marcus, 2014), these beliefs may not be pathological on their own. Bailey and Wells (2015b; 2016b) set out to explore whether metacognitive beliefs determined the strength and/or direction of the observed relationship between maladaptive health-related beliefs and health anxiety (Bailey & Wells, 2016b; Bailey & Wells, 2015b).

In a cross-sectional study, Bailey & Wells (2015b) demonstrated that metacognitive beliefs about the uncontrollability and danger of one's thoughts moderated the relationship between maladaptive beliefs about illness (catastrophic misinterpretations) and health anxiety. Their results also revealed that the interaction between negative beliefs about one's thoughts and dysfunctional beliefs regarding illness predicted health anxiety, after controlling for anxiety sensitivity, neuroticism, and dysfunctional beliefs regarding illness. The cross-sectional design of this study limited the conclusions that can be made regarding causation and whether metacognitive beliefs can directly influence the relationship between dysfunctional health-specific cognitions and future health anxiety.

To address this short-coming, Bailey & Wells (2016b) explored the role of metacognitive beliefs as a causal moderator in the relationship between dysfunctional illness-related beliefs and emotional distress. Specifically, they wanted to explore whether the relationship between dysfunctional beliefs about health and future health anxiety was moderated by a combination of health-related metacognitive beliefs: beliefs that thoughts cause illnesses, beliefs about biased thinking, and beliefs that thoughts are uncontrollable.

Their results demonstrated that the maladaptive beliefs about health interacted with metacognitive beliefs about health to influence the direction and strength of symptoms of health anxiety, six months later.

Further analyses revealed that the interaction between beliefs about health and metacognitive beliefs independently predicted severity of future health anxiety, after controlling for personality factors, metacognitive beliefs, maladaptive non-metacognitive beliefs about health, and baseline health anxiety. The only other significant predictors were baseline health anxiety scores and metacognitive beliefs that thoughts are uncontrollable. In line with the S-REF theory (Wells & Matthews, 1994; 1996), these results suggest that cognitions and metacognitions may work together to increase risk for future emotional distress.

5.1.1.4. Metacognitions in the perinatal period

There is a significant lack of research exploring metacognitions and the S-REF theory (Wells & Matthews, 1994, 1996) in the perinatal period. Only one study, to date, has explored the role of metacognitions in the perinatal period (Alfaraj et al., 2008). Alfaraj and colleagues (2008) compared positive metacognitive beliefs about the usefulness of engaging in ruminative thought between depressed pregnant women and non-depressed pregnant women and found the depressed group of women held significantly more positive metacognitive beliefs about the usefulness of engaging in ruminative thought than the non-depressed group. Additionally, positive metacognitive beliefs predicted the classification of an episode of antenatal depression, after controlling for perceived lack of social support (Alfaraj et al., 2008). The cross-sectional nature of this study limits the conclusions regarding causation and whether positive beliefs about rumination were the reason for the increase in depression or whether increased depression led to increased positive beliefs about rumination.

Research on metacognitive beliefs in the perinatal period is in its preliminary stages. There is no research, to date, exploring the contribution of metacognitions in predicting perinatal depression, outside of the contribution of maladaptive cognitive content. Research examining the contribution of metacognitive processes, outside of the contribution made by maladaptive cognitive content, is necessary to examine the relevance of the S-REF theory (Wells & Matthews, 1994, 1996) in the perinatal population and to obtain a more thorough understanding of perinatal emotional distress.

5.1.1.5. Aims of the current study

There are several aims for the current study:

1.) To explore the association between metacognitive beliefs and perinatal depression using a large, cross-sectional sample of women in the perinatal period;

2.) To explore the association between metacognitive beliefs and maladaptive cognitive content (general and specific);

3.) To examine the independent contribution of metacognitive processes in predicting perinatal depression after controlling for the contribution of socio-demographic factors, history of mental health difficulties, and dysfunctional cognitive content (general and specific to motherhood);

4) To explore whether metacognitions moderate or mediate the relationship between maladaptive attitudes and perinatal depression.

5.1.1.6. Study Hypotheses

1) It is hypothesised that all five factors of the MCQ-30 will be associated with perinatal depression and that negative beliefs about the uncontrollability and danger of one's thoughts will be the metacognitive factor with the strongest association with perinatal depression.

2.) It is hypothesised that all five factors of the MCQ-30 will be associated with increased maladaptive attitudes (both general and specific to motherhood);

3). It is hypothesised that negative metacognitive beliefs about the uncontrollability and danger of one's thoughts will significantly contribute to the prediction of perinatal depression, after taking into account the effects of socio-demographic factors, past history of mental health difficulties, and dysfunctional cognitive content;

4. It is hypothesised that metacognitive beliefs about the uncontrollability and danger of thoughts will moderate the relationship between dysfunctional attitudes about motherhood and perinatal depression.

5.1.2. Methods

5.1.2.1. Participants

The cross-sectional sample (N = 344) used for the psychometric evaluation of the PRBQ-8 (study one of the thesis) was used. See Chapter Four, pages 74-76 for details.

5.1.2.2. Instruments

Measure of depression. The Edinburgh Postnatal Depression Scale (EPDS) was used to measure perinatal depression severity. The description and psychometric properties are given in Chapter 4, page77 (See Appendix 2).

Measure of general dysfunctional attitudes. The Dysfunctional Attitudes Scale (Form A) Revised (DAS-A-17; de Graaf et al., 2009) is a 17-item measure of the presence and severity of general dysfunctional cognitive style, with two factors:

perfectionism/performance evaluation and need for approval by others (see Appendix 3). The description and psychometric properties are provided in Chapter 4, page 78.

Measures of dysfunctional beliefs specific to the perinatal period. The revised Pregnancy Related Beliefs Questionnaire (PRBQ-8; See Appendix 12) is a valid and reliable eight-item measure of dysfunctional maternal attitudes (see chapter 4). Respondents are asked to read each of the eight statements provided and indicate how much they agree or disagree with each statement using a seven-point Likert-style scale, with answer options ranging from totally agree (1) to totally disagree (7). Scores range from 7-56. Higher scores indicate greater levels of dysfunctional attitudes towards motherhood.

Measure of metacognitive beliefs. The Metacognitions Questionnaire-30 (MCQ-30), developed by Wells & Cartwright-Hatton (2004), consists of five replicable sub-scales assessed by 30 items in total (see Appendix 20). The five sub-scales measure the following dimensions of metacognition: (1) positive beliefs about worry, (2) negative beliefs about worry concerning uncontrollability and danger, (3) beliefs about cognitive confidence, (4) beliefs about the need to control thoughts, and (5) cognitive self-consciousness. Respondents are asked to read a series of 30 statements and to indicate the extent to which they agree with each statement using a four-point Likert-style scale, with answers ranging from "do not agree" (1) to "agree very much" (4). Scores range from 30-120, with higher scores indicating more dysfunctional metacognitive beliefs.

The MCQ-30 possesses good internal consistency. Item-total correlations for the full scale are .31-.68 and for each factor are .77-.83 (positive beliefs about worry), .70-.82 (negative beliefs about worry), .72-.87 (cognitive confidence), .30-.65 (need to control thoughts), and .56-.83 (cognitive self-consciousness). Cronbach's alpha for the total scale is .93 and each factors' Cronbach alpha is .92, .91, .93, .72, and .92, respectively.

Temporal reliability was demonstrated over the re-test period of 22-118 (mean re-test interval was 34.14 days), with no significant differences between the five factors over time. Pearson's re-test correlations for the total scale was .75. For each subscale Pearson's re-test correlations were .79, .59, .69, .74, and .87, respectively.

Construct validity was demonstrated through confirmatory and exploratory factor analyses. Convergent validity was demonstrated, as all five factors of the MCQ-30 were significantly correlated with the trait anxiety subscale of the State-Trait Anxiety Inventory (STAI; Spielberger et al., 1983) and the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990). The strength of the relationships between factor two of the MCQ-30, representing negative metacognitive beliefs about worry, and both worry (r = .73) and anxiety (r = .69) are highlighted by the authors, as negative beliefs about worry explain 53% of the variance in worry scores and 48% of the variance in trait anxiety scores (Wells & Cartwright-Hatton, 2004).

Study-developed questionnaire. The study-developed questionnaire from study one (see Appendix 6), was used to assess demographic information and past history of mental health difficulties, description of the questions are provided in Chapter 4, page 79.

5.1.2.3. Procedure

The same procedure from study one was followed. The procedure is described in Chapter 4, page 79.

5.1.3. Results

5.1.3.1. Study variables

A series of Shapiro-Wilks tests of normality were conducted on the data, which suggested that our variables were significantly different than normal (See Appendix 10 for results of the normality tests). Means, standard deviations and ranges for our study variables are presented in Table 17.

Table 17. Descriptive Statistics for Study Three Variables (N = 344)

Descriptive statistics of study variables				
	Mean	SD	Range	Cronbach's α
EPDS	8.53	5.38	0-29	.89
DAS-A-17	49.05	18.14	17-96	.93
PRBQ-8	25.44	9.14	8-54	.86
MCQ POS	10.75	4.18	6-24	.91
MCQ NEG	11.06	4.50	6-24	.89
MCQ CC	9.98	4.32	6-24	.90
MCQ CT	9.30	3.47	6-22	.82
MCQ CSC	13.54	3.87	6-24	.80

5.1.3.2. Correlations

A series of non-parametric Spearman's Rho correlation analyses were conducted to examine the association between the five factors of the MCQ-30, EPDS, DAS-A-17, and PRBQ-8 scores. Results of the correlation analyses are presented in Table 18. All five metacognitive factors were positively and significantly associated with perinatal depression. The metacognitive factor with the strongest association with perinatal depression was negative beliefs about the uncontrollability and danger of thoughts.

All five metacognitive factors were also significantly and positively associated with both GDA and maladaptive attitudes specific to motherhood. Negative beliefs about the uncontrollability and danger of thoughts was the metacognitive factor most strongly associated with both GDA and dysfunctional attitudes about motherhood, followed by metacognitive beliefs about the need to control thoughts.

Table 18. Correlation Coefficients for Study Three Variables (*N* = 344)

Spearman's Rho Correlations								
	1	2	3	4	5	6	7	8
(1) EPDS	1	.52	.49	.34	.60	.35	.43	.35
(2) DAS-A-17		1	.75	.39	.46	.33	.40	.24
(3) PRBQ-8			1	.35	.44	.34	.47	.23
(4) MCQ POS				1	.40	.21	.34	.40
(5) MCQ NEG					1	.35	.55	.50
(6) MCQ CC						1	.42	.26
(7) MCQ CT							1	.45
(8) MCQ CSC								1
All are significant at <.01								

Note: *N* = 344, EPDS = Edinburgh Postnatal Depression Scale; DAS-A-17 = Dysfunctional Attitudes Scale-Revised; PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised; MCQ POS = Metacognitive Questionnaire-30, positive beliefs about worry; MCQ NEG = Metacognitive Questionnaire-30, negative beliefs about the uncontrollability and danger of one's thoughts; MCQ CC = Metacognitive Questionnaire-30, cognitive confidence; MCQCT = Metacognitive Questionnaire-30, need to control thoughts; MCQ CSC = Metacognitive Questionnaire-30, cognitive self-consciousness.

5.1.3.3. Hierarchical regression analysis

In order to test the role of the MCQ-30 factors as independent predictors of perinatal depression, we ran a regression analysis in which the EPDS scores were the dependent variable and the predictor variables were entered stepwise in the following order: demographics, past history of mental health difficulties, DAS-A-17 scores, PRBQ-8 scores, and the MCQ-30 factors. The results showed that the regression model was significant: $F(14, 329) = 23.71$; $p < .001$; $R = .71$, explaining 50.2% of the variance in

depression scores. Factor two (negative beliefs about the uncontrollability and danger of one's thoughts) was the strongest predictor of depression, followed by the PRBQ-8, GDA, and a history of mental health difficulties (Table 19).

Table 19. Hierarchical Regression Analysis Assessing the Incremental Predictive Validity of the MCQ-30 Factors on Perinatal Depression Severity

Block of variables			
Model	R^2	$F(df)$	Sig of F
1	.04	2.01 (337)	.06
2	.15	8.63 (336)	<.001
3	.36	24.00 (335)	<.001
4	.40	25.04 (334)	<.001
5	.50	23.71 (329)	<.001
Individual variables in final equation			
	B	*t*	Sig of *t*
Model 1			
Age	-.12	-2.11	.04
Education	.03	.57	.57
Ethnicity	-.07	-1.27	.20
Marital status	.05	.88	.38
Pregnant vs postpartum	.13	2.44	.02
Parity	.07	1.14	.26
Model 2			
Age	-.13	-2.37	.02
Education	.06	1.13	.26
Ethnicity	-.09	-1.73	.09
Marital status	.04	.66	.51
Pregnant vs postpartum	.10	1.97	.05
Parity	.04	.83	.41
PHMHD	-.35	-6.83	<.001
Model 3			
Age	-.02	-.34	.73
Education	-.10	-2.07	.04
Ethnicity	-.06	-1.48	.16
Marital status	.03	.69	.49
Pregnant vs postpartum	.01	.27	.79
Parity	.02	.38	.70
PHMHD	-.22	-4.88	<.001
DAS-A-17	.51	10.57	<.001
Model 4			
Age	-.01	-.12	.91
Education	-.10	-2.02	.04
Ethnicity	-.06	-1.48	.14
Marital status	.02	.39	.69
Pregnant vs postpartum	.00	.03	.97
Parity	.02	.44	.66
PHMHD	-.22	-4.88	<.001
DAS-A-17	.28	4.10	<.001
PRBQ-8	.31	4.64	<.001
Model 5			
Age	.04	.86	.39
Education	-.06	-1.35	.18
White vs non white	-.03	-.61	.55
Married vs not married	.01	.16	.87
Pregnant vs postpartum	.02	.48	.63

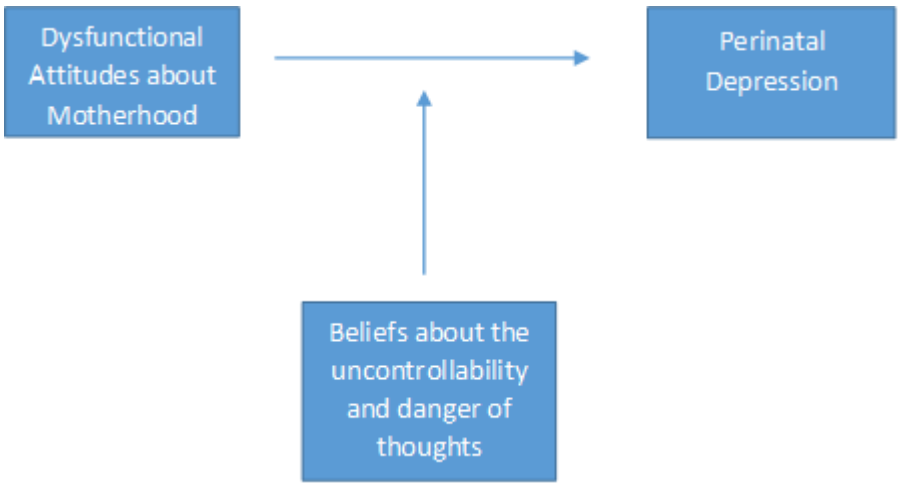
First child	.03	.64	.53
PHMHD	-.12	-2.79	.01
DAS-A-17	.18	2.76	.01
PRBQ-8	.19	2.95	<.001
MCQ POS	-.01	-.15	.88
MCQ NEG	.36	5.68	<.001
MCQ CC	.01	.21	.83
MCQ CT	.04	.55	.58
MCQ CSC	.03	.58	.56

Note: *N* = 344, Age and Education were entered as continuous variables; Ethnicity: Non-white = 1, White = 2; Marital status: Married = 1, Not married = 2; Pregnant vs postpartum: Currently pregnant = 1, Given birth in the last six months = 2; Parity: First child = 1, Not first child = 2; PHMHD = Past history of mental health difficulties: Yes = 0, No = 1; EPDS = Edinburgh Postnatal Depression Scale. DAS-A-17 = Dysfunctional Attitudes Scale-Revised; PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised; MCQ POS = Metacognitive Questionnaire-30, positive beliefs about worry; MCQ NEG = Metacognitive Questionnaire-30, negative beliefs about the uncontrollability and danger of worry; MCQ CC = Metacognitive Questionnaire-30, cognitive confidence; MCQ CT = Metacognitive Questionnaire-30, need to control thoughts; MCQ CSC = Metacognitive Questionnaire-30, cognitive self-consciousness

5.1.3.4. Moderation

To determine whether metacognitive beliefs about the uncontrollability and danger of thoughts moderate the relationship between maladaptive attitudes about motherhood and perinatal depression, a bootstrap estimation approach was adopted (PROCESS; Preacher & Hayes, 2004). For a variable to act as moderator, variation in the moderation variable must change either the strength or direction of the relationship between the independent variable and the dependent variable, producing an interaction effect between the moderator and the independent variable (Baron & Kenny, 1986). The proposed moderation model asserts that the relationship between maladaptive attitudes about motherhood and perinatal depression is directly affected by metacognitive beliefs about the uncontrollability and danger of one's thoughts (see Figure 3).

Figure 3. Proposed Moderation Model



Results revealed the moderation effect was not significant, B = .01, 95% CI [-.00, .02], t = 1.60, p = .11. The conditional effect of maladaptive attitudes about motherhood on perinatal depression was demonstrated in three regression analyses:

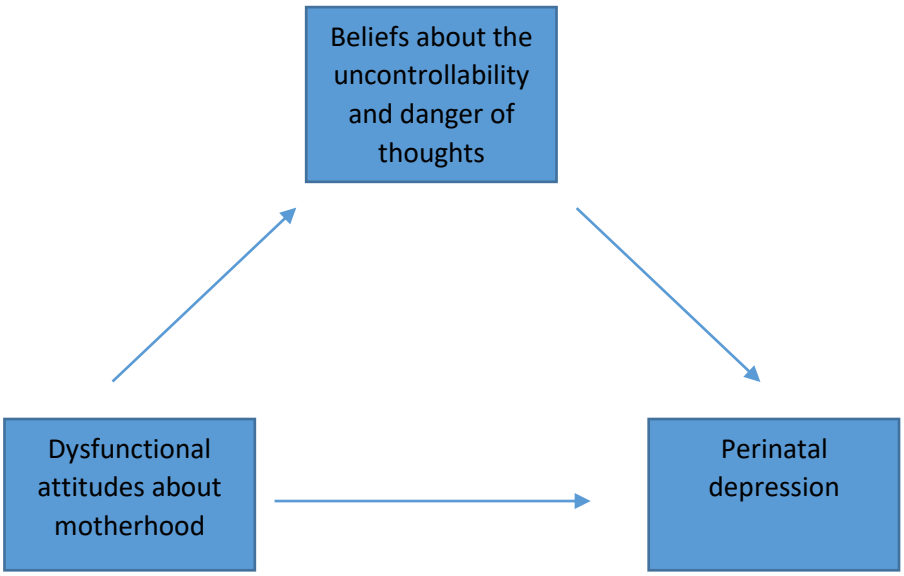
1. When individuals produce low scores on the measure of metacognitive beliefs about the harmfulness and danger of one's thoughts, the relationship between maladaptive attitudes about motherhood and perinatal depression is positive and significant, B = .14, 95% CI [.07, .22], t = 3.73, p < .001.
2. When individuals produce moderate scores on the measure of metacognitive beliefs about the harmfulness and danger of one's thoughts, the relationship between maladaptive attitudes about motherhood and perinatal depression remains positive and significant, B = .18, 95% CI [.12, .23], t = 6.44, p < .001.
3. When individuals produce high scores on the measure of metacognitive beliefs about the harmfulness and danger of one's thoughts, the relationship between maladaptive attitudes about motherhood and perinatal depression still remains positive and significant, B = .21, 95% CI [.15, .27], t = 6.75, p < .001.

No evidence of moderation was found, as the relationship between maladaptive attitudes about motherhood and perinatal depression remained significant, regardless of changes in metacognitive beliefs about the harmfulness and danger of one's thoughts.

5.1.3.5. Mediation

In order to explore whether metacognitive beliefs about the danger and uncontrollability of ones' thoughts mediates the relationship between maladaptive attitudes about motherhood and perinatal depression, Baron and Kenny's (1986) four step approach was used. According to Baron and Kenny (1986) four conditions must be met: 1) The independent variable must predict the dependent variable. 2) The independent variable must predict the mediating variable. 3) The mediating variable should predict the dependent variable, after controlling for the effect of the independent variable. 4) The strength of the relationship between the independent variable and the dependent variable should be decreased (with partial mediation) or lose its significance (full mediation), after controlling for the effect of the mediator. See Figure 4 for a diagram of the proposed mediation model, which asserts that the relationship between maladaptive attitudes about motherhood and perinatal depression will be indirectly affected through metacognitive beliefs about the uncontrollability and danger of one's thoughts.

Figure 4. Proposed Mediation Model



Results of a regression analysis revealed that the first and second criteria were met, as maladaptive attitudes about motherhood significantly predicted perinatal depression, *B* = .33, SE = .03, $p < .001$ and maladaptive attitudes about motherhood significantly predicted negative beliefs about the uncontrollability and danger of one's thoughts, *B* = .25, SE = .02, $p < .001$. The third condition was also met, as metacognitive beliefs predicted perinatal depression (*B* = .56, SE = .05, $p < .001$), after taking into account the contribution of maladaptive attitudes about motherhood (*B* = .19, SE = .03, $p < .001$), with the combination of the two variables explaining 46.8% of the variance $F(2,341) = 149.96$, $p < .001$. These results are indicative of partial mediation, based on the fourth criteria, as the strength of the direct relationship between maladaptive attitudes about motherhood and perinatal depression (*B* = .33, SE = .03, $p < .001$) was significantly reduced (*B* = .19, SE = .03, $p < .001$) after controlling for the indirect effect of metacognitive beliefs. Maladaptive attitudes about motherhood still contributed unique variance towards perinatal depression symptoms, after the indirect effect of the mediator was controlled for; therefore, full

mediation is not present.

The significance of the indirect effect of the mediating variable was tested using a bootstrap estimation approach with 5000 samples (PROCESS; Preacher & Hayes, 2004). These results indicated there was a significant indirect effect of maladaptive attitudes about motherhood on perinatal depression through negative metacognitive beliefs about the uncontrollability and danger of one's thoughts, *ab* = .14, SE = .02, 95% CI = [.10, .18]. A Sobel-test (also known as the product of coefficients approach; Baron & Kenny, 1986; Hayes, 2009) confirmed the significance of the indirect effect (Sobel $Z = 7.42$, $p < .001$).

5.1.4. Discussion

5.1.4.1. Association between metacognitive beliefs and perinatal depression

In support of the first study hypothesis, the results revealed that all five metacognitive factors were associated with perinatal depression. The associations between these metacognitions and depression in the general population have previously been demonstrated (Spada, Mohiyeddini, & Wells, 2008; Spada, Nikčević, Moneta, & Wells, 2008); however, this is the first time the relationship between these metacognitive factors have been explored in the perinatal period. These results suggest that certain stable beliefs about the significance, appraisal, and regulation of one's thoughts are associated with depression in the perinatal period, as well as the general population.

The second study hypothesis, that negative metacognitive beliefs about the uncontrollability and danger of thoughts would be the metacognitive factor most strongly associated with depressive symptoms, was also supported. These results support findings from other researchers who have examined these factors in the general population (Spada, Mohiyeddini, & Wells, 2008; Spada et al., 2011). Specifically, holding strong metacognitive beliefs that one's thoughts are out of control and potentially harmful to

one's self, appears to be strongly linked with increased severity of depression in the perinatal period. Once again, these results provide evidence that the S-REF (Matthews & Wells, 1994, 1996) theory may be generalisable to the perinatal period.

5.1.4.2. Association between metacognitive beliefs and non-metacognitive beliefs

In support of the third study hypothesis, all five metacognitive factors were associated with maladaptive attitudes (both general and specific to motherhood). These results suggest that individuals who hold maladaptive stable beliefs about the appraisal, significance, and regulation of thoughts, may also be likely to hold dysfunctional attitudes about non-metacognitive external content, such as perfectionism, the need for approval, and rigid beliefs about what makes a good or a bad mother. Previous researchers have reported associations between metacognitive beliefs and maladaptive beliefs about health and found the metacognitions with the strongest associations with maladaptive health-specific content were metacognitive beliefs about uncontrollability, cognitive confidence, and the need to control thoughts (Bailey & Wells, 2015a; Melli et al., 2016). In the current study, the strongest metacognitive associations with dysfunctional cognitive content were found with metacognitive beliefs about the uncontrollability and danger of thoughts and the need to control thoughts. These results suggest that the role that metacognitive factors play in the development and maintenance of perinatal emotional distress, may work together with maladaptive cognitive content (both general and specific to motherhood). Therefore, it is relevant to explore the contribution of each of these factors independently to get a more thorough understanding of their potential roles in increasing the risk for perinatal depression.

5.1.4.3. Predictors of perinatal depression

To further explore the association between metacognitive beliefs and perinatal depression, we explored the independent contribution of each of the metacognitive factors in predicting perinatal depression, outside of the contribution of socio-demographic and cognitive factors. As expected, based on the results from the final regression model using the same cross-sectional sample from chapter four, having a history of mental health difficulties remained a significant predictor in the final equation. Having a history of mental health difficulties is commonly reported as a risk factor for both antenatal and postnatal depression (Leigh & Milgrom, 2008). Similarly, in the final equation, both GDA and maternal-specific dysfunctional attitudes independently predicted perinatal depression, which supports the notion that women who are depressed in the perinatal period may be cognitively heterogeneous (Church et al., 2005; Cooper & Murray, 1995). As presented in chapter four, dysfunctional attitudes specific to motherhood contributed more variance to perinatal depression scores than GDA.

The final regression model explained 51% of the variance in depression scores. The addition of the MCQ-30 factors explained an additional 10% of the variance in perinatal depression scores, with negative metacognitive beliefs about the uncontrollability and danger of one's thoughts, adding significant contribution to the depression variance. Holding metacognitive beliefs about the danger and uncontrollability of one's thoughts emerged as the strongest predictor of perinatal depressive symptoms after taking into account women's demographic information, past history of mental health difficulties, GDA, and dysfunctional attitudes specific to motherhood. These results suggest that, although holding metacognitive beliefs and maladaptive attitudes are associated, metacognitive beliefs about the uncontrollability and danger of one's thoughts contribute to perinatal depression, independently from the contribution of maladaptive cognitive content. Holding certain maladaptive appraisals about one's thoughts may be more relevant

in predicting perinatal emotional distress than holding non-metacognitive maladaptive beliefs, such as attitudes about motherhood, perfectionism, or need for approval by others. This is the first time the independent contribution of the individual factors of the MCQ-30 in predicting variance in perinatal depression scores has been explored, after controlling for the variance accounted for through dysfunctional attitudes (both general and specific to motherhood).

According to the S-REF theory, holding maladaptive attitudes about motherhood may lead to a discrepancy between one's current state and one's desired state during the perinatal period. Appraisals about the significance of one's thoughts can lead to unhelpful coping mechanisms, such as thought control strategies and self-focused repetitive thoughts, which have been shown to increase emotional distress in the general population (Wells & Matthews, 1994; 1996). According to this theory, metacognitive beliefs about the uncontrollability and danger of one's thoughts may moderate or mediate the relationship between maladaptive attitudes and perinatal depression.

5.1.4.4. Moderation

In contrast to our hypothesis and contrary to research that has demonstrated that metacognitive beliefs moderate the relationship between maladaptive attitudes and health anxiety (Bailey & Wells, 2016b), metacognitive beliefs about the uncontrollability and danger of one's thoughts did not moderate the relationship between maladaptive attitudes about motherhood and perinatal depression. The results from the current study revealed that the predictive relationship between maladaptive attitudes about motherhood and perinatal depression remained significant at every level (low, medium, and high) of metacognitive beliefs. Therefore, holding different levels of metacognitive beliefs about the uncontrollability and danger of one's thoughts did not directly change the direction or

strength of the predictive relationship between maladaptive attitudes about motherhood and perinatal depression severity.

5.1.4.5. Mediation

The results from the current study revealed that the predictive relationship between holding maladaptive attitudes about motherhood and perinatal depression was indirectly affected by negative beliefs about the uncontrollability and danger of one's thoughts. Negative metacognitive beliefs about uncontrollability and danger of one's thoughts partially mediated the relationship between maladaptive attitudes about motherhood and perinatal depression, demonstrating that the predictive relationship between maladaptive attitudes and perinatal depression is significantly strengthened when an individual negatively appraises one's thoughts as uncontrollable or dangerous.

5.1.4.6. Summary

The results of this study suggest that metacognitive beliefs may be more relevant in understanding emotional distress in the perinatal period than maladaptive cognitive content, as was suggested in the S-REF theory (Matthews & Wells, 1994, 1996). Perhaps it may be more relevant to target strongly held metacognitive beliefs about the uncontrollability and danger of one's thoughts for change, than maladaptive cognitive content in order to prevent or at least reduce perinatal emotional distress. Because of the cross-sectional design of this study, we are unable to determine whether metacognitions led to increased emotional distress or whether the emotional distress is a by-product of metacognitive beliefs. Longitudinal research is necessary to determine whether metacognitive processes increases risk for future perinatal emotional distress, after controlling for the effects of maladaptive attitudes.

Previous research has demonstrated that metacognitive beliefs can independently predict future health anxiety, outside of the contribution of maladaptive beliefs about health (Bailey & Wells, 2016b); however, there is no research exploring the independent role of metacognitive processes in predicting perinatal anxiety, outside of the contribution of maladaptive beliefs about motherhood. Longitudinal research examining the independent contribution of cognitive and metacognitive processes in predicting perinatal depression and anxiety, outside of the contribution of maladaptive cognitive content, such as maladaptive attitudes about motherhood, is necessary to build on the S-REF theory and help to determine which of these amenable cognitive factors may increase risk for emotional distress during the perinatal period. In the next, longitudinal phase of this chapter, these short-comings will be addressed.

5.2. Study Four: The Contribution of Metacognitions in Predicting Perinatal Depression and Anxiety: A Prospective Exploration

5.2.1. Introduction

The Metacognitive approach offers new insights into understanding the development and maintenance of a variety of psychological disorders, including depression and anxiety. The metacognitive approach asserts that emotional distress is developed and maintained by beliefs about the significance of one's thoughts and the need to control and regulate one's thoughts. Based on the S-REF theory (Wells, & Matthews, 1994, 1996), the metacognitive approach suggests that beliefs about one's thoughts may be more relevant to understanding emotional distress than non-metacognitive maladaptive beliefs, such as attitudes about motherhood, perfection, and need for approval. This is because, under stress, potentially due to holding maladaptive attitudes, metacognitive beliefs can lead to the use of maladaptive coping strategies that regulate unwanted thoughts (e.g. rumination, worry, and

thought suppression), which can maintain and exacerbate the distress originally experienced through holding maladaptive attitudes.

In the cross-sectional study, it was demonstrated that all five metacognitive factors of the MCQ-30 were significantly associated with perinatal depression, with negative beliefs about uncontrollability and danger concerning worry accounting for the majority of the variance in perinatal depression scores, after controlling for the effects of demographic information, past history of mental health difficulties, and general and dysfunctional attitudes specific to motherhood. These results suggested that the metacognitive approach to understanding emotional distress may be useful in explaining emotional distress in the perinatal period. The cross-sectional design employed in the previous study limited the conclusions one could draw regarding causation, making it impossible to determine whether negative metacognitive beliefs about the uncontrollability and danger of one's thoughts precedes increases in perinatal depression or whether increased depression leads to more negative beliefs about the uncontrollability and danger of one's thoughts.

A longitudinal study exploring the prospective role of metacognitive factors in predicting future perinatal emotional distress will build on the S-REF theory, by being the first to prospectively explore the role of these metacognitive dimensions in the perinatal period. For the current study we aim to explore the independent role of metacognitive beliefs, outside of the contribution of maladaptive cognitive beliefs, using a large, prospective perinatal sample.

5.2.1.1. Aims of the current study

There are several aims for the current study:

1.) To explore the prevalence and incidence of perinatal depression and anxiety in a large sample of women who will be followed from the second trimester of pregnancy to eight weeks postpartum;

2.) To explore the association between metacognitive beliefs and perinatal distress outcomes of anxiety and depression;

3.) To explore the association between metacognitive beliefs and maladaptive attitudes about motherhood;

4.) To explore the independent role of maladaptive metacognitive beliefs in prospectively predicting the severity of antenatal and postnatal depression and anxiety, after controlling for socio-demographic factors, baseline emotional distress, social support, and maladaptive attitudes about motherhood;

5.) To explore the independent role of negative beliefs about the uncontrollability and danger of one's thoughts in predicting the onset of an episode of antenatal and postnatal depression and anxiety, after controlling for maladaptive attitudes about motherhood.

6.) To explore whether negative metacognitive beliefs about the uncontrollability and danger of one's thoughts mediates in the prospective relationship between maladaptive attitudes about motherhood and future depression and anxiety.

5.2.1.2. Hypotheses of the current study

1.) It is hypothesised that all five factors of the MCQ-30 will be significantly associated with depression and anxiety, at all three measurement points;

2.) It is hypothesised that, out of all the metacognitive beliefs measured, metacognitive beliefs about the uncontrollability and danger of one's thoughts will have the strongest association with perinatal depression and anxiety at all three measurement points;

3.) It is hypothesised that all five MCQ-30 factors will be significantly associated with maladaptive attitudes about motherhood;

4.) It is hypothesised that, out of all the metacognitive beliefs measured, metacognitive beliefs about the uncontrollability and danger of one's thoughts will have the strongest association with maladaptive attitudes about motherhood;

5.) It is hypothesised that negative beliefs about the uncontrollability and danger of one's thoughts will significantly predict future antenatal and postnatal depression and anxiety severity, after controlling for socio-demographic factors, baseline emotional distress, social support, and maladaptive attitudes about motherhood;

6.) It is hypothesised that negative beliefs about the uncontrollability and danger of one's thoughts will significantly predict the future onset of an episode of antenatal and postnatal depression and anxiety, in a non-depressed/anxious sample of women, after controlling for maladaptive attitudes about motherhood.

7.) It is hypothesised that the relationship between maladaptive attitudes about motherhood and perinatal depression and anxiety, at all three measurement points, will be mediated through negative metacognitive beliefs about the uncontrollability and danger of one's thoughts.

5.2.2. Methods

5.2.2.1. Participants

A consecutive sample of 398 participants were recruited from St. Michael's Hospital, NHS North Bristol Trust, ages 19-42 years old. Participants were included if they were 18 years of age or older, residing in the UK, could complete the questionnaires in English, and were in their second trimester of pregnancy. Participants completed a set of questionnaires in the second trimester (Mean weeks gestation = 14.45, SD = 1.53), the third trimester (Mean weeks gestation = 31.15 SD = 1.50), and after the birth of their baby (Mean weeks after birth = 7.25, SD = 1.81). Out of the 398 participants who completed the first set of study questionnaires, 344 (86.4%) also completed the second set, and 303 (76.13%) participants completed all three sets of questionnaires (n = 303).

An independent samples t-test revealed significant differences in second trimester

depression and anxiety scores between those who did not complete all three questionnaires and those who did, $t(138.74) = 2.74$, $p = .01$ and $t(396) = 3.37$, $p = .00$, for depression and anxiety respectively. Individuals who completed all three questionnaires had lower mean depression and anxiety scores during the second trimester ($n = 303$; Depression: M = 6.57, SD = 4.95; Anxiety: M = 72.67, SD = 18.37) than those who did not complete all three questionnaires ($n = 95$; Depression: M = 8.39, SD = 5.86; Anxiety: M = 80.21, SD = 20.91).

There were also significant differences in marital status and education levels between those who completed all three sets of questionnaires and those who did not. Individuals who completed all three questionnaire sets were more likely to be married (M = 1.35, SD = .50) than those who did not complete all three sets (M = 1.54, SD = .50), $t(151.33) = 3.21$, $p = .00$, and more likely to be University educated (M = 1.70, SD = .46), than those who did not complete all three sets (M = 1.43, SD = .50), $t(147.89) = 4.60$, $p < .001$. There were no significant differences in parity between the two groups. See Table 20 for demographic characteristics of individuals who completed all three questionnaire sets and those that did not.

Table 20. Demographic Characteristics of Study Four Participants (N = 398)

	Completed all questionnaires (n = 303)	Did not complete all questionnaires (n = 95)
	n (%)	*n* (%)
Ethnicity		
Caucasian	282 (93.1)	89 (93.7)
Asian	7 (2.3)	0 (0)
Mixed	6 (2.0)	2 (2.1)
Black	4 (1.3)	2 (2.1)
Hispanic	3 (1.0)	1 (1.1)
Far East Asian	1 (.3)	1 (1.1)
Education		
O levels/GCSE or equivalent	34 (11.2)	25 (26.3)
A levels or equivalent	58 (19.1)	28 (29.5)
University degree	126 (41.6)	28 (29.5)
Postgraduate degree	85 (28.1)	13 (13.7)
Prefer not to say	0 (0)	1 (1.1)
Employment status		
Employed full time	194 (64.0)	60 (63.2)
Employed part-time	58 (19.1)	17 (17.9)
Homemaker	27 (8.9)	9 (9.5)
Student	4 (1.3)	3 (3.2)
Other	20 (6.6)	6 (6.3)
Marital status		
Married	197 (65)	44 (46.3)

Not married	106 (35)	51 (53.7)
Children		
Primiparous	164 (54.1)	46 (48.4)
Multiparous	139 (45.9)	49 (51.6)

5.2.2.2. Instruments

Measure of depression. The Edinburgh Postnatal Depression Inventory (described in Chapter 4, page 77) was used to measure perinatal depressive symptoms (see Appendix 2). Empirically determined cut-off scores were used to determine the presence of an episode of perinatal depression. To determine the probability of an episode of minor (including major) antenatal depression a cut-off score of 13 or more was used (Murray & Cox, 1990). Sensitivity for this cut-off criteria is reported at 64%, specificity at 90%, and positive predictive value is 50%. A cut-off score of 10 or more was used to determine the presence of an episode of minor (including major) postnatal depression, with high sensitivity (90%) and specificity (78%) demonstrated (Cox et al., 1987; Harris, Huckle, Thomas, Johns, & Fung, 1989; Murray & Carothers, 1990). In order to identify major antenatal depression a cut-off score of 15 or more is recommended; sensitivity is 100%, specificity is 96%, and positive predictive value is 60% (Murray & Cox, 1990). A score of 13 or more is necessary to determine a high probability of major postnatal depression (Boyce et al., 1993; Cox et al., 1987; Harris et al., 1989; Murray & Carothers, 1990); it demonstrates high sensitivity (86%), specificity (79%), and positive predictive power (73%; Cox et al., 1987; Harris et al., 1989; Murray & Carothers, 1990).

Measure of anxiety. The 40-item State Trait Anxiety Inventory (STAI; Spielberger et al., 1983) is a commonly used measure of anxiety, with 20 statements that assess both state anxiety (see Appendix 21), such as current feelings of anxiety, tension, and nervousness and 20 statements that measure trait anxiety, which measure ones' longer lasting tendencies towards anxiety (see Appendix 22). Participants endorse each statement using a 4-point Likert-style scale (e.g. 1 = "almost never" to 4 = "almost always"). Scores for the STAI (State and Trait) range from 40 to 160. Higher scores indicate higher levels of anxiety.

The STAI has been shown to have good internal consistency (average $\alpha > .89$). The trait sub-scale has good test-retest reliability (average $r = .88$). The state sub-scale's test-retest reliability, as expected, is lower, but adequate (average $r = .70$; Barnes, Harp, & Jung, 2002). Both convergent and discriminate validity has been demonstrated, as the STAI has been shown to be associated with alternative state and trait anxiety measures. The STAI has also been shown to differentiate between individuals in highly stressful situations and controls, as well as anxiety patients and controls (Spielberger, 1983).

The scale has been validated for use in perinatal populations (Dennis, Coghlan, & Vigod, 2013; Grant et al., 2008; Meades & Ayers, 2011). A cut-off score of > 40 on both the state and trait subscales demonstrated optimal sensitivity (80.95%), specificity (79.75), positive (51.50%) and negative (94%) predictive value in determining cases of anxiety disorders in the antenatal period (Grant et al., 2008). A cut-off score of > 40 on the state subscale of the state-trait anxiety inventory has also been used to identify the likely presence of minor (including major) postnatal anxiety symptomatology (Dennis et al., 2013), demonstrating sensitivity (67.5%), specificity (87.1%), positive (53.1) and negative (92.5%) predictive value in determining likely cases of minor (including major) postnatal anxiety symptomatology. For the current study we will utilize cut-off scores of > 40 for both state and trait subscales to determine the presence of clinically significant perinatal anxiety.

Measure of dysfunctional attitudes specific to the perinatal period. The PRBQ-8, as described in Chapter 4, was used to measure dysfunctional attitudes specific to the perinatal period (see Appendix 12).

Measure of metacognitive beliefs. The Metacognitions Questionnaire-30 (MCQ-30; outlined in study two), developed by Wells and Cartwright-Hatton (2004) was used to measure metacognitions (see Appendix 20). For information about the psychometric properties of the MCQ-30 see Chapter 5, page 127.

Measure of social support. The Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988) was used to measure levels of perceived social support (see Appendix 23). It is a 12-item questionnaire with three factors assessing perceived support from significant others, friends, and family members. Participants are asked to rate the extent to which they agree or disagree with each statement, using a 7-point, Likert-type scale, ranging from 1 (totally agree) to 7 (totally disagree). Scores range from 7 – 84. Higher scores indicate a lack of perceived social support. Each of the three factors has demonstrated good internal validity (α = .91, .87, and .85) as has the scale as a whole (α = .88). Each factor also demonstrated good test-retest reliability (*r* = .72, .85, and .75). Test-retest reliability for the scale as a whole was r = .85. Moderate construct validity was also demonstrated, as the scale as a whole (r = .25), along with each of the factors (r = .13, .24, and .24) were significantly correlated with depression (Zimet et al., 1988). This scale has been validated for use in a community population (Canty-Mitchell & Zimet, 2000; Clara, Cox, Enns, Murray, & Torgrudc, 2003; Zimet et al., 1988)

Study-developed questionnaire. Questions were developed by the researchers to examine demographic factors, such as age, education, ethnicity, marital status, and parity (see Appendices 13-15).

5.2.2.3. Procedure

Recruitment took place in the waiting room of the Antenatal Ultrasound Department at the NHS North Bristol Trust St. Michael's Hospital. All patients who were aged 18 years or older and attending their routine 12-week scan were offered an information sheet by the researcher (see Appendix 16), outlining the purpose of the study, expectations of participants, and anonymity of responses. Women who wanted to participate signed a consent form (see Appendix 17) and were given the option to complete the questionnaire online or via hard copy. Participants who chose to complete the questionnaires online were emailed a hyperlink, directing them to the study's website, which contained the battery of questionnaires. Participants who chose to complete a hardcopy were provided with a copy of the questionnaires via post and were asked to complete and return them in the provided stamped and addressed return envelope. Participants were offered a £5 Amazon voucher after completion of the first and the last set of questionnaires.

5.2.3. Results

5.2.3.1. Prevalence and incidence of antenatal and postnatal depression

Prevalence. The use of empirically determined cut-off scores were used to explore the prevalence of minor (≥ 13 for antenatal depression and ≥ 10 for postnatal depression) and major depression (≥ 15 for antenatal depression and ≥ 13 for postnatal depression) in the second trimester, the third trimester, and approximately six to eight weeks after the birth of

the baby. Point prevalence rates for major depression at all three measurement points were 7.9% (*n* = 24/303), 6.3% (*n* = 19/303), and 11.6% (*n* = 35/303), respectively. The point prevalence rates of minor depression at all three measurement points were 12.2% (*n* = 37/303), 12.5% (*n* = 38/303), and 28.4% (*n* = 86/303). The point prevalence rates of major and minor depression are presented in Table 21.

Incidence. Incidence of a new episode of major depression during the third trimester was 4.3% (*n* = 12/279). Out of the 279 participants who did not reach the criteria for major depression during the second trimester, 12 met the criteria in the third trimester. Incidence of a new episode of major postnatal depression was 7.5% (*n* = 20/265). Out of the 265 individuals who did not meet the criteria for major depression in the second and third trimester, 20 participants developed major depression in the postnatal period.

Incidence of a new onset of minor depression during the third trimester is 9% (*n* = 24/266). Out of the 266 women who were not depressed in the second trimester, 24 reached the criteria for minor depression in the third trimester. Incidence of a new episode of minor postnatal depression was 19.8% (*n* = 48/242). Out of the 242 women who did not meet criteria for minor depression in the second and third trimester, 48 reached the criteria for minor depression in the postnatal period. Incidence of a new episode of major and minor depression during the third trimester and in the postnatal period are presented in Table 21.

5.2.3.2. Prevalence and incidence of antenatal and postnatal anxiety

Prevalence. Empirically determined cut-off scores (> 40) were used to explore the prevalence of clinically significant anxiety in the second trimester, the third trimester, and approximately six to eight weeks after the birth of the baby. The point prevalence rates of

clinically significant state anxiety at all three measurement points were 24.4% (*n* = 74/303), 31.0% (*n* = 94/303), and 21.1% (*n* = 64/303). Point prevalence rates of clinically significant trait anxiety at all three measurement points were 36.0% (*n* = 109/303), 32.3% (*n* = 98/303), and 29.7% (*n* = 90/303). The point prevalence rates of clinically significant state and trait anxiety, at all three measurement points, are presented in Table 21.

Incidence. Incidence of a new onset of clinically significant state anxiety during the third trimester was 21.8% (*n* = 50/229). Out of the 229 women who did not reach criteria for an episode of clinical state anxiety in the second trimester, 50 developed an episode of clinically significant state anxiety in the third trimester. Incidence of a new onset of an episode of clinically significant trait anxiety during the third trimester was 13.9% (*n* = 27/194). Out of the 194 women who did not reach criteria for clinical trait anxiety in the second trimester, 27 developed clinically significant trait anxiety in the third trimester.

Incidence of a new episode of postnatal state anxiety was 11.2% (*n* = 20/179). Out of the 179 women who did not meet criteria for clinically significant state anxiety in the second and third trimester, 20 reached the criteria for clinical state anxiety in the postnatal period. Incidence of a new episode of clinical postnatal trait anxiety was 9.6% (*n* = 16/167). Out of the 167 women who did not meet criteria for an episode of clinically significant trait anxiety in the second and third trimester, 16 reached the criteria for clinical trait anxiety in the postnatal period. Incidence of a new episode of clinically significant state and trait anxiety during the third trimester and in the postnatal period is presented in Table 21.

Table 21. Point Prevalence and Incidence of Perinatal Depression and Anxiety

	Second trimester	Third trimester	Postnatal Period
	N (%)	*N* (%)	*N* (%)
Point Prevalence (*N* = 303)			
Depression			
Major	24 (7.9%)	19 (6.3%)	35 (11.6%)
Minor	37 (12.2%)	38 (12.5%)	86 (28.4%)
Anxiety			
State	74 (24.4%)	94 (31.0%)	64 (21.1%)
Trait	109 (36.0%)	98 (32.3%)	90 (29.7%)
Incidence			
Depression			
Major		12/279 (4.3%)	20/265 (7.5%)
Minor		24/266 (9.0%)	48/242 (19.8%)
Anxiety			
State		50/229 (21.8%)	20/179 (11.2%)
Trait		27/194 (13.9%)	16/167 (9.6%)

5.2.3.3. Participant differences

In order to determine whether increased depression and anxiety in the attrition group was due to socio-demographic factors or increased emotional distress, a binary logistic regression analysis was conducted to explore whether increased depression and anxiety was still associated with attrition, after controlling for education levels and marital status.

Assumptions of binary logistic regression analysis. Assumptions for the logistic regression analysis were met, as our dependent variable was binary (completed all three sets: yes or no), and our observations were independent. Peduzzi and colleagues (1996) developed a formula (N = 10 k / p) to determine the minimum number of participants to include for a binary logistic regression analysis. In this suggested formula, p represents the smallest of the proportions of negative or positive cases in the population and k represents the number of independent variables. For the current study, we had three independent variables and the proportion of attrition cases was 24% (n = 95/398). Based on these criteria, the minimum number of cases required was N = 10 x 3 / .24 = 125; therefore our sample size (n = 398) was adequate.

Baseline depression as a predictor of attrition. In order to determine whether second trimester depression scores were significantly associated with attrition, after controlling for education level and marital status, a binary logistic regression analysis was conducted. Education level and marital status were entered simultaneously into the first step (enter method) and second trimester depression scores were entered into the second step. The final logistic regression model was statistically significant, $\chi^2(3) = 31.93$, $p < .001$. The model explained 11.6% (Nagelkerke R^2) of the variance in attrition and correctly classified 76.6% of the 95 cases of attrition (See Table 22). In the final regression model, education was most strongly associated with attrition, followed by baseline depression severity. Individuals with higher education levels were 1.7 times more likely to complete all three sets than individuals with lower education levels. Individuals with more severe depression severity were .95 times more likely to drop out of the study without completing all three sets than individuals with lower depression levels.

Table 22. Logistic Regression Analysis Assessing Baseline Depression Severity as a Predictor of Attrition

Block of variables				
Model	R^2		Chi-square (*df*)	Sig of *F*
1	.10		26.58 (2)	<.001
2	.12		31.93 (3)	<.001
Individual variables in final model				
	B	Wald statistic	*p*-value	Odds ratio
Model 1				
Education	.51	15.54	<.001	1.66
Marital Status	-.41	2.50	.11	.66
Model 2				
Education	.50	15.04	<.001	1.65
Marital Status	-.33	1.59	.21	.72
Baseline EPDS	-.05	5.38	.02	.95

Note: *N* = 398, Education was entered as a continuous variable; Marital status: Married = 1, Not married = 2; Baseline EPDS = Edinburgh's Postnatal Depression Scale administered during the second trimester;

Baseline anxiety as a predictor of attrition. In order to determine whether second trimester anxiety scores were significantly associated with attrition, after controlling for education level and marital status, a binary logistic regression analysis was conducted. Education level and marital status were entered simultaneously into the first step (enter method) and second trimester STAI scores were entered into the second step. The final logistic regression model was statistically significant, $\chi^2(3) = 33.12$, $p < .001$. The model explained 12% (Nagelkerke R^2) of the variance in attrition and correctly classified 77.4% of the 95 cases of attrition (See Table 23). In the final regression model, education was most strongly associated with attrition, followed by baseline anxiety severity. Individuals with higher education levels were 1.6 times more likely to complete all three sets than individuals with lower education levels. Individuals with more severe anxiety symptoms were .98 times more likely to drop out of the study without completing all three sets than individuals with less anxiety.

Table 23. Logistic Regression Analysis Assessing Baseline Anxiety Severity as a Predictor of Attrition

Block of variables				
Model	R^2		Chi-square (*df*)	Sig of *F*
1	.10		26.58 (2)	<.001
2	.12		33.12 (3)	<.001
Individual variables in final model				
	B	Wald statistic	*p*-value	Odds ratio
Model 1				
Education	.51	15.54	<.001	1.66
Marital Status	-.41	2.50	.11	.66
Model 2				
Education	.49	14.21	<.001	1.63
Marital Status	-.34	1.73	.19	.71
Baseline STAI	-.02	6.60	.01	.98

Note: *N* = 398, Education was entered as a continuous variable; Marital status: Married = 1, Not married = 2; Baseline STAI = State-Trait Anxiety Inventory administered during the second trimester;

5.2.3.4. Descriptive Statistics for Study Variables

A series of Shapiro-Wilks tests of normality were conducted on the data (see Appendix 24), which suggested that our variables were significantly different than normal. Descriptive statistics, including means, standard deviations and ranges for our study variables are presented in Table 24. Mean EPDS scores appear to increase from the second trimester into the postnatal period. In contrast, mean STAI scores appear to be at their highest in the third trimester and at their lowest in the postnatal period.

To examine the differences in mean EPDS and STAI scores across time, a repeated measures ANOVA was conducted. Mauchley's test of sphericity revealed that the EPDS met the assumption of sphericity (p = .97), however, STAI scores violated the assumption of sphericity (p = .02). A Greenhouse-Geisser correction was applied to the degrees of freedom for the STAI analysis, to account for the violation of sphericity. Results revealed there was no significant differences in mean EPDS scores across the three measurement points, $F(2, 604) = 1.23$, p =.29. There does appear to be a significant difference in mean STAI scores across the three measurement points, $F(1.95, 588.81) = 8.28$, $p < .001$. The

results from the Bonferroni posthoc test revealed that the only significant difference was between second trimester mean STAI scores and postnatal mean STAI scores (mean difference = 3.99, SE = 1.01). Second trimester STAI scores (M = 74.77, SE = 1.15) were significantly higher than postnatal STAI scores (M = 70.79, SE = 1.05).

A closer look at the state and trait subscales mean scores suggest that the significant increase in STAI scores during the third trimester may actually be from increases in state anxiety during the third trimester and not trait anxiety, as mean trait anxiety scores appear relatively stable across the three measurement points. After accounting for a violation of the assumption of sphericity (p = .00), a Greenhouse-Geisser correction was applied to the degrees of freedom for the state subscale. The trait subscale did not violate the assumption of sphericity (p = .07). Results from the repeated measures ANOVA revealed there were significant differences in mean state anxiety scores across the three measurement points, $F(1.93, 581.76) = 15.40$, $p < .001$), but no mean differences in trait anxiety scores across the three measurement points $F(2, 604) = 2.76$, $p = .07$.

Bonferroni post hoc tests revealed that state anxiety was significantly higher in the third trimester (M = 36.72, SE = .63) compared to the first trimester (M = 34.23, SE = .58; Mean difference = -2.50, SE = .55, p < .001) and that state anxiety during the third trimester (M = 36.72, SE = .63) was significantly higher than state anxiety scores in the postnatal period (M = 33.49, SE = 10.35; Mean difference = 3.23, SE = .64, $p < .001$). There were no significant differences between second trimester mean state anxiety and postnatal mean state anxiety scores.

Table 24. Descriptive Statistics of Study Four Variables (*N* = 303)

	Range	Mean	SD	Cronbach's α
MSPSS	12-84	19.63	10.87	.95
PRBQ-8	8-53	26.09	9.22	.85
MCQ POS	6-24	10.02	3.78	.89
MCQ NEG	6-24	10.80	4.52	.90
MCQ CC	6-24	8.85	3.53	.87
MCQ CT	6-21	8.99	3.00	.74
MCQ CSC	6-24	12.75	4.13	.84
EPDS set 1	0-23	6.57	4.95	.87
EPDS set 2	0-29	6.66	5.05	.89
EPDS set 3	0-25	6.95	4.72	.87
STAI set 1	40-134	72.67	18.37	.94
State	20-64	34.23	10.02	.92
Trait	20-74	38.44	10.04	.87
STAI set 2	40-149	74.77	19.99	.95
State	20-73	36.72	11.01	.94
Trait	20-79	38.05	10.26	.88
STAI set 3	40-137	70.79	18.32	.94
State	20-76	33.49	10.35	.94
Trait	20-69	37.30	9.53	.85

Note: *N* = 303, MSPSS = Multidimensional Scale of Perceived Social Support; PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised; MCQ POS = Metacognitive Questionnaire-30, positive beliefs about worry; MCQ NEG = Metacognitive Questionnaire-30, negative beliefs about the uncontrollability and danger of worry; MCQ CC= Metacognitive Questionnaire-30, cognitive confidence; MCQ CT = Metacognitive Questionnaire-30, need to control thoughts; MCQ CSC = Metacognitive Questionnaire-30, cognitive self-consciousness; EPDS set 1 = Edinburgh Postnatal Depression Inventory measured in the second trimester; EPDS set 2 = Edinburgh Postnatal Depression Inventory measured in the third trimester; EPDS set 3 = Edinburgh Postnatal Depression Inventory measured within five months after birth. STAI set 1 = State-Trait Anxiety Inventory measured in second trimester; STAI set 2 = State-Trait Anxiety Inventory measured in third trimester; STAI set 3 = State-Trait Anxiety Inventory measured approximately 7.25 weeks after birth.

5.2.3.5. Correlations

A series of non-parametric, Spearman's Rho correlation analyses were conducted to examine the association between the study variables. Results of the correlation analyses are

presented in Table 25. All five metacognitive factors were positively and significantly associated with depression and anxiety at all three measurement points, with the exception of metacognitive beliefs about one's cognitive ability, which did not correlate with postnatal depression. The metacognitive factor with the strongest association with depression and anxiety, at all three measurement points was negative beliefs about the uncontrollability and danger of one's thoughts.

All five metacognitive factors were significantly and positively associated with dysfunctional attitudes about motherhood, with negative beliefs about the uncontrollability and danger of thoughts correlating most strongly with dysfunctional attitudes about motherhood. Levels of perceived social support were not significantly associated with most of the metacognitive factors, with the exception of a weak, but significant association with negative beliefs about the uncontrollability and danger of one's thoughts.

Table 25. Correlation Coefficients for Study Four Variables (N = 303)

Spearman's Rho Correlation Coefficients												
	1	2	3	4	5	6	7	8	9	10	11	12
1. MSPSS	1											
2. PRBQ-8	.26	1										
3. MCQ POS	*.05*	.33	1									
4. MCQ NEG	.17	.38	.36	1								
5. MCQ CC	*.07*	.12	.21	.32	1							
6. MCQ CT	*.09*	.35	.40	.55	.27	1						
7. MCQ CSC	*.03*	.25	.36	.56	.31	.51	1					
8. EPDS set 1	.37	.47	.35	.54	.16	.36	.30	1				
9. EPDS set 2	.30	.31	.27	.51	.20	.39	.34	.62	1			
10. EPDS set 3	.20	.36	.30	.39	*.11*	.33	.29	.59	.61	1		
11. STAI set 1	.32	.42	.34	.63	.33	.45	.40	.73	.61	.47	1	
12. STAI set 2	.37	.29	.23	.49	.21	.36	.32	.60	.84	.53	.70	1
13. STAI set 3	.29	.39	.27	.43	.16	.37	.30	.59	.58	.78	.58	.60

All correlation coefficients are significant at $p < .01$, expect for items in italics

Note: N = 303, MSPSS = Multidimensional Scale of Perceived Social Support; PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised; MCQ POS = Metacognitive Questionnaire-30, positive beliefs about worry; MCQ NEG = Metacognitive Questionnaire-30, negative beliefs about the uncontrollability and danger of worry; MCQ CC= Metacognitive Questionnaire-30, cognitive confidence; MCQ CT = Metacognitive Questionnaire-30, need to control thoughts; MCQ CSC = Metacognitive Questionnaire-30, cognitive self-consciousness; EPDS set 1 = Edinburgh Postnatal Depression Inventory measured in the second trimester; EPDS set 2 = Edinburgh Postnatal Depression Inventory measured in the third trimester; EPDS set 3 = Edinburgh Postnatal Depression Inventory measured within five months after birth. STAI set 1 = State-Trait Anxiety Inventory measured in second trimester; STAI set 2 = State-Trait Anxiety Inventory measured in third trimester; STAI set 3 = State-Trait Anxiety Inventory measured approximately 7.25 weeks after birth.

5.2.3.6. The role of metacognitive beliefs in predicting the severity of perinatal depression and anxiety symptoms

Four hierarchical regression analyses (HRA) were conducted to examine the independent role of metacognitive beliefs, during the second trimester, in predicting increased severity of third trimester and postnatal depression and anxiety, after taking into account variance accounted for by socio-demographic variables, baseline emotional distress, perceived social support, and maladaptive maternal attitudes.

Assumptions of HRA. The Durbin Watson statistic was used to ensure the assumption of independence was met for each regression analysis. As a conservative rule, Field (2013) suggests values less than 1 or greater than 3 may be indicative of a violation of this assumption. He also suggests that the closer to two the value is, the more certain one can be that the assumption has been met. The Durbin Watson statistic fell within 1.82 - 2.08 in all of our regression analyses, suggesting the assumption of independence was met.

We also looked for signs of collinearity between predictors. We examined the correlation matrix to see if any predictors correlated highly, above .8 or .9, which researchers have suggested is a good "ballpark" method (Field, 2013) of identifying collinearity, and did not find any evidence of multicollinearity. We also examined the variance inflation factor (VIF) and tolerance statistic for evidence of collinearity, and found our VIF scores fell much below 10 and tolerance scores were much above .2. Researchers have suggested that if the largest VIF is greater than 10, there may be an issue with multicollinearity (Myers, 1990) and if tolerance scores are below .2 this is indicative of a potential problem (Menard, 1995). Results suggest there are no problems with multicollinearity in our data.

To test for normality violations we examined a normal probability plot (see Appendix 25). The results show that the distribution is normal, as the dots lie almost

exactly along the diagonal line. To examine homoscedasticity in our data we looked at a plot of predicted values versus residuals. There were no obvious outliers on our plot and the dots were evenly spaced, indicating the assumption of homoscedasticity was met.

With regards to sample size, a commonly recommended "rule of thumb" is to use at least 10-20 cases per independent variable. Tabachnick and Fidell (2007) suggest a formula of N = 104 + k for a minimum sample size, with k representing the number of predictors used. These sample size suggestions are based on detecting a medium effect size ($\beta \geq .20$), with critical $\alpha \leq .05$, with power of 80%. With 13 predictors, our sample size of 303 is larger than the recommended sample size for a hierarchical regression analysis.

Predictors of antenatal depression severity. In order to test the role of metacognitions as prospective predictors of antenatal depression severity, we ran a regression analysis in which third trimester EPDS scores were the dependent variable and the predictor variables from the second trimester were entered stepwise in the following order: demographics, EPDS scores, MSPSS, PRBQ-8, and all five factors of the MCQ-30, which were entered together in the last block. The results showed that the regression model was significant: $F(13, 289) = 20.67$, $p < .001$; $R = .69$, explaining 48.2% of the variance in third trimester EPDS scores. Second trimester EPDS scores were the strongest predictor of third trimester EPDS scores, followed by social support, parity, negative metacognitive beliefs about the uncontrollability and danger of one's thoughts, and age (see Table 26). Durbin Watson statistic is 1.99.

Table 26. Hierarchical Regression Analysis Assessing the Predictive Role of Second Trimester Metacognitions on Third Trimester Depression Severity

Block of variables			
Model	R^2	$F(df)$	Sig of F
1	.06	3.77 (297)	.00
2	.40	32.61 (296)	<.001
3	.42	29.98 (295)	<.001
4	.42	26.66 (294)	<.001
5	.48	20.67 (289)	<.001
Individual variables in final model			
	β	t	p
Model 1			
Age	-.11	-1.85	.07
Ethnicity	-.06	-.97	.33
Education	-.06	-.91	.37
Marital status	.07	1.16	.25
Parity	.19	3.27	.00
Model 2			
Age	-.07	-1.47	.14
Ethnicity	.01	.24	.81
Education	-.10	-1.95	.05
Marital status	-.02	-.39	.69
Parity	.15	3.08	.00
EPDS time one	.59	12.90	<.001
Model 3			
Age	-.08	-1.70	.09
Ethnicity	.04	.81	.42
Education	-.09	-1.83	.07
Marital status	-.03	-.61	.54
Parity	.14	2.92	.00
EPDS time one	.55	11.25	<.001
MSPSS	.15	3.00	.00
Model 4			
Age	-.09	-1.81	.07
Ethnicity	.03	.72	.47
Education	-.10	-2.03	.04
Marital status	-.03	-.52	.60
Parity	.15	3.07	.00
EPDS time one	.51	9.23	<.001
MSPSS	.14	2.90	.00
PRBQ-8	.08	1.55	.12
Model 5			
Age	-.10	-2.11	.04
Ethnicity	.04	1.01	.31
Education	-.07	-1.35	.18
Marital status	-.01	-.23	.82
Parity	.16	3.53	<.001
EPDS time one	.38	6.63	<.001
MSPSS	.18	3.65	<.001
PRBQ-8	.01	.12	.90
MCQ POS	.04	.72	.47

MCQ NEG	.14	2.32	.02
MCQ CC	.04	.94	.35
MCQ CT	08	1.35	.18
MCQ CSC	.09	1.63	.11

Note: *N* = 303, Age and Education were entered as continuous variables; Ethnicity: Non-white = 1, White = 2; Marital status: Married = 1, Not married = 2; Pregnant vs postpartum: Currently pregnant = 1, Given birth in the last six months = 2; Parity: First child = 1, Not first child = 2; EPDS time one = Edinburgh Postnatal Depression Inventory measured in the second trimester; MSPSS = Multidimensional Scale of Perceived Social Support; PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised; MCQ POS = Metacognitive Questionnaire-30, positive beliefs about worry; MCQ NEG = Metacognitive Questionnaire-30, negative beliefs about the uncontrollability and danger of worry; MCQ CC = Metacognitive Questionnaire-30, cognitive confidence; MCQ CT = Metacognitive Questionnaire-30, need to control thoughts; MCQ CSC = Metacognitive Questionnaire-30, cognitive self-consciousness.

Predictors of antenatal anxiety severity. In order to test the independent role of metacognitions as prospective predictors of antenatal anxiety severity, we ran a regression analysis in which third trimester STAI scores were the dependent variable and the predictor variables from the second trimester, were entered stepwise in the following order: demographic information, STAI scores, MSPSS, PRBQ-8, and the five factors of the MCQ-30, which were entered together in the last block. The results showed that the regression model was significant: $F(13, 289) = 25.53$; $p < .001$; $R = .73$, explaining 53.5% of the variance in antenatal anxiety scores. Second trimester STAI scores were the strongest predictor of third trimester STAI scores, followed social support, parity, negative metacognitive beliefs about the uncontrollability and danger of one's thoughts, and age (see Table 27). Durbin Watson statistic is 1.89.

Table 27. Hierarchical Regression Analysis Assessing the Prospective Predictive Role of Second Trimester Metacognitions on Third Trimester Anxiety Severity

Block of variables			
Model	R^2	$F(df)$	Sig of F
1	.07	4.16 (297)	.00
2	.48	45.92 (296)	<.001
3	.52	45.36 (295)	<.001
4	.52	39.61 (294)	<.001
5	.54	25.53 (289)	<.001
Individual variables in final model			
	β	t	p
Model 1			
Age	-.09	-1.50	.13
Ethnicity	-.09	-1.51	.13
Education	-.08	-1.26	.21
Marital status	.06	.98	.33
Parity	.20	3.31	.00
Model 2			
Age	-.07	-1.59	.11
Ethnicity	-.05	-1.19	.23
Education	-.05	-.97	.33
Marital status	-.02	-.33	.74
Parity	.16	3.60	<.001
STAI time one	.66	15.43	<.001
Model 3			
Age	-.08	-1.91	.06
Ethnicity	-.01	-.22	.83
Education	-.04	-.96	.34
Marital status	-.03	-.76	.45
Parity	.14	3.36	.00
STAI time one	.60	13.99	<.001
MSPSS	.21	4.71	<.001
Model 4			
Age	-.08	-1.92	.06
Ethnicity	-.01	-.24	.82
Education	-.05	-1.04	.30
Marital status	-.03	-.74	.46
Parity	.15	3.39	.00
STAI time one	.59	12.28	<.001
MSPSS	.20	4.63	<.001
PRBQ-8	.02	.48	.63
Model 5			
Age	-.09	-2.15	.03
Ethnicity	-.01	-.12	.90
Education	-.04	-.94	.35
Marital status	-.03	-.63	.53
Parity	.15	3.53	<.001
STAI time one	.50	8.61	<.001
MSPSS	.23	5.09	<.001
PRBQ-8	-.00	-.06	.95
MCQ POS	.03	.56	.58

MCQ-NEG	.12	1.97	.05
MCQ CC	.02	.39	.69
MCQ CT	-.04	-.64	.53
MCQ CSC	.06	1.26	.21

Note: *N* = 303, Age and Education were entered as continuous variables; Ethnicity: Non-white = 1, White = 2; Marital status: Married = 1, Not married = 2; Pregnant vs postpartum: Currently pregnant = 1, Given birth in the last six months = 2; Parity: First child = 1, Not first child = 2; STAI time one = State-Trait Anxiety Inventory measured during second trimester; MSPSS = Multidimensional Scale of Perceived Social Support; PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised; ; MCQ POS = Metacognitive Questionnaire-30, positive beliefs about worry; MCQ NEG = Metacognitive Questionnaire-30, negative beliefs about the uncontrollability and danger of worry; MCQ CC = Metacognitive Questionnaire-30, cognitive confidence; MCQ CT = Metacognitive Questionnaire-30, need to control thoughts; MCQ CSC = Metacognitive Questionnaire-30, cognitive self-consciousness.

Predictors of postnatal depression severity. In order to test the role of the MCQ-30 dimensions as prospective predictors of postnatal EPDS scores, we ran a regression analysis in which postnatal EPDS scores were the dependent variable and the predictor variables from the second trimester were entered stepwise in the following order: demographic information, EPDS scores, MSPSS, PRBQ-8 scores, and the four factors of the MCQ-30 that were significantly associated with postnatal depression were entered together in the last block. The results showed that the regression model was significant: $F(12, 290) = 14.29$; $p < .001$; $R = .61$, explaining 37% of the variance in postnatal EPDS scores. Second trimester EPDS scores were the only significant predictor of postnatal EPDS scores (see Table 28). Durbin Watson statistic is 2.09.

Table 28. Hierarchical Regression Analysis Assessing the Predictive Role of Second Trimester Metacognitions on Postnatal Depression Severity

Block of variables			
Model	R^2	$F(df)$	Sig of F
1	.02	1.28 (297)	.27
2	.34	25.76 (296)	<.001
3	.34	22.07 (295)	<.001
4	.35	20.11 (294)	<.001
5	.37	14.29 (290)	<.001
Individual variables in final model			
	β	t	p
Model 1			
Age	.00	.07	.95
Ethnicity	-.07	-1.19	.24
Education	.12	1.87	.06
Marital status	.09	1.43	.16
Parity	-.01	-.09	.93
Model 2			
Age	.04	.87	.39
Ethnicity	-.00	-.09	.93
Education	.08	1.51	.13
Marital status	.00	.02	.99
Parity	-.05	-1.03	.30
EPDS time one	.58	12.04	<.001
Model 3			
Age	.04	.82	.41
Ethnicity	.00	.02	.99
Education	.08	1.53	.13
Marital status	-.00	-.02	.98
Parity	-.05	-1.07	.29
EPDS time one	.57	11.11	<.001
MSPSS	.03	.55	.59
Model 4			
Age	.03	.67	.50
Ethnicity	-.01	-.10	.92
Education	.07	1.23	.22
Marital status	.01	.10	.92
Parity	-.04	-.84	.40
EPDS time one	.51	8.88	<.001
MSPSS	.02	.41	.68
PRBQ-8	.12	2.14	.03
Model 5			
Age	.03	.63	.53
Ethnicity	.00	.02	.99
Education	.07	1.38	.17
Marital status	.02	.31	.76
Parity	-.03	-.65	.52
EPDS time one	.48	7.52	<.001
MSPSS	.04	.69	.49
PRBQ-8	.08	1.32	.19
MCQ POS	.09	1.63	.11

MCQ NEG	-.03	-.37	.71
MCQ CT	.06	.91	.37
MCQ CSC	.06	.97	.33

Note: *N* = 303, Age and Education were entered as continuous variables; Ethnicity: Non-white = 1, White = 2; Marital status: Married = 1, Not married = 2; Pregnant vs postpartum: Currently pregnant = 1, Given birth in the last six months = 2; Parity: First child = 1, Not first child = 2; EPDS = Edinburgh Postnatal Depression Inventory; MSPSS = Multidimensional Scale of Perceived Social Support; PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised; MCQ POS = Metacognitive Questionnaire-30, positive beliefs about worry; MCQ NEG = Metacognitive Questionnaire-30, negative beliefs about the uncontrollability and danger of worry; MCQ CT = Metacognitive Questionnaire-30, need to control thoughts; MCQ CSC = Metacognitive Questionnaire-30, cognitive self-consciousness.

Predictors of postnatal anxiety severity. In order to test the role of metacognitions as prospective predictors of postnatal anxiety severity, we ran a regression analysis in which postnatal STAI scores were the dependent variable and the predictor variables were entered stepwise in the following order: demographic information, STAI scores, MSPSS, PRBQ-8, and all five factors of the MCQ-30 were entered together in the last block. The results showed that the regression model was significant: $F(13, 289) = 11.93$; $p < .001$; $R = .59$, explaining 34.9% of the variance in postnatal anxiety scores. Second trimester STAI scores were the strongest predictor of postnatal anxiety, followed only by PRBQ-8 scores (see Table 29). Durbin Watson statistic is 2.21.

Table 29. Hierarchical Regression Analysis Assessing the Prospective Predictive Role of Second Trimester Metacognition on Postnatal Anxiety Severity

Block of variables			
Model	R^2	$F(df)$	Sig of F
1	.01	.72 (297)	.61
2	.29	20.21 (296)	<.001
3	.30	17.93 (295)	<.001
4	.33	18.02 (293)	<.001
5	.35	11.93 (291)	<.001
Individual variables in final model			
	β	t	p
Model 1			
Age	.03	.42	.67
Ethnicity	-.09	-1.46	.15
Education	.04	.59	.55
Marital status	.06	.89	.38
Parity	.00	.04	.97
Model 2			
Age	.04	.80	.43
Ethnicity	-.06	-1.14	.26
Education	.07	1.20	.23
Marital status	-.01	-.10	.92
Parity	-.03	-.54	.59
STAI set one	.54	10.78	<.001
Model 3			
Age	.04	.70	.49
Ethnicity	-.04	-.74	.46
Education	.07	1.22	.22
Marital status	-.01	-.26	.79
Parity	-.04	-.68	.50
STAI time one	.51	9.87	<.001
MSPSS	.10	1.82	.07
Model 4			
Age	.03	.54	.59
Ethnicity	-.04	-.86	.39
Education	.03	.51	.61
Marital status	-.01	-.14	.89
Parity	-.02	-.35	.73
STAI time one	.42	7.38	<.001
MSPSS	.08	1.45	.15
PRBQ-8	.20	3.65	<.001
Model 5			
Age	.02	.52	.60
Ethnicity	-.04	-.78	.43
Education	.03	.53	.59
Marital status	.00	.01	.99
Parity	-.01	-.17	.87
STAI time one	.37	5.44	<.001
MSPSS	.09	1.71	.09
PRBQ-8	.16	2.84	.01
MCQ POS	.06	1.13	.26

MCQ NEG	.03	.25	.73
MCQ CC	-.07	-1.34	.18
MCQ CT	.02	.34	.74
MCQ CSC	.10	1.64	.10

Note: *N* = 303, Age and Education were entered as continuous variables; Ethnicity: Non-white = 1, White = 2; Marital status: Married = 1, Not married = 2; Pregnant vs postpartum: Currently pregnant = 1, Given birth in the last six months = 2; Parity: First child = 1, Not first child = 2; STAI = State-Trait Anxiety Inventory; MSPSS = Multidimensional Scale of Perceived Social Support; PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised; ; MCQ POS = Metacognitive Questionnaire-30, positive beliefs about worry; MCQ NEG = Metacognitive Questionnaire-30, negative beliefs about the uncontrollability and danger of worry; MCQ CC = Metacognitive Questionnaire-30, cognitive confidence; MCQ CT = Metacognitive Questionnaire-30, need to control thoughts; MCQ CSC = Metacognitive Questionnaire-30, cognitive self-consciousness.

5.2.3.7. The role of metacognitive beliefs that one's thoughts are uncontrollable or dangerous in predicting the onset of clinically significant perinatal depression and anxiety

Four binary logistic regression analyses were conducted to examine the independent role of metacognitive beliefs about the uncontrollability and danger of one's thoughts, during the second trimester, in predicting the onset of clinically significant depression and anxiety during the third trimester and in the postnatal period, after taking into account variance accounted for through maladaptive maternal attitudes.

Assumptions for the binary logistic regression analysis. Assumptions for the logistic regression analyses were met, as our dependent variables were binary (classification met for the likely presence of an episode of clinically significant depression or anxiety: yes or no), and our observations were independent. Peduzzi and colleagues (1996) developed a formula ($N = 10\ k / p$) to determine the minimum number of participants to include for a binary logistic regression analysis. In this suggested formula, p represents the smallest of the proportions of negative or positive cases in the population and k represents the number of independent variables. For the first analysis, exploring predictors of the onset of third trimester depression, we had two independent variables and the proportion of positive cases was 9% (n = 24/266). Based on these criteria, the minimum number of cases required

was N = 10 x 2 / .09 = 222, and our sample of women who were not clinically depressed in the second trimester (n = 266) was adequate. For the second analysis, exploring predictors of the onset of clinically significant anxiety during the third trimester, we had two independent variables and the proportion of positive cases was 14% (n = 31/218). Based on this criteria, the minimum number of cases required was N = 10 x 2 / .14 = 143, and our sample of women who did not meet the criteria for clinically significant anxiety in the second trimester (n = 218) was adequate. For the third analysis, exploring predictors of the onset of an episode of postnatal depression, we had two independent variables and the proportion of positive cases was 20% (n = 48/242). Based on this criteria, the minimum number of cases required was N = 10 x 2 / .20 = 100, and our sample of women who did not reach the criteria for clinically significant depression during the second or third trimester (n = 242) was adequate. For the fourth analysis, exploring predictors of the onset of an episode of postnatal anxiety, we had two independent variables and the proportion of positive cases was 12% (n = 22/187). Based on these criteria, the minimum number of cases required was N = 10 x 2 / .12 = 167, and our sample of women who were not clinically anxious during the second and third trimester (n = 187) was adequate.

Metacognition as a predictor of the onset of an episode of third trimester depression. In order to determine whether negative metacognitive beliefs about the uncontrollability and danger of one's thoughts significantly predicted the onset of an episode of antenatal depression, in a sample of women who were not depressed during the second trimester (N = 266), after controlling for variance accounted for through maladaptive attitudes about motherhood, a binary logistic regression analysis was conducted. Second trimester PRBQ-8 scores were entered into the first step, followed by second trimester MCQ NEG scores in the second step. The final logistic regression model was statistically significant, $\chi^2(2)$ = 14.99, p =.00. The model explained 12.1% (Nagelkerke R^2) of the variance in detecting the

presence of an episode of clinically significant antenatal depression and correctly classified 91% of the 24 new cases (See Table 30). Second trimester negative beliefs about the uncontrollability and danger of one's thoughts were the only significant predictor of the onset of an episode of depression in the third trimester.

Table 30. Logistic Regression Analysis Exploring the Role of Metacognition as a Prospective Predictor of the Onset of an Episode of Antenatal Depression

Block of variables				
Model	R^2		Chi-square (*df*)	Sig of *F*
1	.00		.52 (1)	.47
2	.12		14.99 (2)	.00
Individual variables in final model				
	B	Wald statistic	*p*-value	Odds ratio
Model 1				
PRBQ-8	.02	.51	.47	.98
Model 2				
PRBQ-8	-.01	.26	.61	1.01
MCQ NEG	.19	14.38	<.001	.83

Note: *N* = 242, PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised; MCQ NEG = Metacognitive Questionnaire-30, negative beliefs about the uncontrollability and danger of worry

Metacognition as a predictor of the onset of an episode of third trimester anxiety. In order to determine whether negative metacognitive beliefs about the uncontrollability and danger of one's thoughts significantly predicted the onset of an episode of antenatal anxiety, in a sample of women who did not meet the criteria for clinically significant anxiety during the second trimester (*N* = 218), after controlling for variance accounted for through maladaptive attitudes about motherhood, a binary logistic regression analysis was conducted. Second trimester PRBQ-8 scores were entered into the first step, followed by second trimester MCQ NEG scores in the second step. The final logistic regression model was statistically significant, $\chi^2(2) = 13.28$, $p = .00$. The model explained 10.6% (Nagelkerke R^2) of the variance in detecting the presence of an episode of clinically significant antenatal anxiety and correctly classified 86.7% of the 31 new cases (See Table 31). Second

trimester negative beliefs about the uncontrollability and danger of one's thoughts were the only significant predictor of the onset of an episode of clinically significant anxiety in the third trimester.

Table 31. Logistic Regression Analysis Exploring the Role of Metacognition as a Prospective Predictor of the Onset of an Episode of Antenatal Anxiety

Block of variables				
Model	R^2	Chi-square (*df*)	Sig of *F*	
1	.01	1.33 (1)	.25	
2	.11	13.28 (2)	.00	
Individual variables in final model				
	B	Wald statistic	*p*-value	Odds ratio
Model 1				
PRBQ-8	.03	1.32	.25	.97
Model 2				
PRBQ-8	.00	.02	.90	1.00
MCQ NEG	.18	11.72	.00	.83

Note: *N* = 242, PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised; MCQ NEG = Metacognitive Questionnaire-30, negative beliefs about the uncontrollability and danger of worry

Metacognition as a predictor of the onset of an episode of postnatal depression. In order to determine whether negative metacognitive beliefs about the uncontrollability and danger of one's thoughts significantly predicted the onset of an episode of postnatal depression, in a sample of women who were not depressed during the antenatal period (*N* = 242), after controlling for variance accounted for through maladaptive attitudes about motherhood, a binary logistic regression analysis was conducted. Second trimester PRBQ-8 scores were entered into the first step, followed by second trimester MCQ NEG scores in the second step. The final logistic regression model was statistically significant, $\chi^2(2) = 25.12$, $p < .001$. The model explained 15.6% (Nagelkerke R^2) of the variance in detecting the presence of an episode of postnatal depression and correctly classified 81.4% of the 48 new cases (See Table 32). Maladaptive attitudes about motherhood were the only significant predictor of the onset of an episode of postnatal depression in the final equation.

Table 32. Logistic Regression Analysis Exploring the Role of Metacognition as a Prospective Predictor of the Onset of an Episode of Postnatal Depression

Block of variables				
Model	R^2		Chi-square (*df*)	Sig of *F*
1	.15		23.27 (1)	<.001
2	.16		25.12 (2)	<.001
Individual variables in final model				
	B	Wald statistic	*p*-value	Odds ratio
Model 1				
PRBQ-8	.10	20.09	<.001	.91
Model 2				
PRBQ-8	.09	15.01	<.001	.92
MCQ NEG	.06	1.88	.17	.94

Note: *N* = 242, PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised; MCQ NEG = Metacognitive Questionnaire-30, negative beliefs about the uncontrollability and danger of worry

Metacognition as a predictor of the onset of an episode of postnatal anxiety. In order to determine whether negative metacognitive beliefs about the uncontrollability and danger of one's thoughts significantly predicted the onset of an episode of postnatal anxiety, in a sample of women who were not clinically anxious during pregnancy (*N* = 187), after controlling for variance accounted for through maladaptive attitudes about motherhood, a binary logistic regression analysis was conducted. Second trimester PRBQ-8 scores were entered into the first step, followed by second trimester MCQ NEG scores in the second step. The final logistic regression model was statistically significant, $\chi^2(2) = 32.07$, $p <$ .001. The model explained 31% (Nagelkerke R^2) of the variance in detecting the presence of an episode of postnatal anxiety and correctly classified 89.8% of the 22 new cases (See Table 33). Second trimester maladaptive attitudes about motherhood significantly predicted the onset of an episode of postnatal anxiety. Although metacognitive beliefs about the uncontrollability and danger of one's thoughts showed a trend towards the prediction of postnatal anxiety, it didn't quite reach significance.

Table 33. Logistic Regression Analysis Exploring the Role of Metacognition as a Prospective Predictor of the Onset of an Episode of Postnatal Anxiety

Block of variables				
Model	R^2		Chi-square (*df*)	Sig of *F*
1	.28		29.08 (1)	<.001
2	.31		32.07 (2)	<.001
Individual variables in final model				
	B	Wald statistic	*p*-value	Odds ratio
Model 1				
PRBQ-8	.17	20.59	<.001	.84
Model 2				
PRBQ-8	.16	17.06	<.001	.85
MCQ NEG	.12	3.03	.08	.88

Note: *N* = 187, PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised; MCQ NEG = Metacognitive Questionnaire-30, negative beliefs about the uncontrollability and danger of worry

5.2.3.7. Mediation

In order to explore whether metacognitive beliefs about the uncontrollability and danger of ones' thoughts mediates the prospective relationship between maladaptive attitudes about motherhood and perinatal depression and anxiety, Baron and Kenny's (1986) four step approach was used. According to Baron and Kenny (1986), in order to demonstrate mediation four conditions must be met: 1) The independent variable must predict the dependent variable. 2) The independent variable must predict the mediating variable. 3) The mediating variable should predict the dependent variable, after controlling for the effect of the independent variable. 4) The strength of the relationship between the independent variable and the dependent variable should be decreased (with partial mediation) or lose its significance (full mediation), after controlling for the effect of the mediator. Based on the regression analyses above, the following conditions for mediation were not met: 1) metacognitive beliefs about the uncontrollability and danger (mediator) did not predict postnatal depression and anxiety (dependent variables), independently from maladaptive attitudes about motherhood (independent variable) and 2) Maladaptive attitudes about motherhood (independent variable) did not predict future antenatal

depression and anxiety (dependent variables); therefore, further mediational analyses were not carried out.

5.2.4. Discussion

5.2.4.1. Prevalence and incidence of perinatal depression

The rates of point prevalence and incidence of perinatal depression in the current study were similar to previous reports of prevalence and incidence of perinatal depression (Heron, et al., 2004; Johanson et al., 2000; Joseffson et al., 2001; see Appendix 26 for a summary of these rates). In contrast to several previous reports (Heron et al., 2004; Johanson et al., 2000; Joseffson et al., 2001), however, the prevalence and incidence of postnatal depression, specifically minor postnatal depression, in the current study, appeared slightly higher than other reported rates of antenatal depression. Our results revealed that overall, there were no significant differences in mean depression scores across the three measurement points. The reason for the observed differences in rates of postnatal depression prevalence and incidence between the current study and previous reports may be explained by the use of different cut-off points to identify a likely episode of clinical depression between the current study and previous studies.

For the current study, two different cut-off scores were used to determine the presence of an episode of depression in the antenatal period and in the postnatal period, as researchers recommend the use of a higher cut-off score (≥ 13) in the antenatal period and a lower cut-off score in the postnatal period (≥ 10; Cox et al., 1987; Murray & Carothers, 1990; Murray & Cox, 1990). Researchers typically use only one cut-off point for both the antenatal and postnatal period, often ranging from ≥ 10 to ≥ 13 (Bennett et al., 2004; Heron et al., 2004; Johanson et al., 2000; Joseffson et al., 2001), despite some researchers acknowledging evidence suggesting that two separate cut-off scores are optimal (Joseffson

et al., 2001). When the prevalence rates of the current sample were examined using one cut-off score, of 13 or more (See Table 34), for both antenatal and postnatal depression, our results looked similar to previous studies using similar cut-off scores, with point prevalence and incidence appearing to be similar across the three measurement points and, in line with previous reports, slightly decreasing in the postnatal period. The results from this study highlight the relevance of using empirically validated cut-off scores when exploring rates of perinatal depression.

Table 34. Point Prevalence and Incidence of Perinatal Depression (≥ 13 EPDS)

	Second trimester *N* (%)	Third trimester *N* (%)	Postnatal Period *N* (%)
Point prevalence	37 (12.2%)	38 (12.5%)	35 (11.6%)
Incidence		24/266 (9%)	13/242 (5.4)

5.2.4.2. Prevalence and incidence of perinatal anxiety

Although there is less empirically-based evidence determining the optimal cut-off scores for the STAI that indicate the likely presence of an anxiety disorder, compared to depression, the point prevalence and incidence of clinically significant state and trait anxiety were explored in this study. Our results suggest that the prevalence of trait anxiety was similar across the three measurement points, with a slight decrease over time. As expected, state anxiety appears to peak during the third trimester, with rates of second trimester and postnatal state anxiety remaining similar. Our results also revealed that mean state anxiety scores were significantly higher in the third trimester, compared to the second trimester and after the birth of the baby, while mean trait anxiety scores remained similar across all three measurement points. These results suggest that one's stable, longer lasting tendencies towards anxiety do not fluctuate much over the course of pregnancy and into

the postnatal period; however, more current feelings of anxiety and tension tend to peak during the third trimester.

This decrease in prevalence rates from late pregnancy into the postnatal period has previously been demonstrated in other studies (Grant et al., 2008; Heron et al., 2004; see Appendix 27 for a summary of these rates). Heron and colleagues (2004) also reported that anxiety point prevalence rates of clinically significant anxiety reaches its highest point in the third trimester. Also, in line with findings from Heron and colleagues (2004), the rates of new cases of antenatal anxiety, in the third trimester, were also higher than new cases in the postnatal period, especially in the case of incidence of clinically significant state anxiety. Increased anxiety during the third trimester could potentially be explained by increased anxiety about the upcoming labour and the arrival of the baby. Increased anxiety about the health of the baby and the delivery have been demonstrated amongst non-pathological women in the perinatal period (Ross, McLean, & Psych, 2006).

The prevalence rates for the current study were similar to rates of those who have used the same empirically validated cut-off scores for STAI (> 40; Grant et al., 2008; Dennis et al., 2013); however, rates from the current study appear to be slightly higher than reported rates that were based on different measures and/or cut-off criteria (Heron et al., 2004; Stuart, Couser, Schilder, O'Hara, & Gorman, 1998). For example, Heron and colleagues (2004), who used a cut-off point to determine clinically significant perinatal anxiety based on the top 15% of scores on the Crown-Crisp Experiential Inventory (CCEI; Crisp, Jones, & Slater, 1978) at 18 weeks gestation, reported much lower prevalence and incidence rates of both antenatal and postnatal anxiety, then those in the current study. The rates from the current study were compared with Heron and colleagues (2004) using scores from the top 15% of scores from the second trimester and our results revealed similar point prevalence and incidence rates (see Table 35). These results, again, highlight the significance of using empirically-determined cut-off scores when reporting rates and

incidence of perinatal emotional distress in order to obtain a more accurate measure of the percentages of women affected by these disorders.

Table 35. Point prevalence and Incidence of Perinatal Anxiety Using Top 15% of STAI Scores at Time One

	Second trimester N (%)	Third trimester N (%)	Postnatal Period N (%)
Point prevalence			
State	51 (16.8%)	72 (23.8%)	47 (15.5%)
Trait	46 (15.2%)	44 (14.5%)	39 (12.9%)
Incidence		24/266 (9%)	13/242 (5.4)
State		41 (16.3%)	18 (8.5%)
Trait		21 (8.2%)	13 (5.5%)

5.2.4.3. Attrition

Attrition is another factor that makes obtaining accurate rates of emotional distress, using self-report measures, difficult. The prevalence rates of the current study may underestimate the actual rates of clinically significant perinatal emotional distress, as, in the current study, results revealed that individuals who dropped out of the study before completing all three sets of questionnaires were more depressed and anxious than those who completed all three sets. In addition, those who did not complete all three sets of questionnaires were less educated and less likely to be married than those who completed all three sets of questionnaires. Previous research has demonstrated that attrition is associated with the presence of psychological disorders (Graaf, Bijl, Smit, Ravelli, & Vollebergh, 2000). However, after controlling for the effects of socioeconomic status, psychological disorders were no longer significantly associated with increased attrition rates (de Graaf, Dorsselaer, Tuithof, & ten Have, 2013).

In contrast to these reports, in the current study, both baseline depression and anxiety were significantly associated with attrition rates, even after controlling for education and marital status. The results from the final regression model revealed that education was most strongly associated with attrition rates and that marital status was no longer associated with attrition, once education was taken into account. These results suggest that the prevalence and incidence of perinatal depression and anxiety may be under-represented, as individuals with more severe depression and anxiety were more likely to drop-out of the study, without completing all three sets of questionnaires.

5.2.4.4. Correlations between study variables

As expected, due to their often comorbid nature, perinatal depression and anxiety were significantly correlated with each other at each measurement point, which is in accordance with previous findings (Field et al., 2003; Reck et al., 2008). In support of the first hypothesis, results from the current study revealed that all five metacognitive beliefs, measured in the second trimester, were associated with perinatal depression and anxiety at all three measurement points, with the exception of metacognitive beliefs about one's cognitive abilities, which was not significantly associated with postnatal depression scores. Out of all of the metacognitive factors, metacognitive beliefs about one's cognitive abilities had the weakest associations, overall, with both perinatal depression and anxiety at all three measurement points.

These results are in accordance with previous, cross-sectional, research that has demonstrated that all five factors of the MCQ-30 were associated with depression in the general population (Spada, Mohiyeddini, & Wells, 2008; Spada, Nikčević, Moneta, & Wells, 2008) and also in line with findings that have found that not all factors are as strongly associated with depression and anxiety as others. The direction and magnitude of these associations were similar to previously reported findings, with both positive and

negative beliefs about one's thoughts often having the strongest positive association with increased depression and anxiety (Cook et al., 2014) and beliefs about one's cognitive abilities, one's need to control thoughts, and cognitive self-consciousness often possessing a positive, albeit weak, or even non-significant association with depression and anxiety (Yılmaz et al., 2011).

In support of the second hypothesis, and in line with research on metacognitive beliefs in the general population (Spada, Mohiyeddini, & Wells, 2008), our results revealed that out of the five metacognitive factors, negative metacognitive beliefs about the uncontrollability and danger of one's thoughts was most strongly associated with perinatal depression and anxiety at all three measurement points, suggesting that negatively appraising one's thoughts as uncontrollable or dangerous is the metacognitive factor that is most strongly linked with emotional distress in the perinatal period, as it is in the general population (Bailey & Wells, 2016b) and across psychopathologies (Sun et al., 2017), as well as cancer patients (Cook et al., 2014) and people with diabetes (Purewal & Fisher, 2018).

In support of the third hypothesis, all five metacognitive beliefs were significantly associated with maladaptive attitudes about motherhood, with the strongest association demonstrated between negative metacognitive beliefs about the uncontrollability and danger of one's thoughts and maladaptive attitudes about motherhood. These results are similar to reports from previous research that have found that dysfunctional beliefs were positively associated with all five factors of the MCQ-30 (Bailey & Wells, 2015a;b). These results suggest that individuals who have dysfunctional attitudes, such as inflexible beliefs about motherhood and what makes a good or a bad mother, may also be more likely to endorse more maladaptive metacognitive beliefs, and especially beliefs about the uncontrollability and danger of one's thoughts.

5.2.4.5. Risk factors for increased severity of antenatal emotional distress

In support of the fifth hypothesis, results revealed that holding negative metacognitive beliefs about the uncontrollability and danger of one's thoughts during the second trimester predicted increased severity of depression and anxiety in the third trimester, after controlling for the effects of socio-demographic information, second trimester emotional distress, social support, and maladaptive attitudes about motherhood. None of the other metacognitive beliefs in the regression model reached significance. These results are in accordance with research suggesting that negative beliefs about the uncontrollability and danger of thoughts predict future depression and anxiety in the general population (Yilmaz et al., 2011); however, this is the first time these metacognitive dimensions have been explored prospectively in the perinatal population.

As expected, in the final equation, second trimester depression and anxiety scores were the strongest predictors of third trimester depression and anxiety severity. Baseline emotional distress severity is commonly found to be the strongest predictor of increased antenatal emotional distress (Giardinelli et al., 2012; Leigh & Milgrom, 2008). Out of all the socioeconomic factors, in the final equation, parity and age emerged as significant predictors of antenatal emotional distress, while education, ethnicity, and marital status did not reach significance. Although there is very little prospective research exploring antenatal predictors of future antenatal emotional distress, Leigh and Milgrom (2008) reported that maternal age, in women 17 years or older, was not a significant predictor of antenatal depression, when measured approximately two weeks later. In contrast, Rubertsson and colleagues (2003) explored predictors of antenatal depression, using a cross-sectional sample, and found that younger maternal age (< 25) was a significant predictor of antenatal depression. In the current study, our results revealed that, in a sample of women 18 years or older, younger age was a significant predictor of greater severity of antenatal depression symptoms. Parity is not often reported as a risk factor for antenatal

depression or anxiety (Lee et al., 2007; Leigh & Milgrom, 2008); however, our results suggest that multiparous women may also be at greater risk of increased antenatal depression and anxiety symptoms during the third trimester. It could be that the imminent arrival of the baby, in the presence of other children in the family, represents a threat to one's coping ability, through a perception of an increase in the expected demand from the women. This threat to one's ability to cope with these increased demands may leads to an elevation of distress in the third trimester.

Perceptions of social support also seem to be important in the antenatal period, as women reporting lower levels of perceived social support also experienced an increase in antenatal depression and anxiety. Previous research has identified low perceived social support as a predictor of antenatal depression (Leigh & Milgrom, 2008). Specifically, the perceived unavailability of support when it is needed in the antenatal period is strongly and directly associated with increased antenatal depression (Séguin, Potvin, Denis, & Loiselle, 1995). This is the first study, to date, that has demonstrated that low levels of perceived social support during the second trimester predicts future antenatal anxiety, as most studies only consider its effect on perinatal depression. Perhaps when a woman feels she does not have adequate instrumental and emotional support from her friends, family, or significant others during pregnancy, she may experience more insecurity and unease about the pregnancy and childbirth, which may contribute to increased symptoms of antenatal anxiety.

Maladaptive attitudes about motherhood were not predictive of increased severity of antenatal emotional distress. Although cross-sectional research suggests that dysfunctional attitudes specific to motherhood are associated with perinatal depression and anxiety (Sockol et al., 2015; Sockol & Battle, 2015), this is the first study that has explored the role of attitudes specific to motherhood in prospectively predicting antenatal emotional distress. Perhaps increases in emotional distress during the third trimester were partially

due to increased worry surrounding the birth of the baby. When these types of thoughts are activated, which are not measured by the PRBQ-8 scale, women who hold metacognitive beliefs regarding the uncontrollability and danger of worry may experience increased emotional distress.

5.2.4.6. Risk factors for the onset of clinically significant antenatal emotional distress

In support of our sixth study hypothesis, negative beliefs about the uncontrollability and danger of one's thoughts significantly predicted the onset of an episode of clinically significant depression and anxiety during the third trimester, after controlling for the contribution of maladaptive attitudes about motherhood. This is the first time the role of metacognition has been prospectively explored as a predictor of the onset of an episode of antenatal emotional depression or anxiety and the first time its contribution has been explored after taking into account maladaptive attitudes. These results, which are in line with the observed predictors of increased severity of antenatal emotional distress and the S-REF theory (Wells & Matthews, 1994; 1996), suggest that women who did not experience clinically significant symptoms of emotional distress during the second trimester, who hold beliefs that their thoughts are uncontrollable and harmful to them, are at an increased risk for developing clinically significant symptoms of depression and anxiety during the third trimester, after controlling for the contribution of maladaptive attitudes.

Holding dysfunctional attitudes about motherhood did not contribute to the prediction of the onset of an episode of depression or anxiety during the third trimester, suggesting that attitudes about motherhood and what makes a good or a bad mother may not increase emotional distress in the antenatal period. Perhaps, in the third trimester, when women are cognitively preparing for the arrival of the new baby and coping with anxieties regarding the birth, rigid attitudes about motherhood and what makes a good or a bad

mother are less relevant. It is possible that cognitive content reflective of unease and insecurity surrounding the birth would be more relevant in increasing emotional distress during the third trimester.

5.2.4.7. Risk factors for increased severity of postnatal emotional distress

None of the socioeconomic variables were predictive of postnatal emotional distress, nor was perceived social support. In both of the regression analyses, after controlling for socioeconomic factors, social support, and baseline emotional distress, maladaptive attitudes about motherhood were significantly associated with increased emotional distress in the postnatal period. Maladaptive attitudes about motherhood independently contributed 1% additional variance in postnatal depression scores and 3% of postnatal anxiety scores, after controlling for the effects of socioeconomic factors, baseline emotional distress, and perceived social support. Perhaps, in contrast to the third trimester, now that the baby has arrived and the imminent stress and anxiety associated with child-birth has passed, cognition becomes centred more on coping practically with the baby and dysfunctional attitudes specific to the role of motherhood and what makes a good or a bad mother becomes more relevant and more likely to increase postnatal emotional distress.

In the final equation when metacognitive beliefs were entered into the equation, baseline emotional distress remained a significant predictor of postnatal depression and anxiety; however, the significance of maladaptive attitudes specific to motherhood was lost in the case of postnatal depression, but remained a significant predictor of postnatal anxiety. Contrary to the study hypothesis, none of the metacognitive factors were predictive of postnatal depression or anxiety severity, outside of the contribution of demographic information, baseline emotional distress, social support, and maladaptive attitudes about motherhood. Perhaps once the baby has been born, the unease surrounding

the birth of the baby fades and beliefs about one's thoughts being uncontrollable or harmful are not triggered as much as they were during the third trimester.

5.2.4.8. Risk factors for the onset of clinically significant postnatal emotional distress

In contrast to our sixth hypothesis, results revealed that metacognitive beliefs about the uncontrollability and danger of thoughts were not independently predictive of the onset of an episode of postnatal depression or anxiety, after taking into account the contribution of maladaptive attitudes about motherhood. The presence of maladaptive attitudes about motherhood, however, remained a significant predictor of the onset of an episode of postnatal depression and anxiety in the final regression model, highlighting the relevance of holding rigid, inflexible attitudes about motherhood and what makes a good or a bad mother in the weeks following the birth of the baby.

There was, however, a non-significant trend towards the association between metacognitive beliefs about the uncontrollability and danger of one's thoughts and the onset of postnatal anxiety, but this trend was not present with postnatal depression, suggesting that beliefs that one's thoughts are uncontrollable or dangerous may be more associated with increased anxiety, than depression. Perhaps, this is because the measure of negative metacognitive beliefs about the uncontrollability and danger of one's thoughts used in this study focuses on beliefs about worries and worry tends to be more strongly associated with anxiety disorders than depression (Gladstone et al., 2005). Metacognitive beliefs that focus more on the uncontrollability and danger of rumination, which is more strongly associated with depression than anxiety (Nolen-Hoeksema, Wisco, & Lyubomirsky 2008), may be more likely to increase risk for depression, specifically.

Overall, these results highlight the differences in the relevance of cognitive and metacognitive factors depending on which stage of the perinatal period the mother is in. It appears that holding metacognitive beliefs that one's worrisome thoughts are

uncontrollable and harmful is particularly relevant to increasing emotional distress in the third trimester, when a woman is likely to be thinking, and perhaps worrying, about the birth of the baby. Rigid beliefs and attitudes specific to motherhood and what makes a good or a bad mother are more likely to lead to emotional distress after the birth of baby, when a woman may be more focused on coping with her new-born and being a good mother.

An alternative explanation for the unexpected results may be due to the more general nature of the Metacognitions Questionnaire (MCQ-30), which focuses on metacognitive beliefs about the need to control thoughts, general cognitive abilities, and beliefs about worrisome thoughts that contribute to emotional distress in the general population. It may be that metacognitive beliefs about the uncontrollability and danger of more generic thoughts may be more relevant during pregnancy, but after the birth of the baby, metacognitive beliefs more specific to parenting-specific thoughts would be more relevant. In the health anxiety domain, metacognitive beliefs specific to health anxiety were found to be more relevant in predicting health anxiety, than the MCQ-30 (Bailey & Wells, 2015a). Perhaps exploring metacognitive beliefs specific to motherhood, such as beliefs about the uncontrollability of one's thoughts about motherhood or being a good or bad mother, would be more relevant in predicting future distress in the perinatal period than more general metacognitive beliefs, as measured by the MCQ-30.

5.2.4.9. Limitations

There are a number of limitations to note. First, the same participants, although only the first 210, used in study two to explore the role of maternal attitudes in predicting the onset and severity of postnatal depression, were also used in the current study. For the current study, however, this data was used to explore whether metacognitive beliefs could independently contribute to the onset and severity of antenatal and postnatal depression

and anxiety, building on the results from study two. Second, attrition was more likely in individuals with lower education levels and those with more depression and anxiety symptoms. This may partially explain why our sample consists of a disproportionate number of individuals with higher education levels, not representative of the general population. The reported prevalence rates from this sample may also be effected by attrition. Because individuals with increased emotional distress were more likely to drop out of the study, the reported prevalence rates may underestimate the actual rates of women presenting with perinatal emotional distress.

5.2.4.10. Implications

Despite the above limitations, the current study extends our understanding of the role of cognitive and metacognitive factors in prospectively predicting both the onset and severity of perinatal depression and anxiety and is the first study to explore the independent contribution of both maladaptive cognitive content and metacognitive beliefs in increasing vulnerability to perinatal emotional distress. Both cognitive and metacognitive factors independently contributed to future perinatal emotional distress. Specifically, metacognitive beliefs about the uncontrollability and danger of one's thoughts contributed to the onset and severity of antenatal emotional distress, while maladaptive attitudes about motherhood contributed to the onset and severity of postnatal emotional distress.

Perhaps, in addition to screening for maladaptive attitudes about motherhood, which have been demonstrated to increase risk for postnatal depression and anxiety, health care specialists could also include screening measures for metacognitive beliefs about the uncontrollability and danger of one's thoughts in the antenatal period to identify women at high risk for future antenatal depression and anxiety.

5.3. Conclusions and Future Directions

The results from this study suggest that metacognitive beliefs about the uncontrollability and danger of one's thoughts play a role in predicting increased severity of depression and anxiety in the third trimester, independently from socioeconomic factors, baseline emotional distress, social support and maladaptive attitudes about motherhood. The results also showed that metacognitive beliefs about the uncontrollability and danger of one's thoughts independently predicts the onset of a clinically significant episode of depression and anxiety during the third trimester, after taking into account the effects of maladaptive attitudes about motherhood. These results support the generalisability of the S-REF theory in the antenatal period.

In line with Beck's Cognitive Theory of Depression (Beck, 1967; 2002), our results also demonstrated that maladaptive attitudes about motherhood and holding overly rigid and inflexible cognitions regarding what makes a good or a bad mother during pregnancy can increase vulnerability for future increases in postnatal emotional distress severity over and above the effects of socioeconomic factors, baseline emotional distress, and social support. It also remained a significant predictor of postnatal anxiety severity, but not postnatal depression severity, after metacognitive factors were taken into account. The presence of maladaptive attitudes about motherhood also increased risk for the onset of a future clinically significant episode of postnatal depression and anxiety, independently from the role of metacognitive beliefs about the uncontrollability and danger of one's thoughts.

The metacognitive approach to understanding psychological dysfunction, based on the S-REF theory (Wells & Matthews, 1994; 1996) asserts that holding certain maladaptive beliefs about the regulation of cognition should be more relevant in predicting emotional distress than holding maladaptive cognition/beliefs, such as attitudes about motherhood, perfectionism, or beliefs regarding the need for approval by others (Hjemdal et al., 2013;

Myers et al., 2009b). Therefore, it was surprising that metacognitive beliefs did not play a bigger role in increasing risk for postnatal emotional distress. Metacognitive beliefs about health-specific thoughts have been shown to prospectively predict increased health anxiety, after controlling for maladaptive cognitions and to moderate the relationship between maladaptive cognitions about health and health anxiety (Bailey & Wells, 2016). There is no measure, to date, of metacognitive beliefs about thoughts specific to motherhood that may be associated with increased emotional distress in the perinatal period. Perhaps the development of a measure of metacognitions specific to thoughts about motherhood may explain additional variance in perinatal emotional distress severity, outside of the contribution of the metacognitive beliefs measured by the MCQ-30. Future researchers could develop and validate a measure of metacognitive beliefs specific to the perinatal period in order to further explore the role of metacognitive beliefs in increasing risk for perinatal emotional distress.

Overall, our results provide preliminary support for the use of the metacognitive approach to understanding antenatal emotional distress and suggest the use of a more integrative approach, incorporating both cognitive and metacognitive factors, may be useful in order to more fully understand the underlying factors than can increase risk for perinatal emotional distress. A full summary of the findings from this dissertation, along with conclusions and future directions are presented in the following chapter.

Chapter Six: General Discussion and Conclusions

6.1. General Discussion of the Thesis

Perinatal emotional distress, estimated to occur in approximately 13% of women (Bennett et al., 2004; Heron et al., 2004), is associated with a range of adverse outcomes for both the mother and the child (Brouwers et al., 2001; Murray & Cooper, 1996); hence, identifying risk factors for perinatal depression and anxiety is an important public health issue (NICE, 2007). A variety of psychosocial risk factors for perinatal emotional distress, such as socioeconomic status, environmental stressors, having a history of mental health difficulties, and lack of perceived social support have been identified (Biaggi et al., 2016; Eberhard-Gran et al., 2002; Jones et al., 2010; Leigh & Milgrom, 2008). Cognitive and metacognitive factors that may increase risk for perinatal emotional distress are particularly relevant to this thesis, as they are amenable to change (Wells et al., 2009; Zuroff et al., 1999) and could potentially be targeted for change in women identified as high risk. A brief review overview of the general aims of this thesis are presented below, followed by more specific study aims.

6.2. Overview of the Aims of the Thesis

6.2.1. Exploration of dysfunctional attitudes specific to motherhood

General dysfunctional attitudes (GDA) are associated with increased perinatal emotional distress (Jones et al., 2010; Sockol et al., 2014; Sockol & Battle, 2015), however, they do not appear to increase vulnerability for future perinatal emotional distress (Gotlib et al., 1991; O'Hara et al., 1982). According to more recent adaptations of Beck's Cognitive theory (Beck, 2002), it could be that GDA contribute to vulnerability to perinatal emotional distress in some women, but that there is also a further subset of women for whom having

a child acts as a specific stressor, which triggers maladaptive cognitions related to being, or becoming, a mother, increasing their risk for perinatal emotional distress. As such, dysfunctional attitudes specific to motherhood may, independently or additively (together with GDA), and in interaction with other background factors, increase the risk of perinatal emotional distress. To date, many of the maternal attitudes questionnaires have a number of shortcomings (Moorhead et al., 2003); therefore the first aim of this thesis was to develop and validate a measure of dysfunctional attitudes specific to motherhood that could be used to test this theory.

6.2.2. Exploration into the role of metacognitions in the perinatal period

More recently researchers (Wells & Matthews, 1994; 1996) have suggested the use of an integrative cognitive approach that incorporates metacognition may be necessary to understanding emotional distress. According to the metacognitive approach, based on the S-REF theory (Wells & Matthews, 1994; 1996), metacognitive beliefs, which control our responses to stressful thoughts or situations may be responsible for the development and maintenance of emotional distress. The metacognitive approach to understanding psychological dysfunction asserts that holding certain maladaptive beliefs about the regulation of cognition may be more relevant in predicting perinatal emotional distress than maladaptive cognitive content, such as dysfunctional attitudes about motherhood, perfectionism, or beliefs regarding the need for approval by others.

The second aim of this thesis was to be the first to explore the role of metacognitions in increasing vulnerability to perinatal emotional distress, outside of the contribution of maladaptive attitudes and other psychosocial factors. The thesis consists of four studies, presented across two chapters. In the following sections, we will present an overview of the aims of the four studies, the general conclusions of the four studies, the theoretical and practical implications of the findings, as they relate to the cognitive and

metacognitive findings, and finally we will discuss some of the limitations of the studies and future directions for researchers.

6.3. Study Aims and Results

6.3.1. Study One: Questionnaire Development, Exploratory Factor Analysis, and Cross-sectional Exploration of the Validity and Reliability of the Pregnancy Related Beliefs Questionnaire-8 (PRBQ-8)

6.3.1.1. Aims of study one

The aim of this study was to revise the original 54-item PRBQ to represent maternal attitudes and, based on results from an exploratory factor analysis, to develop a valid and reliable measure of dysfunctional attitudes specific to motherhood. Specifically, we wanted to determine whether the revised PRBQ would independently contribute variance to perinatal depression, after controlling for GDA.

6.3.1.2. Results from study one

Results of an exploratory factor analysis supported a one factor, eight-item measure of dysfunctional attitudes specific to motherhood (PRBQ-8), based on Beck's Cognitive Theory of depression (Beck, 1967; 2002). Also in accordance with Beck's Cognitive Theory of Depression, most of the items typify attitudes relating to motherhood that are of a conditional nature, "if... then," which Beck termed conditional assumptions. These "if ...then" propositions give rise to 'rules' of how one must, or should, be.

The scale demonstrated strong internal and temporal consistency, as well as convergent and concurrent validity, as it was significantly associated with alternative measures of depression and both GDA and dysfunctional attitudes specific to motherhood.

The PRBQ-8 also demonstrated strong predictive validity, as it was the strongest predictor of perinatal depression, after taking into account the effects of demographic variables, PHMHD, and GDA. Our results demonstrated that maternal attitudes added incrementally to the explained variance in perinatal depression scores after GDA were taken into account.

In summary, the results from this study suggest that attitudes specific to motherhood and specifically holding rigid beliefs about what makes a good or a bad mother are strongly associated with perinatal depression. The results revealed, in the context of parenting-related stressors during pregnancy and the postnatal period, dysfunctional beliefs that focus on themes of motherhood and what it means to be a good or bad mother may be of greater importance, compared to perfectionism and attitudes relating to the need for approval by others, which represent more general dysfunctional attitudes.

6.3.2. Study Two: Confirmatory Factor Analysis and Prospective Predictive Validity of the PRBQ-8

6.3.2.1. Aims of study two

The aim of the second study was to explore whether a CFA would support the one factor, eight item model (PRBQ-8) and to explore the validity of the scale using a longitudinal sample. Specifically, we wanted to determine whether antenatal PRBQ-8 score would prospectively predict of the onset of an episode of postnatal depression, in a non-depressed antenatal sample, after controlling for the effects of baseline depression and GDA. Finally, we wanted to explore the role of antenatal maternal attitudes as a prospective predictor of postnatal depression severity, after controlling for demographic information, baseline depression, and GDA.

6.3.2.2. Results from study two

The results from a confirmatory factor analysis confirmed that one factor, eight-item structure of the revised PRBQ (PRBQ-8) is a good fit to the model. The PRBQ-8 was also demonstrated, using a longitudinal sample, to be a valid and reliable measure of dysfunctional attitudes specific to motherhood. The PRBQ-8 was associated with both antenatal and postnatal depression, as well as an alternative measure of dysfunctional attitudes. It also demonstrated strong predictive validity, as it was the only antenatal cognitive factor that predicted the onset of an episode of postnatal depression, after controlling for baseline depression severity and GDA, in a sample of non-depressed pregnant women. It was also the only antenatal cognitive factor that independently predicted postnatal depression severity, after taking into account the effects of demographic variables, baseline depression severity, and GDA. In the final regression model, baseline depression severity and PRBQ-8 scores were the only significant predictors of the future onset and severity of postnatal depression.

In line with Beck's Cognitive Theory of Depression (Beck, 1964; 2002), the results from study two demonstrate that holding overly rigid and inflexible cognitions regarding motherhood and what makes a good or a bad mother during pregnancy can increase vulnerability for future postnatal depression, despite baseline depression symptoms and GDA. The results also suggest that under the specific stress associated with motherhood and pregnancy, that dysfunctional attitudes specific to motherhood were more relevant than GDA in increasing risk for the onset and increased severity of postnatal depression, which supports Beck's Cognitive Theory of Depression (1964; 2002).

6.3.3. Study Three: The Contribution of Metacognitive Beliefs in Predicting Perinatal Depression: A Cross-Sectional Study

6.3.3.1. Aims of study three

The first aim of the third study was to explore the association between metacognitive beliefs and perinatal depression using a large, cross-sectional sample of women in the perinatal period. Specifically, we wanted to be the first to examine the independent contribution of metacognitive processes in predicting perinatal depression severity after controlling for the contribution of socio-demographic factors, history of mental health difficulties, and dysfunctional cognitive content (general and specific to motherhood). Second, we aimed to explore the association between metacognitive beliefs and maladaptive cognitive content and, specifically, to be the first to explore whether metacognitive beliefs moderate the relationship between maladaptive attitudes about motherhood and perinatal depression.

6.3.3.2. Results from study three

An exploration into the role of metacognitions in the perinatal period, using the same cross-sectional sample as study one, revealed that all five dimensions of metacognitive beliefs represented in the MCQ-30 were significantly associated with perinatal depression and both GDA and dysfunctional attitudes about motherhood. A regression analysis revealed that having a history of mental health difficulties remained a significant predictor in the final equation. In addition, both GDA and maternal-specific dysfunctional attitudes independently predicted perinatal depression, with dysfunctional attitudes specific to motherhood contributing more variance to perinatal depression scores than GDA.

Holding metacognitive beliefs about the danger and uncontrollability of one's thoughts emerged as the strongest predictor of perinatal depressive symptoms after taking

into account women's demographic information, past history of mental health difficulties, GDA, and dysfunctional attitudes specific to motherhood. These results suggest that, metacognitive beliefs about the uncontrollability and danger of one's thoughts contribute to perinatal depression, independently from the contribution of maladaptive cognitive content. These results are in line with the S-REF theory (Matthews & Wells, 2003; 2004). Holding negative maladaptive appraisals about one's thoughts being uncontrollable or dangerous appear to be more relevant in predicting perinatal emotional distress than holding maladaptive attitudes about motherhood, perfectionism, or need for approval by others.

In summary, the results from this study suggest that a more integrative cognitive approach to understanding perinatal emotional distress may be necessary. These results also provide preliminary evidence for the relevance of holding metacognitive beliefs about the uncontrollability and danger of one's thoughts in increasing vulnerability to perinatal depression, independently from the role of psychosocial and cognitive predictors, such as demographics, past history of mental health difficulties, and dysfunctional attitudes (specific to motherhood and GDA).

6.3.4. Study Four: The Contribution of Metacognitions in Predicting Perinatal Depression and Anxiety: A Prospective Exploration

6.3.4.1. Aims of study four

The aim of the fourth study was to explore the prevalence and incidence of perinatal depression and anxiety in a large sample of women who were followed from the second trimester of pregnancy to eight weeks postpartum. We aimed to be the first to explore the independent role of maladaptive metacognitive beliefs in prospectively predicting the severity of antenatal and postnatal emotional distress, after controlling for socio-

demographic factors, baseline emotional distress, social support, and maladaptive attitudes about motherhood as well as the first to explore the independent role of metacognition in predicting the onset of a clinically significant episode of depression and anxiety in the perinatal period, after controlling for maladaptive cognitive content. Finally, we aimed to determine whether negative metacognitive beliefs about the uncontrollability and danger of one's thoughts would prospectively mediate the relationship between maladaptive attitudes about motherhood and future depression and anxiety.

6.3.4.2. Results from study four

Results from a longitudinal exploration of the role of metacognitions in the perinatal period revealed that holding negative metacognitive beliefs about the uncontrollability and danger of one's thoughts during the second trimester predicted increased severity of depression and anxiety in the third trimester, after controlling for the effects of socio-demographic information, second trimester emotional distress, social support, and maladaptive attitudes about motherhood. None of the other metacognitive dimensions reached significance. The final model also revealed that being younger, multiparous, having less perceived social support, and higher levels of antenatal emotional distress during the second trimester significantly predicted third trimester depression and anxiety. These results suggest that, in combination with socio-demographic factors and baseline emotional distress, negative appraisals of one's thoughts during the second trimester increased risk for third trimester emotional distress, while maladaptive attitudes about motherhood did not. The results also revealed holding metacognitive beliefs about the uncontrollability and danger of one's thoughts predicted the future onset of a clinically significant episode of depression and anxiety in the third trimester, after controlling for the effects of maladaptive attitudes about motherhood. In line with the S-REF theory (Wells & Matthews, 1994; 1996), these results suggest that negative beliefs about the uncontrollability and danger of one's thoughts are

more relevant in increasing vulnerability to future antenatal emotional distress than maladaptive attitudes about motherhood.

Contrary to expectation, metacognition did not prospectively predict postnatal depression or anxiety severity, after controlling for socio-demographic factors, antenatal emotional distress, social support, and maladaptive attitudes about motherhood. In the final regression model examining predictors of postnatal depression, only antenatal depression severity reached significance. In line with past research (Leigh & Milgrom, 2008), these results highlight the relevance of antenatal depression symptoms in increasing vulnerability to postnatal depression. In the final model explaining variance in postnatal anxiety severity, only antenatal anxiety severity and maladaptive attitudes about motherhood predicted postnatal anxiety. Maladaptive attitudes about motherhood also predicted postnatal depression severity, after controlling for socioeconomic factors, baseline depression severity, and social support, but lost its significant once metacognitions were taken into account. These results suggest that holding maladaptive attitudes specific to motherhood during pregnancy can increase vulnerability to future postnatal depression and anxiety.

Results also revealed that metacognitive beliefs about the uncontrollability and danger of one's thoughts did not significantly increase risk for the onset of an episode of postnatal depression, however it showed an insignificant trend towards the prediction of the onset of a clinically significant episode of postnatal anxiety, independent from the contribution of maladaptive attitudes about motherhood. These results suggest that holding beliefs that worrisome thoughts are uncontrollable or dangerous, as measured by the MCQ-30 factor two, may lead to increased anxiety. Perhaps metacognitive beliefs about the uncontrollability and danger of more depressive thoughts, such as ruminative thoughts, would have increased the likelihood of developing postnatal depression. In the final regression model, maladaptive attitudes towards motherhood significantly predicted the

onset of an episode of clinically significant postnatal depression and anxiety. These results suggest, in the weeks after the birth of the baby, holding rigid, inflexible beliefs about motherhood and what makes a good or a bad mother become more relevant in increasing risk for depression and anxiety than metacognitive beliefs that one's thoughts are uncontrollable or dangerous.

Overall, the results from this study did not fully support the study's hypotheses that metacognitive beliefs about the uncontrollability and danger of one's thoughts would be more relevant than dysfunctional attitudes about motherhood in increasing vulnerability to perinatal emotional distress. Metacognitive appraisals of one's thoughts as uncontrollable and dangerous appear to be more relevant in increasing risk of antenatal emotional distress and maladaptive attitudes about motherhood appear more relevant in increasing risk for postnatal emotional distress. Perhaps, the unexpected findings could be explained by the measure of metacognitive beliefs used (MCQ-30), which measures metacognitive beliefs about one's more general thought processes, such as worry, one's cognitive abilities, and one's desire to monitor and control one's thoughts. Similar to how maladaptive attitudes specific to motherhood were more relevant in increasing vulnerability to postnatal emotional distress, compared to more GDA, metacognitive beliefs about one's thoughts about motherhood may be more relevant in increasing risk for perinatal depression than metacognitive beliefs about one's more general thoughts.

This is the first study that has examined the independent contribution of metacognitive beliefs in increasing vulnerability to perinatal emotional distress, outside of the contribution of maladaptive cognitive content and other psychosocial predictors. In summary, the results from this study suggest that both cognitive and metacognitive approaches offer useful frameworks for understanding perinatal emotional distress and that the most relevant approach may differ depending on context.

6.4. Theoretical and Practical Implications

6.4.1. Cognitive Findings

6.4.1.2. Theoretical Implications

The psychometric development of the PRBQ-8 and the exploration of the role of maladaptive attitudes about motherhood and GDA in predicting perinatal depression was theoretically based on Beck's Cognitive Theory of Depression (Beck, 1964; 1967). Beck's Cognitive Theory of Depression (1967) suggests that a variety of emotional problems, including depression and anxiety arise from holding general dysfunctional beliefs and assumptions about the self, others, and the world, in general. These relatively stable, and often latent, dysfunctional beliefs interact with a corresponding stressor to produce depressive symptoms.

The result from the exploration of cognitive factors that increase risk for perinatal depression had clear theoretical implications. The finding that GDA did not predict either the onset or severity of postnatal depression, after taking into account the contribution of antenatal depression suggests that GDA may either simply be a by-product of emotional distress (state-dependent) or that, under the context of motherhood/childbirth, holding more general attitudes regarding perfectionism and need for approval do not significantly increase vulnerability for future distress during the perinatal period.

The main results from study one and two were consistent with Beck's theory (Beck, 2002) that specific dysfunctional beliefs activated by relevant stressors appear to be more relevant in predicting both severity of postnatal depression symptoms and the onset of an episode of postnatal depression compared to GDA. Holding dysfunctional attitudes about motherhood and what it means to be a good or bad mother in the antenatal period, independently predicted both the onset and severity of postnatal depression, after

controlling for GDA. This suggests that maladaptive cognitions specific to motherhood may be of greater relevance in the perinatal period than holding GDA, such as perfectionism and attitudes relating to the need of approval by others. This is a novel finding, as no study, to date, has demonstrated the role of maternal-specific attitudes in predicting the onset or severity of postnatal depression prospectively, whilst taking into account background factors, antenatal depression symptoms, and GDA.

The results from study four also highlight the relevance of holding rigid, inflexible beliefs about motherhood and what makes a good or a bad mother in the weeks following child-birth in increasing risk for postnatal emotional distress, compared to the third trimester. These attitudes about motherhood do not appear to play a significant role in increasing emotional distress during the third trimester, suggesting that in weeks before giving birth, perhaps when a woman's thoughts are focused on the labour and the safe arrival of the new baby, thoughts about motherhood and what makes a good or a bad mother are less distressing than in the weeks after the baby has been born. Study four was the first study to explore the contribution of maladaptive attitudes specific to motherhood in predicting both antenatal and postnatal emotional distress.

6.4.1.3. Practical implications

There were a number of practical implications from the results of the exploration of cognitive factors that predicted perinatal emotional distress. These results extend our understanding of the role of dysfunctional maternal attitudes in predicting symptoms of perinatal depression and offer a new, brief assessment tool, i.e. the PRBQ-8, as a valid and reliable instrument for the assessment of such attitudes. The brevity and ease of completion of the PRBQ-8 make it particularly suitable for use as an antenatal screening instrument for identification of unhelpful maternal attitudes during the antenatal period. The PRBQ-8 could be added to antenatal screening measures (such as the EPDS) aimed at identifying

women at risk of postnatal depression. The PRBQ-8 offers additional benefits compared to the EPDS; high EPDS antenatal scores indicate presence of depressive symptomatology, which represents a vulnerability risk factor for postnatal depression. However, the EPDS does not identify the presence of cognitive vulnerability in the form of maladaptive maternal attitudes to perinatal depression, which our study shows, independently contributes to the prediction of postnatal depression symptomatology, outside of the contribution of antenatal depression severity.

Women identified by healthcare workers as holding such maladaptive attitudes during early pregnancy should be made aware that these types of dichotomous thoughts about motherhood and what makes a good or a bad mother have been shown to increase risk for the future onset and severity of emotional distress in the postnatal period. The more that individuals are made aware that these deeply engrained attitudes about motherhood are unhelpful, the more likely it is that these attitudes may change in the future. Women identified as holding dysfunctional attitudes about motherhood could be offered an informational packet to take home that provides information about the relationship between mental health and maladaptive attitudes. These women could also be offered cognitive interventions aimed at attitude modification, such as cognitive-behavioural therapy, which, in turn, may reduce their risk of developing depression postnatally, as it has been demonstrated to do in the general population (Butler et al., 2006).

6.4.2. Metacognitive Findings

6.4.2.1. Theoretical implications

The results of the first exploration of these metacognitive dimensions in the perinatal period, outside of the contribution of cognitive factors have clear theoretical significance. The cross-sectional and subsequent longitudinal exploration into the role of metacognitions

in the perinatal period was theoretically embedded in the metacognitive approach to understanding emotional distress, based on the S-REF theory (Matthews & Wells, 1994; 1996). The S-REF theory asserts that dysfunctional cognitive content is not the cause emotional distress, but rather one's counterproductive response to those thoughts, known as the CAS, leads to increased emotional distress. The CAS includes the use of self-focused perseverative thinking, as well as thought monitoring and suppression, which have been demonstrated to increase emotional distress (Wells & Matthews, 1996). The S-REF theory posits that the CAS is activated and maintained by metacognitive appraisals of the significance and controllability of the CAS. In summary, the S-REF model emphasises the relevance of the appraisal and regulation of one's thoughts over the content of one's thoughts in increasing vulnerability to emotional distress.

Researchers have explored the relevance of this theory using several populations, including cancer patients (Cook et al., 2015a; b), clinical patients (Papageorgiou & Wells, 2001a; b), and individuals from the general population (Melli et al., 2016; Yilmz et al., 2011) and have demonstrated that metacognitive beliefs, and in particular, negative metacognitive beliefs that one's thoughts are uncontrollable or harmful to the individual, can increase vulnerability to emotional distress. Only a few researchers, however, have explored the relevance of the metacognitive theory outside of the cognitive theory of emotional distress (Bailey & Wells, 2016a; b).

The role of metacognitive beliefs has been explored independently from the role of maladaptive cognitive content (both GDA and attitudes specific to motherhood), in the perinatal period for the first time in this thesis. As predicted by the S-REF model (Wells & Matthews, 1994; 1996), study four results revealed that holding negative beliefs about the harmfulness and danger of one's thoughts during pregnancy increased risk for future antenatal depression and anxiety severity, as well as predicted the onset of an episode of clinically significant emotional distress during the third trimester, independently from the

role of Maladaptive attitudes about motherhood. In contrast to expectations, metacognitive beliefs did not significantly increase risk for the onset of severity of postnatal emotional distress, after controlling for maladaptive attitudes about motherhood. It appeared that maladaptive cognitive content representing rigid, inflexible beliefs about motherhood were more relevant in increasing risk for postnatal emotional distress than metacognitive beliefs, as measured by the MCQ-30.

Overall, the study four results provide evidence that the S-REF theory (Wells & Matthews, 1994; 1996) may be relevant in the antenatal period and highlight the need for a more integrative approach to understanding perinatal distress that incorporates metacognition, as well as maladaptive cognitions. In contrast to the cognitive approach to understanding perinatal emotional distress, such as Beck's Cognitive Theory (Beck, 1964; 2002), which is focused primarily on the role of maladaptive cognitive content in increasing risk for emotional distress, these results support the relevance of the metacognitive approach, which suggests that beliefs regarding the appraisal and regulation of one's thoughts can increase risk for emotional distress.

6.4.2.2. Practical implications

The results of the exploration of metacognitive factors in the perinatal period hold practical significance, as well as theoretical significance. Interventions aimed at challenging unhelpful metacognitive appraisals of one's thoughts, such as those used in metacognitive therapy, have been shown to reduce symptoms of depression and anxiety in clinical populations (Wells & King, 2006; Wells et al., 2009). Modification of meta-beliefs regarding uncontrollability and danger of worry is one of the key techniques implemented during the process of metacognitive therapy. There is preliminary evidence that such approaches could be effective (Bevan, Wittkowski, & Wells, 2013). Meta-analyses of the effectiveness of meta-cognitive therapy for anxiety and depression suggest large effect

sizes in the treatment of anxiety and depression (Normann et al., 2014). Recently group metacognitive therapy for depression has been trialed and offers promising results (Papageorgiou & Wells, 2015). These protocols could be adjusted and used in the perinatal period.

6.5. General Limitations

There are a number of shortcomings to address that limit the results of the thesis. First, data was based on self-report questionnaires, which may be subject to social desirability, self-report errors, and poor recall. In addition, the under-reporting of depression symptoms is common amongst self-report measures of depression (Eaton et al., 200). The benefits of using self-report measures, such as the relatively quick and easy collection of a large amount of data from participants, outweighed the disadvantages. Future research could use more objective measures of mood, such as clinical interviews, based on DSM-IV criteria.

Second, the use of a snowball recruitment method in our community sample recruited online may have led to a selective sample that is not representative of the general population, as this sample had a disproportionately higher level of education and higher scores on depression and GDA measures than our consecutively recruited sample. The limitations associated with this recruitment style were considered and with the exploratory nature of the cross-sectional studies, it was deemed more important to have a large sample than one that was representative of the entire population.

There was also a slightly higher proportion of Caucasian participants present in the two samples, as a whole. One of the reasons for the disproportionate number of individuals who identified as Caucasian may be that women were required to be fluent in English in order to participate in these studies. Future research could use translators for non-English speaking participants, in order to ascertain the cultural and linguistic generalisability of our findings. There was also a disproportionate number of participants who were educated to a

degree level in the current study samples. The disproportionately higher education level observed in our sample may be partially due to the association between increased attrition rates and lower education levels (Gustavson, Soest, Karevold, & Røysamb, 2012) in our prospective sample, and the use of the snowball recruitment method for a portion of our cross-sectional sample. Sampling representativeness is a common problem in psychology research (Nielsen, Haun, Kärtner, & Legare, 2017) and many high profile studies have adopted similar approaches (Heron et al., 2004) and come across similar limitations. These limitations appear to be generally accepted in the literature due to the advantages of collecting longitudinal data from a large community sample; however, it is important to emphasise that our results may not be generalizable to the entire UK population.

Finally, in our cross-sectional sample, we are unable to determine causation from our results, as our independent variables were measured at the same time as our dependent variable and it is impossible to tell whether changes in cognitive and metacognitive factors led to changes in mood or whether the changes in our cognitive and metacognitive factors were by-products of changes in mood. In our longitudinal sample we were able to determine that our independent variables predicted future changes in perinatal depression and anxiety, but assumptions of causation between these variables should be made with caution. In order to determine whether cognition and metacognition cause significant changes in perinatal depression and anxiety severity, experimental methods should be used. Future experiments exploring whether the manipulation of dysfunctional attitudes and metacognitive beliefs can lead to changes in perinatal depression and anxiety would provide more empirical evidence regarding the cause and effect relationship between these variables.

6.6. Future Directions

Based on the findings from this thesis, there are number of questions to be addressed in future research studies. Dysfunctional attitudes specific to motherhood, as measured by the PRBQ-8, identified during the antenatal period can predict the future onset and severity of postnatal depression and strongly predicts postnatal anxiety severity. The brevity and ease of completion of the PRBQ-8 make it particularly suitable for use as a screening instrument for identification of unhelpful maternal attitudes during the antenatal period. However, in order for the PRBQ-8 to be used in routine care as a tool for identifying pregnant women at an increased risk of developing postnatal depression, normative data and cut-off scores for the likely occurrence of a future episode of postnatal depression should be established. Women identified as holding such attitudes could be offered cognitive interventions aimed at attitude modification, which, in turn, may reduce their risk of developing depression postnatally. In order to determine the effectiveness of cognitive interventions, future research could also establish whether a change in these maternal attitudes could reduce the incidence of depression and anxiety in the perinatal period.

Metacognitive beliefs about the uncontrollability and danger of one's thoughts significantly and prospectively predicted the onset and severity of depression and anxiety in the antenatal period, after taking into account the effects of maladaptive attitudes about motherhood. Contrary to our expectations, however, metacognitive beliefs did not significantly predict the onset or severity of postnatal emotional distress, independently from maladaptive attitudes about motherhood.

One of the reasons for these unexpected results may be that metacognitive beliefs about specific cognitions are more relevant in predicting future emotional distress in certain populations than metacognitive beliefs about more general thoughts and cognitive processes, such as beliefs about one's cognitive abilities and one's ability to control and regulate one's general thoughts and worries. Metacognitive beliefs about health-related

thoughts were shown to be more relevant in predicting health anxiety than both health-specific maladaptive cognitions and more general metacognitions (Bailey & Wells, 2015a; Bailey & Wells, 2016b). Future researchers could develop a measure that identifies unhelpful metacognitions specific to thoughts about motherhood, which may explain more of the variance in perinatal depression and anxiety scores and overall, increase our understanding of metacognition in the perinatal period.

Appendices

Appendix 1: Publications Derived from Thesis

Leach, D. M., Terry, P., & Nikčević, A. V. (2017). The Pregnancy Related Beliefs Questionnaire (PRBQ): An examination of the psychometric properties in perinatal samples. *Clinical Psychology & Psychotherapy,* doi: 10.1002/cpp.2149.

Appendix 2: Edinburgh Postnatal Depression Scale (EPDS)

As you are pregnant or recently had a baby, we would like to know how you are feeling. Please tick the answer that comes closest to how you have felt **IN THE PAST 7 DAYS,** not just how you feel today.

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

□ Hardly 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

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

Appendix 3: Dysfunctional Attitudes Scale (form A) revised (DAS-A-17)

This inventory lists different attitudes or beliefs which people sometimes hold. Read *EACH* statement carefully and decide how much you agree or disagree with the statement. For each of the attitudes, show your answer by placing an X under the column that *BEST DESCRIBES HOW YOU THINK*. Be sure to choose only one answer for each attitude. Because people are different, there is no right or wrong answer to these statements. To decide whether a given attitudes is typical of your way of looking at things, simply keep in mind what you are like *MOST OF THE TIME*.

Belief: answer each statement according to the way you think most of the time	Totally agree	Agree very much	Agree slightly	Neutral	Disagree slightly	Disagree very much	Totally disagree
1. It is difficult to be happy, unless one is good looking, intelligent, rich and creative.							
2. If I do not do well all the time, people will not respect me.							
3. If a person asks for help, it is a sign of weakness.							
4. If I do not do as well as other people, it means I am an inferior human being.							
5. If I fail at my work, then I am a failure as a person.							
6. If you cannot do something well, there is little point in doing it at all.							
7. If someone disagrees with me, it probably indicates that he does not like me.							
8. If I fail partly, it is as bad as a complete failure.							
9. If other people know what you are really like, they will think less of you.							
10. If I am to be a worthwhile person, I must be truly outstanding in at least one major respect.							

11. If I ask a question, it makes me look inferior.							
12. My value as a person depends greatly on what others think of me.							
13. It is awful to be disapproved of by people important to you.							
14. If you don't have other people to lean on, you are bound to be sad.							
15. If others dislike you, you cannot be happy.							
16. My happiness depends more on other people than it does on me.							
17. What other people think about me is very important.							

Appendix 4: The Pregnancy Related Beliefs Questionnaire (PRBQ)

The following is a list of different attitudes or beliefs that people sometimes hold. Read each statement carefully and decide how much you agree or disagree with the statement. Many of them relate to attitudes and expectations about being a mother more than being pregnant. Try to think about these in terms of your own expectations or ideas about motherhood.

For each of the beliefs show your answer by placing a tick under the column that best describes how *you* think. There is no correct answer as everybody is different.

To decide on the correct response when you are thinking about a statement, try to imagine yourself in the situation and answer how *you feel* rather than what you think *should* be the right answer. Another way of helping you decide would be to decide whether a given attitude is your typical way of looking at things - most of the time.

Belief: answer each statement according to the way you think most of the time	Totally agree	Agree very much	Agree slightly	Neutral	Disagree slightly	Disagree very much	Totally disagree
1. I should not have to ask for help with my baby							
2. I am as enthusiastic as I should be about my future role as a mother							
3. I can cope with my baby on my own.							
4. If I do not keep up my appearance people will reject me							
5. If people criticise my baby it is not a criticism of me							
6. If my home does not look absolutely right I feel a failure							
7. If I do not feel maternal it means I am bad							
8. I do not have to be a perfect mother							
9. My independence is very important to me							
10. During the time following childbirth my partner has as much responsibility as I have to make our relationship work							
11. I expect my baby will be happy if I am around a lot							

Belief: answer each statement according to the way you think most of the time	Totally agree	Agree very much	Agree slightly	Neutral	Disagree slightly	Disagree very much	Totally disagree
12. If people only see me as a mother or wife I would feel diminished as a person							
13. I should be able to control how I feel							
14. I can't keep my baby safe from all sources of infection							
15. I should appreciate every single moment of the early part of my baby's life							
16. It is important for me to get back to my normal activities as soon as possible after the birth							
17. I have to do all it takes to make my baby completely happy							
18. People who cry for no reason are just being hysterical							
19. I feel frustrated if I am prevented from doing the things I want to do							
20. I should be able to bring on milk if I want to							
21. My wishes are no less important than those of other people in my life							
22. If I ask for help with mothering my baby it is **not** a sign that I am failing							
23. I should try hard to keep my figure during pregnancy							
24. I have a very clear picture in my mind of what it will be like to have a newborn baby							
25. Motherhood is an instinctive and natural state for a woman							
26. I have to be able to plan my day							

Belief: answer each statement according to the way you think most of the time	Totally agree	Agree very much	Agree slightly	Neutral	Disagree slightly	Disagree very much	Totally disagree
27 I expect that my life will be generally improved as a result of this pregnancy							
28. If my baby was unhappy it would be because of something I had not done							
29. Being a mother will be the most fulfilling experience I can ever have							
30. Sometimes it is necessary to put my own needs before those of my baby							
31. My immediate family should be the only ones I need							
32. It is selfish to get upset in front of my family							
33. I expect to just be able to see more of people as a result of this pregnancy							
34. I should be able to just cope like everyone else does							
35. I expect my relationship with my partner might become very different after this pregnancy							
36. It is important for me to make sure I look my best							
37. People know what kind of person I am by the activities I do							
38. If my baby is unhappy I will feel that it is my fault							
39. If someone important pays me less attention after the birth it is because the baby is more important to them than I							

Belief: answer each statement according to the way you think most of the time	Totally agree	Agree very much	Agree slightly	Neutral	Disagree slightly	Disagree very much	Totally disagree
40. If someone else's baby is happier than mine it is probably because I am an inadequate mother							
41. If I am unable to satisfy my baby I am a bad mother							
42. I have got to do regular exercise after the birth to get my figure back							
43. I welcome the changes in my body, even those like odours (not including any illnesses)							
44. If I do not have lots of interesting news it shows I am a dull person							
45. I should be cheerful and entertaining for people when they come to visit							
46. My sense of worth entirely depends on my achievement at work							
47. If I do not feel completely emotionally attached to my baby I should worry about what this means							
48. Even if I really let myself go my partner would not leave me or have an affair							
49. If my baby loves me back (s)he will play with me better than anyone else							
50. Feeling continually tired is an unpleasant experience I could not bear.							
51. If my baby is able to rule my activities it is because I am too weak							

Belief: answer each statement according to the way you think most of the time	Totally agree	Agree very much	Agree slightly	Neutral	Disagree slightly	Disagree very much	Totally disagree
52. If I can't look after my baby properly it shows I am useless							
53. After my baby is born I will never be lonely in my life again							
54. Motherhood is a time when I should be calm and serene							

Appendix 5: Attitudes towards Motherhood Scale (AToM)

Instructions: Below is a series of statements about motherhood. Indicate how often you agree with each statement.

	Always agree	Agree most of the time	Agree some of the time	Disagree some of the time	Disagree most of the time	Always disagree
1. If I make a mistake, people will think I am a bad mother.						
2. If my baby is crying, people will think I cannot care for him/her properly.						
3. People will probably think less of me if I make parenting mistakes.						
4. Seeking help with my baby from other people makes me feel incompetent.						
5. I am the only person who can keep my baby safe.						
6. Good mothers always put their baby's needs first.						
7. I should feel more devoted to my baby.						
8. If I love my baby, I should want to be with him/her all the time.						
9. If I fail at motherhood, then I am a failure as a person.						
10. It is wrong to feel disappointed by motherhood.						
11. It is wrong to have mixed feelings about my baby.						
12. Negative feelings towards my baby are wrong.						

Appendix 6: Study-Developed Questionnaire for the Cross-sectional Sample

Some information about you

1. Your age is _____
(please specify)

2. Your ethnic group is (please tick):

☐ White ☐ Asian ☐ Mixed ethnicity

☐Black ☐Far East Asian ☐ Hispanic

☐Other……
(please specify)

3. Please select which is your highest **completed** level of education:

☐ O levels/GCSE or equivalent

☐ A levels or equivalent education or training

☐ University degree

☐ Postgraduate degree

4. What is your current employment status? Please choose one option that best describes your current status:

☐ Employed, please state occupation:……..

☐ Employed part-time

☐ Homemaker

☐ Student

☐ Other……
(please specify)

5. Are you married?

☐ Yes ☐ No if no, are you living with your partner:☐ Yes ☐ No

6. Have you ever consulted your GP or a specialist for emotional difficulties? (Please tick one)

☐Yes ☐No

If Yes, what was it concerning?

_____
(Please specify)

7. Are you currently undergoing psychiatric/psychological treatment for:

Anxiety: ☐Yes ☐No

Depression: ☐Yes ☐No

Other (please specify):_____

8. If previously pregnant, were you ever diagnosed with antenatal or postnatal depression?

Antenatal depression: ☐Yes ☐No

Postnatal depression: ☐Yes ☐No

Some information about your pregnancy

9. How many weeks are you currently pregnant? ……
(please specify)

10. Are you currently pregnant with your first child?

☐Yes ☐No

If not, how many children do you have: _____

11. Was this pregnancy conceived (please tick):

☐ Naturally ☐ Assisted conception

12. Was this pregnancy planned?

☐Yes ☐No

13. Have you experienced any complications in the current pregnancy?

☐Yes ☐No

If yes, please specify what was the problem/complication:……..

Appendix 7: Advertisement for Cross-Sectional Sample

Are you interested in participating in a research study??

An examination into women's beliefs concerning motherhood, general thinking style, and their link with maternal emotional states

We are currently recruiting pregnant women, over the age of 18, to participate in our study. The purpose of this study is to examine pregnant women's beliefs concerning motherhood, general attitudes, and their association with mood during the childbearing period.

The questionnaires should take approximately 10-15 minutes to complete. You can complete the questionnaires online or request a paper version of the questionnaires (including a pre-stamped and addressed return envelope). All participants who complete the set of questionnaires will have the option to be entered into a draw to win one of two £50 vouchers for Amazon.

If you are interested in participating in the study, please click on the link http:_____ for further details and instructions or contact the researchers using the information below to request a paper version of the questionnaires.

This study is sponsored by Kingston University, London. For further inquiries, please contact the researchers, Ms. Dawn Leach at [redacted], or Dr. Ana Nikčević at [redacted]

Thank you!!

Dawn Leach
Department of Psychology
Kingston University, London
Email: [redacted]

Appendix 8: Information Sheet for Cross-Sectional Sample

An examination into women's beliefs concerning motherhood, general thinking style, and their link with maternal emotional states
Questionnaire Study

What is the purpose of the study?
The purpose of this study is to examine women's beliefs concerning motherhood, general attitudes, and their association with mood during the childbearing period.

Why have I been chosen?
You have been chosen because you are over 18 years of age and are pregnant or have given birth in the last 6 months. We are interested in obtaining a variety of women's responses on these questionnaires.

Do I have to take part?
No. It is up to you whether you wish to take part in the study. If you decide to take part, you are still free to withdraw at any time and without giving a reason. This will not affect the care you receive.

What will happen to me if I take part?
If you are happy to take part in the study, we will ask you to complete a set of questionnaires regarding your beliefs and attitudes concerning motherhood, general thinking style, and mood. The completion of all of the questionnaires will take on average 15 minutes and can be done online or using a hard copy of the questionnaire. All participants who complete the questionnaires will be entered into a draw to win one of two £50 vouchers. Some women may find some questions to be distressing, if you feel you need support, please talk to your antenatal midwife, or contact your GP who will be able to refer you to the appropriate sources of support. After completion of the study, if we find you have elevated anxiety/depression scores, you will be notified and referred to you midwife or GP.

What do I have to do?
If you are happy to take part in this study, please indicate on the consent form your preferred method of receiving the questionnaires and return the form to the researcher. You are free to withdraw from this study at any time, without giving any reason and without any negative consequences or impact on your medical care. If you choose to withdraw, your data will be removed from the database.

Will my records be kept confidential?
All details that you provide, such as your name, address, and answers on the questionnaire will be kept strictly confidential. All personal information will be stored on a password-protected personal laptop and will be destroyed when it is no longer needed. All answers on questionnaires will be stored separately from your personal information.

What will happen to the results of the study?
Once the study is complete, the results will be published in an academic journal. You will not be identified in any report or publication. If you like, you will be able to find out the results of the study by contacting the researcher whose details are given below, who will be able to provide the summary of the findings.

Who is the sponsor for this study?
This study is being conducted as part of a PhD project and is sponsored by the Department of Psychology, Kingston University, London.

Who has reviewed the study?
All research in the NHS is looked at by independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable opinion by x Research Ethics Committee.

If you have any questions or require any further information please contact the study researchers Ms Dawn Leach on [redacted] or [redacted] or Dr Ana Nikčević on [redacted] or [redacted].

Appendix 9: NHS Ethical Approval Letter

NHS
Health Research Authority

NRES Committee London - Harrow
[redacted]
Telephone: [redacted]

29 May 2015

Ms Dawn Leach
[redacted]

Dear Ms Leach

Study title:	**The Role of Cognitive and Metacognitive Factors in Perinatal Anxiety and Depression**
REC reference:	**15/LO/0840**
IRAS project ID:	**163466**

Thank you for your email of 20th May 2015. I can confirm the REC has received the documents listed below and that these comply with the approval conditions detailed in our letter dated 19 May 2015

Documents received

The documents received were as follows:

Document	*Version*	*Date*
Other [Letter to Participants]	Version 2	01 May 2015

Approved documents

The final list of approved documentation for the study is therefore as follows:

Document	*Version*	*Date*
Copies of advertisement materials for research participants [Advertising for Study 1]	Version 1	07 April 2015
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Indemnity Insurance KU]		12 May 2014
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Kingston Indemnity]	Version 1	15 July 2013
IRAS Checklist XML [Checklist_24042015]		24 April 2015
IRAS Checklist XML [Checklist_20052015]		20 May 2015
Letters of invitation to participant [Reminder Letter for Study 2]	Version 1	01 March 2015
Non-validated questionnaire [General Information Study 1]	Version 1	01 March 2015
Non-validated questionnaire [General Information 2]	Version 1	01 March 2015
Other [Letter to Participants]	Version 2	01 May 2015
Participant consent form [Consent Form Study 1]	Version 2	01 May 2015
Participant consent form [Consent Form Study 2]	Version 2	01 May 2015

Participant information sheet (PIS) [Debriefing Statement Study 1]	Version 1	01 March 2015
Participant information sheet (PIS) [Debriefing Statement Study 2]	Version 1	01 March 2015
Participant information sheet (PIS) [Information Sheet Study 1]	Version 2	01 May 2015
Participant information sheet (PIS) [Information Sheet Study 2]	Version 2	01 May 2015
REC Application Form [REC_Form_21042015]		21 April 2015
Research protocol or project proposal [Research Protocol]	Version 2	01 May 2015
Response to Request for Further Information [Response to REC]		15 May 2015
Summary CV for Chief Investigator (CI) [CV for Chief Investigator]	Version 1	01 March 2015
Summary CV for supervisor (student research) [CV for Supervisor]	Version 1	26 June 2014
Validated questionnaire [Dysfunctional Attitudes Scale - 17]	Version 1	23 April 2015
Validated questionnaire [Pregnancy-Related Beliefs Questionnaire]	Version 1	23 April 2015
Validated questionnaire [Attitudes towards Motherhood Scale]	Version 1	23 April 2015
Validated questionnaire [MCQ-30]	Version 1	23 April 2015
Validated questionnaire [EPDS]	Version 1	23 April 2015
Validated questionnaire [Scale of Perceived Social Support]	Version 1	23 April 2015
Validated questionnaire [STAI Y-1]	Version 1	23 April 2015
Validated questionnaire [STAI Y-2]	Version 1	23 April 2015
Validated questionnaire [Worry Questionnaire]	Version 1	23 April 2015
Validated questionnaire [Ruminative Response Scale]	Version 1	23 April 2015
Validated questionnaire [Positive Beliefs about Rumination]	Version 1	23 April 2015
Validated questionnaire [Negative Beliefs about Rumination]	Version 1	23 April 2015

You should ensure that the sponsor has a copy of the final documentation for the study. It is the sponsor's responsibility to ensure that the documentation is made available to R&D offices at all participating sites.

15/LO/0840 **Please quote this number on all correspondence**

Yours sincerely

[redacted]

Natasha Bridgeman
REC Assistant

E-mail: [redacted]

Copy to: *Martin McQuillin, Kingston University*
Emma Stoica, University Hospitals Bristol NHS Foundation Trust

Appendix 10: Normality Tests for Cross-Sectional Data

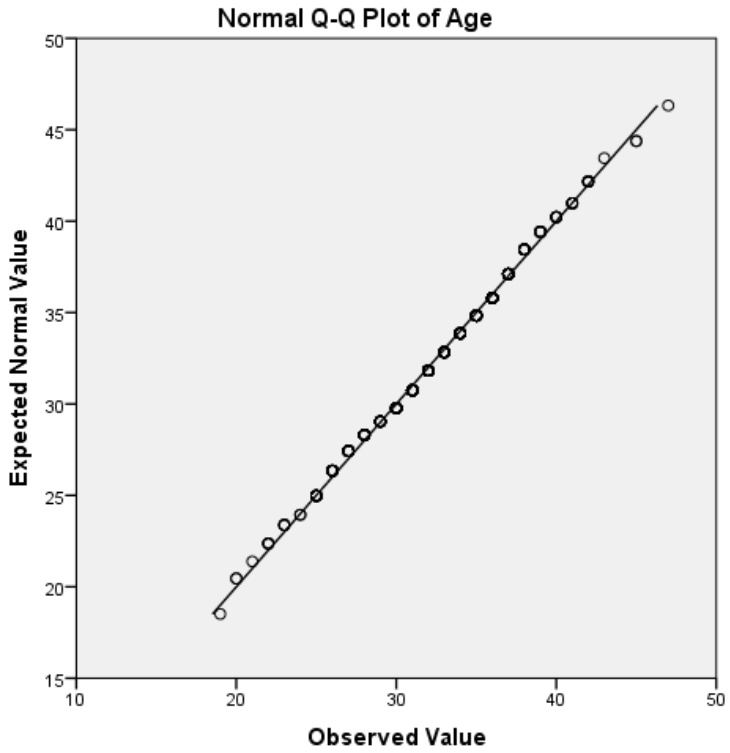
Normality tests for continuous study variables (N = 344)

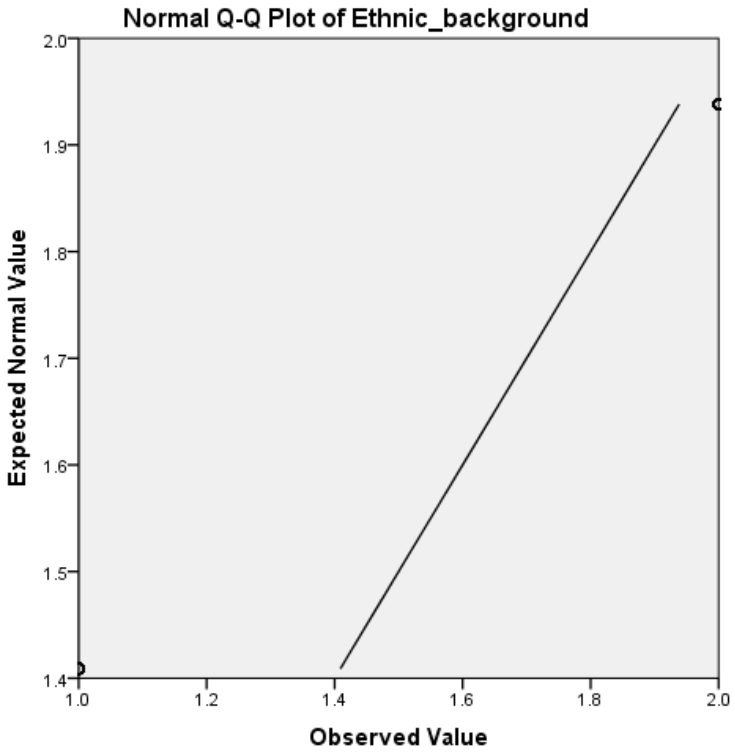
	Kolmogorov-Smirov Statistic	Shapiro-Wilk Statistic	Skewness	Kurtosis
Age	.06*	.99*	-.08	-.05
EPDS	.10**	.96**	.78	.61
DAS-A-17	.07**	.98**	.33	-.65
PRBQ-8 factor 1	.09**	.98**	.53	-.05
PRBQ-8 factor 2	.16**	.91**	-.86	.04
PRBQ-8 factor 3	.08**	.99*	-.04	-.53
AToM	.05	.99*	.27	.34
MCQ POS	.13**	.90**	1.07	1.11
MCQ NEG	.16**	.90**	.98	.17
MCQ CC	.18**	.84**	1.29	1.13
MCQ CT	.17**	.84**	1.43	1.97
MCQ CSC	.10**	.98**	.45	-.32

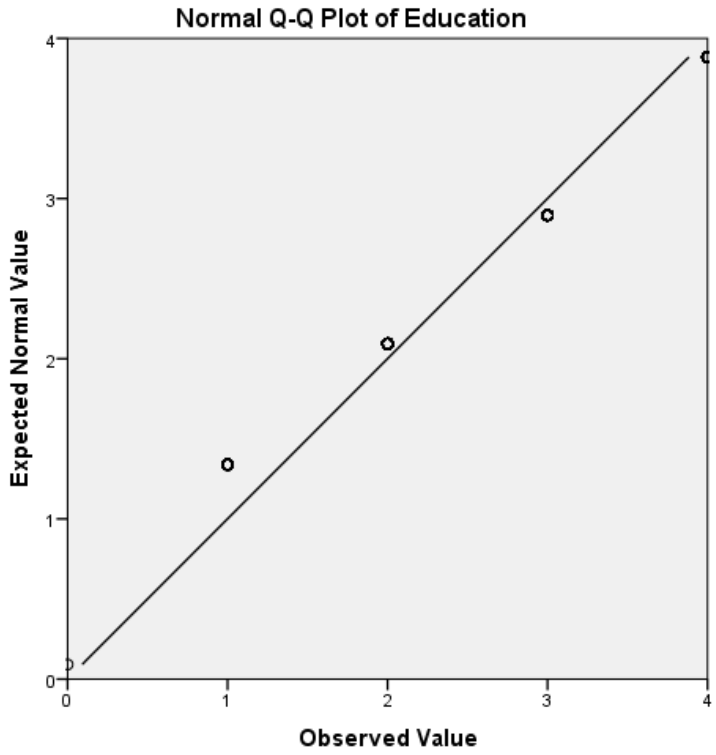
** sig ≤ .001 * sig ≤ .05

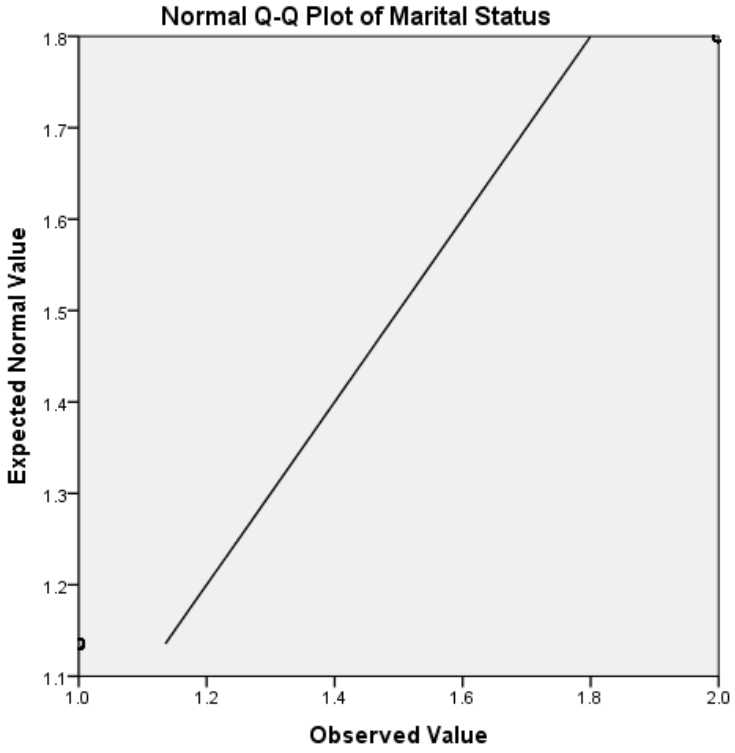
Note: N = 344, EPDS = Edinburgh Postnatal Depression Scale; DAS = Dysfunctional Attitudes Scale-Revised; PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised; MCQ POS = Metacognitive Questionnaire-30, positive beliefs about worry; MCQ NEG = Metacognitive Questionnaire-30, negative beliefs about the uncontrollability and danger of worry; MCQ CC = Metacognitive Questionnaire-30, cognitive confidence; MCQ CT = Metacognitive Questionnaire-30, need to control thoughts; MCQ CSC = Metacognitive Questionnaire-30, cognitive self-consciousness.

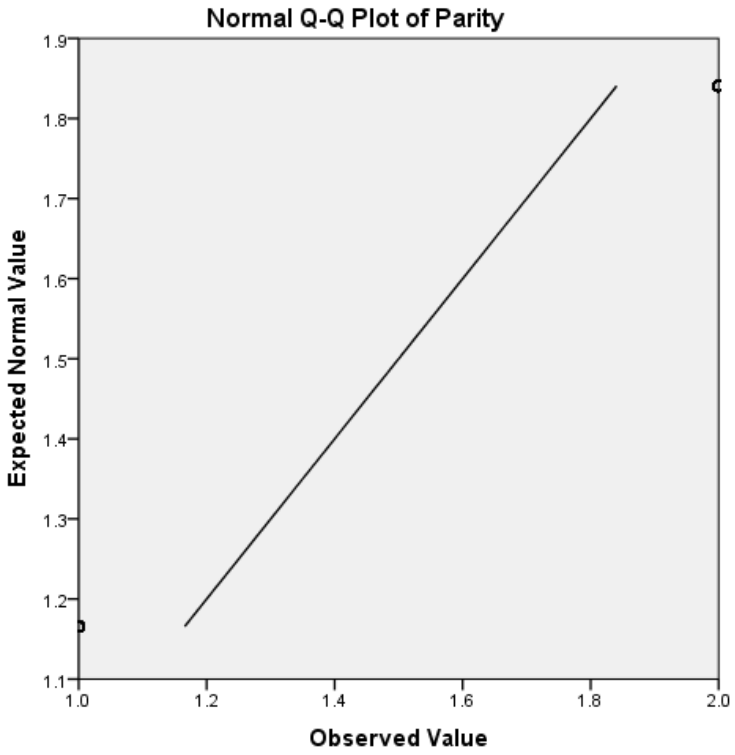
Appendix 11. Normality plots for Cross-sectional Data

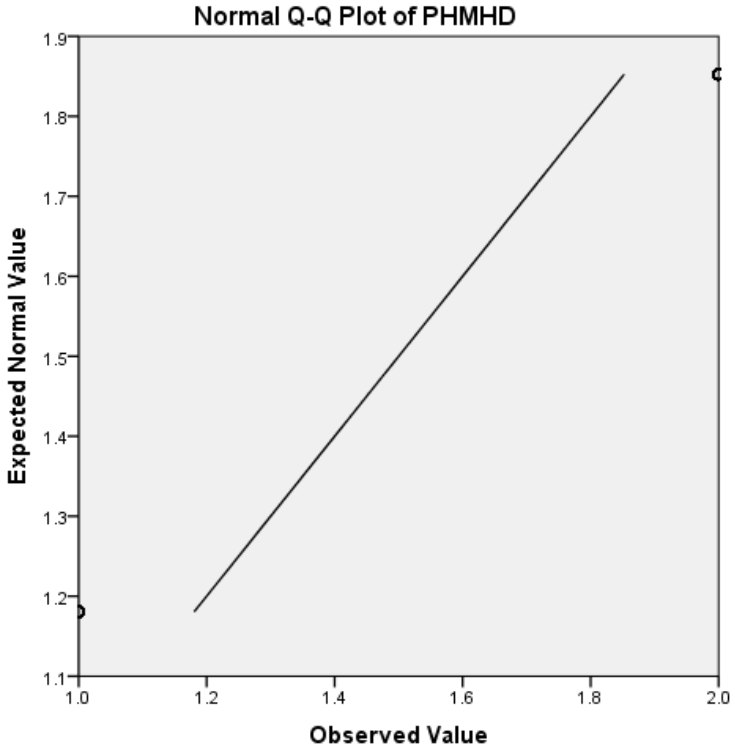


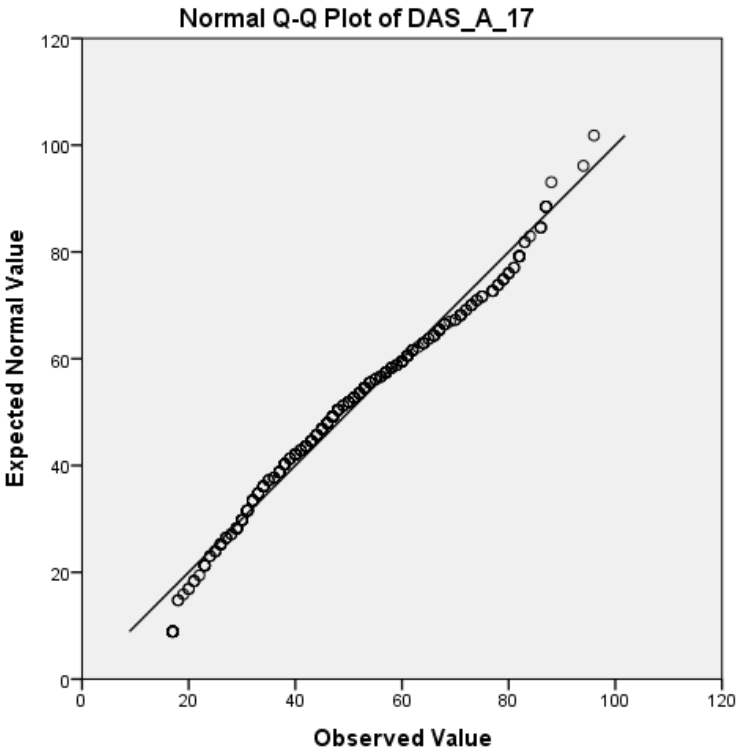


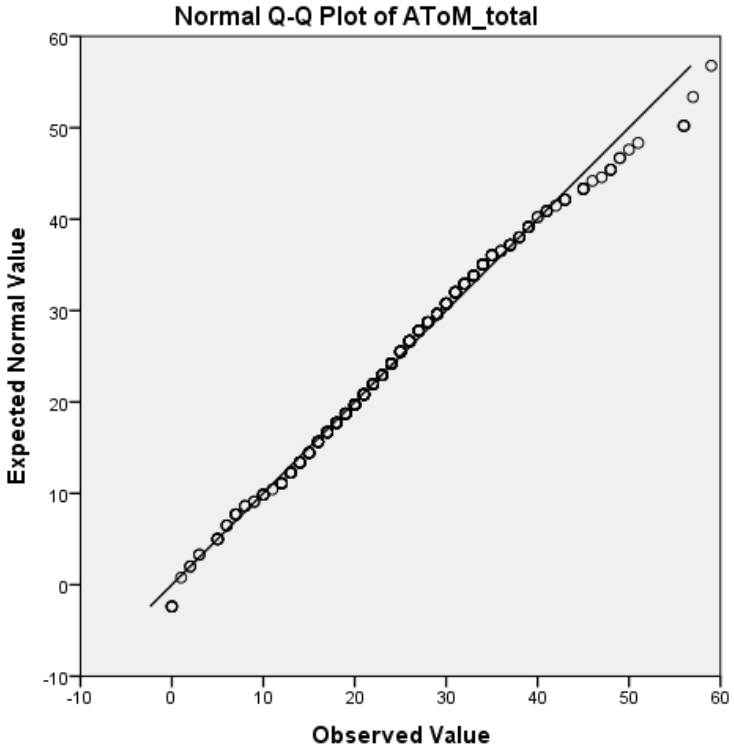

Normal Q-Q Plot of Education
Expected Normal Value
Observed Value
0
1
2
3
4

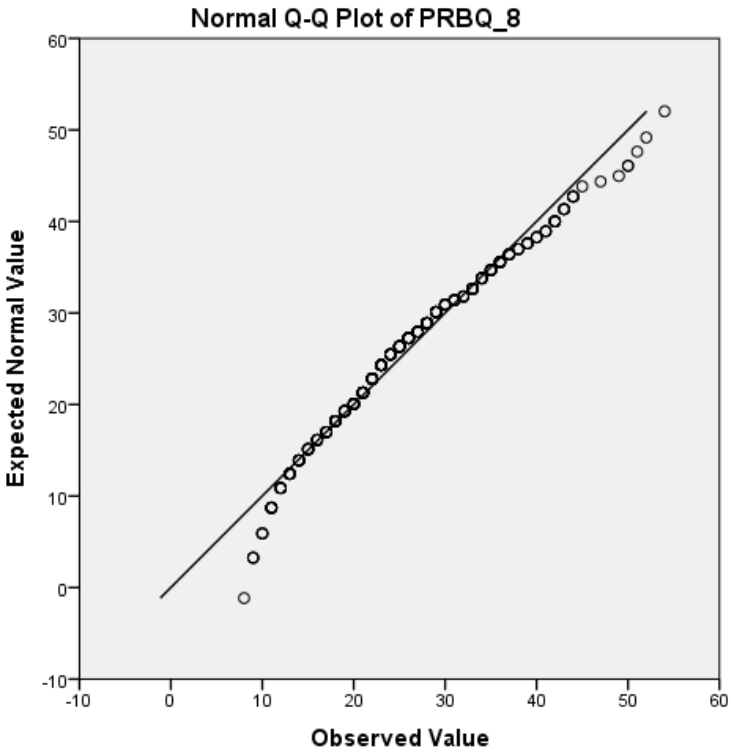

Normal Q-Q Plot of Marital Status
Expected Normal Value
Observed Value
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.0
1.2
1.4
1.6
1.8
2.0

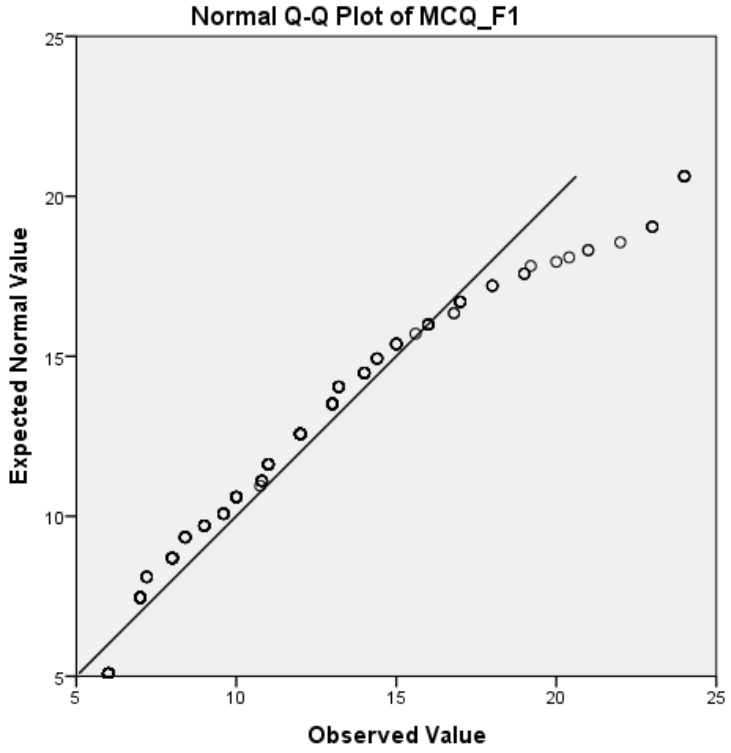

Normal Q-Q Plot of Parity
Expected Normal Value
Observed Value
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
1.2
1.4
1.6
1.8
2.0

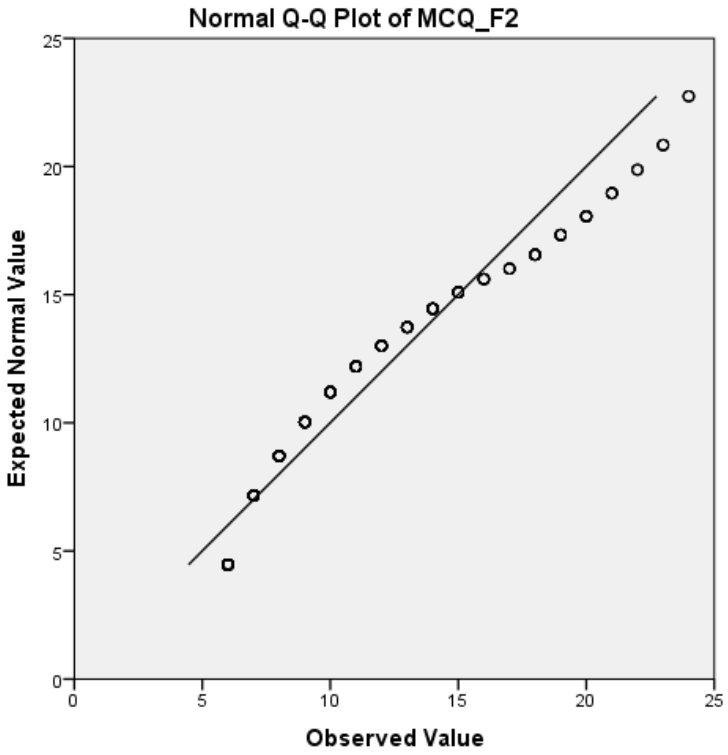

Normal Q-Q Plot of PHMHD
Expected Normal Value
Observed Value
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
1.2
1.4
1.6
1.8
2.0

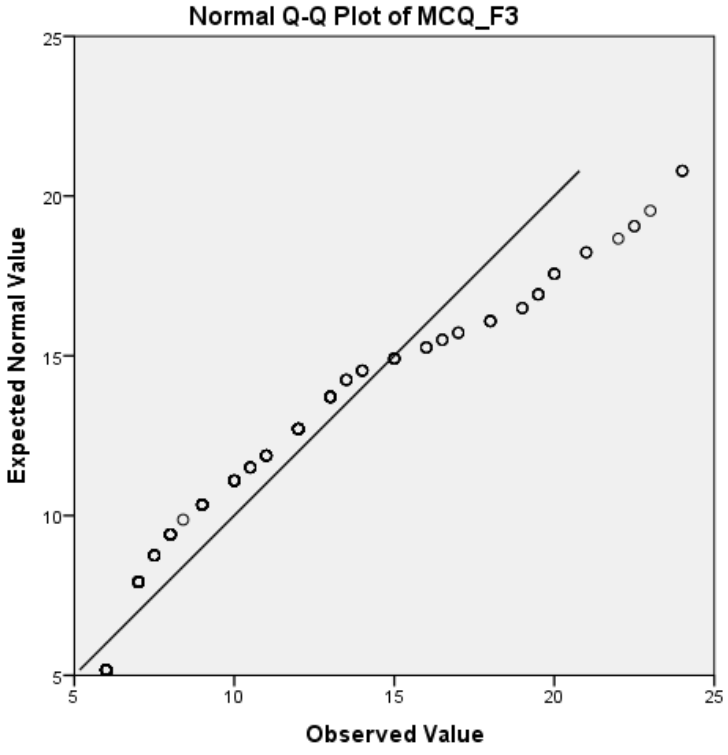

Normal Q-Q Plot of DAS_A_17
Expected Normal Value
Observed Value
0
20
40
60
80
100
120

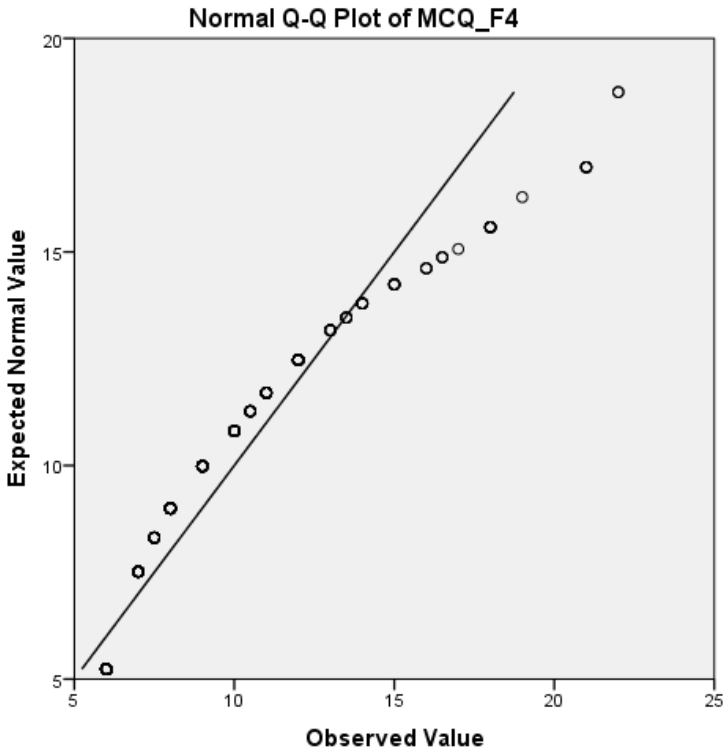

Normal Q-Q Plot of AToM_total
Expected Normal Value
Observed Value
-10
0
10
20
30
40
50
60

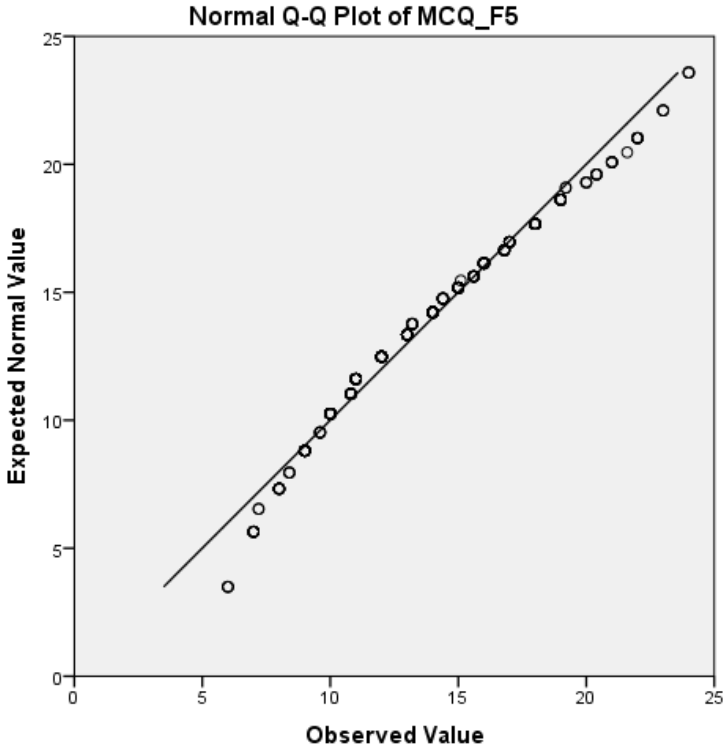

Normal Q-Q Plot of PRBQ_8
Expected Normal Value
Observed Value
60
50
40
30
20
10
0
-10
-10
0
10
20
30
40
50
60

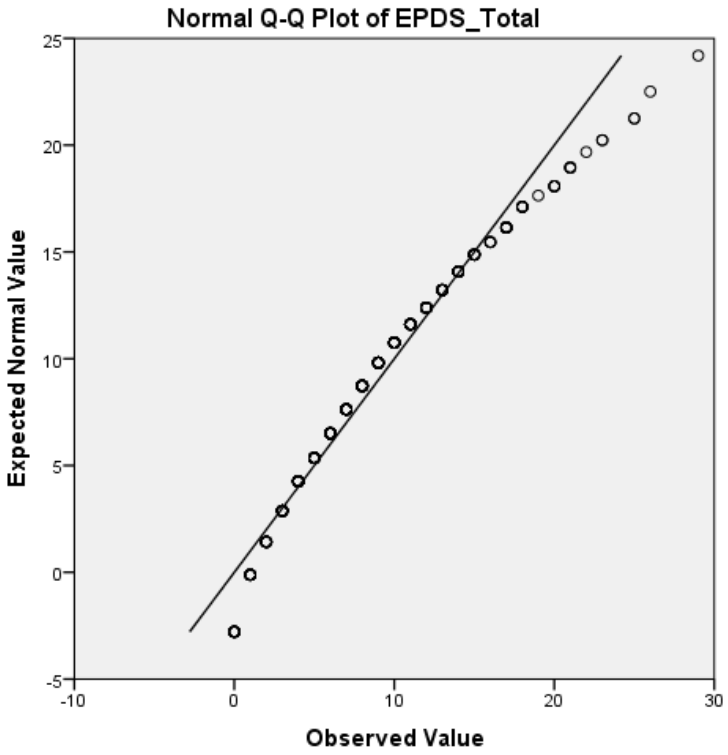

Normal Q-Q Plot of MCQ_F1
Expected Normal Value
Observed Value
25
20
15
10
5
5
10
15
20
25


Normal Q-Q Plot of MCQ_F2
Expected Normal Value
Observed Value
0
5
10
15
20
25


Normal Q-Q Plot of MCQ_F3
Expected Normal Value
Observed Value
5
10
15
20
25


Normal Q-Q Plot of MCQ_F4
Expected Normal Value
Observed Value
5
10
15
20
25


Normal Q-Q Plot of MCQ_F5
Expected Normal Value
Observed Value
0
5
10
15
20
25


Normal Q-Q Plot of EPDS_Total
Expected Normal Value
Observed Value
25
20
15
10
5
0
-5
-10
0
10
20
30

Appendix 12: Pregnancy Related Beliefs Questionnaire - Revised (PRBQ-8)

The following is a list of different attitudes or beliefs that people sometimes hold. Read each statement carefully and decide how much you agree or disagree with the statement. Many of them relate to attitudes and expectations about being a mother more than being pregnant. Try to think about these in terms of your own expectations or ideas about motherhood. For each of the beliefs show your answer by placing a tick under the column that best describes how *you* think. There is no correct answer as everybody is different.

When you are thinking about a statement, try to imagine yourself in the situation and answer how *you feel* rather than what you think *should* be the right answer. Another way of helping you decide would be to decide whether a given attitude is your typical way of looking at things - most of the time.

Belief: answer each statement according to the way you think most of the time	Totally agree	Agree very much	Agree slightly	Neutral	Disagree slightly	Disagree very much	Totally disagree
1. If I do not feel maternal, it means I am bad							
2. If my baby is unhappy, I will feel that it is my fault							
3. If someone else's baby is happier than mine, it is probably because I am an inadequate mother							
4. If I am unable to satisfy my baby, I am a bad mother							
5. If I do not feel completely emotionally attached to my baby, I should worry about what this means							
6. If I can't look after my baby properly, it shows that I am useless							
7. If someone important pays me less attention after the birth, it is because the baby is more important to them than I am							
8. I am as enthusiastic as I should be about my role as a mother							

Appendix 13: Study-Developed Questionnaire for Set One

Some information about you

1. Your age is _____
(please specify)

2. Your ethnic group is (please tick):

☐ White ☐ Asian ☐ Mixed ethnicity

☐Black ☐Far East Asian ☐ Hispanic

☐Other……
(please specify)

3. Your **completed** level of education is (tick all that relevant):

☐ O levels/GCSE or equivalent

☐ A levels or equivalent education or training

☐ University degree

☐ Postgraduate degree

4. What is your current employment status? Please choose one option that best describes your current status:

☐ Employed, please state occupation:……..

☐ Employed part-time

☐ Homemaker

☐ Student

☐ Other……
(please specify)

5. Are you married?

☐ Yes ☐ No if no, are you living with your partner: ☐ Yes ☐ No

6. Have you ever consulted your GP or a specialist for emotional difficulties? (Please tick one)

☐ Yes ☐ No

If Yes, what was it concerning?

_____
(Please specify)

7. Are you currently undergoing psychiatric/psychological treatment for:

Anxiety:
☐ Yes ☐ No

Depression:
☐ Yes ☐ No

Other (please specify):_____

8. If previously pregnant, were you ever diagnosed with antenatal or postnatal depression?

Antenatal depression:
☐ Yes ☐ No

Postnatal depression:
☐ Yes ☐ No

Some information about your pregnancy

9. How many weeks are you currently pregnant? ……
(please specify)

10. Are you currently pregnant with your first child?

☐ Yes ☐ No

If not, how many children do you have: _____

11. Was this pregnancy conceived (please tick):

☐ Naturally ☐ Assisted conception

12. Was this pregnancy planned?

☐ Yes ☐ No

13. Have you experienced any complications in the current pregnancy?

☐ Yes ☐ No

If yes, please specify what was the problem/complication:

_____

_____

_____

_____

14. Please indicate whether you have experienced any of the **following stressors in the past 12 months:**

Personal health problems:	☐ Yes	☐ No
Health problems of your significant other or your children:	☐ Yes	☐ No
Financial difficulties:	☐ Yes	☐ No
Changes to or loss of employment:	☐ Yes	☐ No
Relationship difficulties:	☐ Yes	☐ No
Accommodation problems:	☐ Yes	☐ No
Death or disappearance of a loved one:	☐ Yes	☐ No
Personal abuse or trauma:	☐ Yes	☐ No
Legal problems:	☐ Yes	☐ No
Child support/custody issues:	☐ Yes	☐ No
Separation or divorce:	☐ Yes	☐ No

Appendix 14: Study-Developed Questionnaire for Set Two

Participant ID number _____

Some information about your pregnancy

3. How many weeks are you currently pregnant? ……
(please specify)

4. Have you experienced any complications in the current pregnancy?

☐ Yes ☐ No

If yes, please specify what was the problem/complication:

_____

_____

_____

_____

_____

Appendix 15: Study-Developed Questionnaire for Set Three

Participant ID number _____

Some information about you

1. How many weeks ago did you give birth? ……
(please specify)

2. Did you experience any complications during the birth?

☐ Yes ☐ No

If yes, please specify what was the problem/complication:……..

_____

_____

3. Do you feel you have recovered physically after the birth?

☐ Yes ☐ No

If no, please let us know why that is the case:……..

_____

_____

4. Are you happy with how your baby is doing?

☐ Yes ☐ No

If no, please let us know why that is the case

_____

_____

Appendix 16: Information Sheet for Longitudinal Sample

Participant information leaflet: ID number: _____
Study 2 May 2015 (Version 2)

Predictors of Anxiety and Depression During the Child-bearing Process Questionnaire Study

What is the purpose of the study?
The purpose of this study is to establish the role of thinking styles, beliefs concerning motherhood and environmental factors in predicting women's anxiety and low mood during both the pregnancy and the post-partum.

Why have I been chosen?
You have been chosen because you are pregnant and are undergoing your antenatal care at St. Michael's Hospital, Bristol. We are inviting all women who are attending their first screening appointment at St. Michael's Hospital to take part in this study.

Do I have to take part?
No. It is up to you whether you wish to take part in the study. If you decide to take part, you are still free to withdraw at any time and without giving a reason. This will not affect the care you receive.

What will happen to me if I take part?
If you are happy to take part in the study we will ask you to complete several questionnaires at 3 stages during and after your pregnancy: at approximately 13-17 weeks of pregnancy, 30-36 weeks of pregnancy and 8-12 weeks post-partum. The first questionnaire is the longest, taking approximately 20min to complete. Each woman who completes the first set of questionnaires will receive a £5 voucher (M&S or John Lewis) as a token of appreciation for her time. The subsequent two questionnaire sets will take approximately 5-10min to complete. Participants who complete the follow-up questionnaires will be entered into a draw to win one of two £50 vouchers.

What do I have to do?
If you are happy to take part in this study, please indicate on the consent form your preferred method of receiving the questionnaires and return the form to the researcher. You do not need to provide any explanation if you decide not to take part in the study.

Will my records be kept confidential?
All details that you provide, such as your name, address, and answers on the questionnaire will be kept strictly confidential. Any information that leaves the hospital will have your name and address removed so that you cannot be recognised from it.

What will happen to the results of the study?
Once the study is complete, the results will be published in an academic journal. You will not be identified in any report or publication. If you like, you will be able to find out the results of the study by contacting the researcher whose details are given below, who will be able to provide the summary of the findings.

Who is the sponsor for this study?
Department of Psychology, Kingston University, London.

Who has reviewed the study?
All research in the NHS is looked at by independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favourable opinion by x Research Ethics Committee.

If you have any questions or require any further information, please contact the study researchers Ms Dawn Leach on [redacted] or [redacted] or Dr Ana Nikčević on [redacted] or [redacted].

Appendix 17: Participant Consent Form for Longitudinal Sample

Study 2 May 2015 (Version 2)
Participant ID number _____

Predictors of Anxiety and Depression During the Child-bearing Process Questionnaire Study

Consent form

Please initial box

I confirm that I have read and understand the information sheet dated May 2015 (Version 1) for the above study and have had the opportunity to ask questions and have had these answered satisfactorily. ☐

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. If I choose to withdraw, my data will be removed from the database. ☐

I agree to participate in the psychological study examining the role of predictors of anxiety and depression during the childbearing process, which will involve completion of questionnaires of thoughts, beliefs, mood, and overall well-being at 13-17 and 30-36 weeks gestation and 8-12 weeks after giving birth. ☐

Please choose how you would prefer to receive your questionnaire packet below and provide the relevant contact details.

☐ I prefer to receive my questionnaire packets via post (please provide your mailing address on the line below).

……
……..

☐ I prefer to receive an online version of the questionnaires (please provide your email address on the line below)

……
…….

Consent for psychological study:

Name of patient……..… Signature of patient……..…..

Date…….

Researcher…….. Signature……..……

Date…….

Witness…….... Signature……..……

Date…….

Appendix 18: Normality Tests for Study Two Data

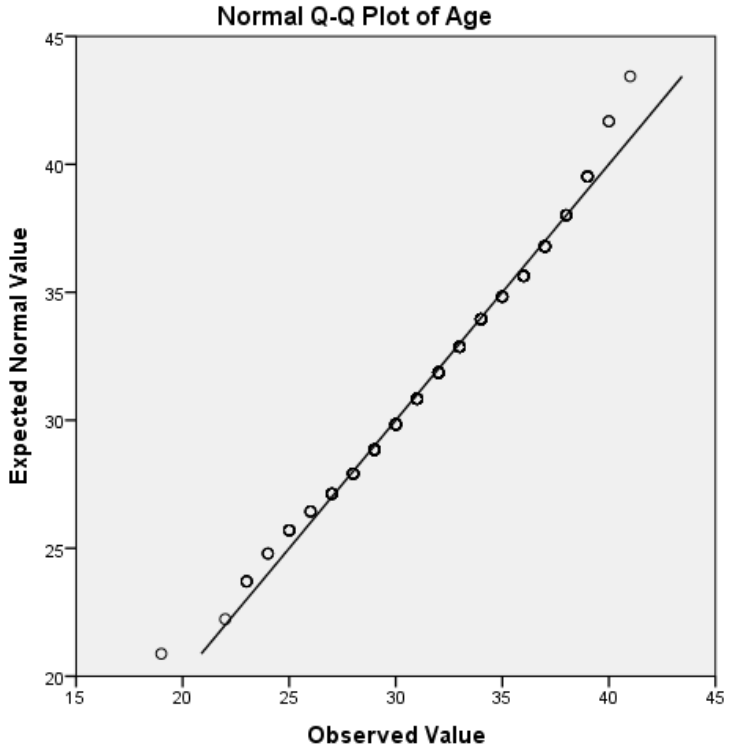
Normality tests for continuous study variables (N = 210)

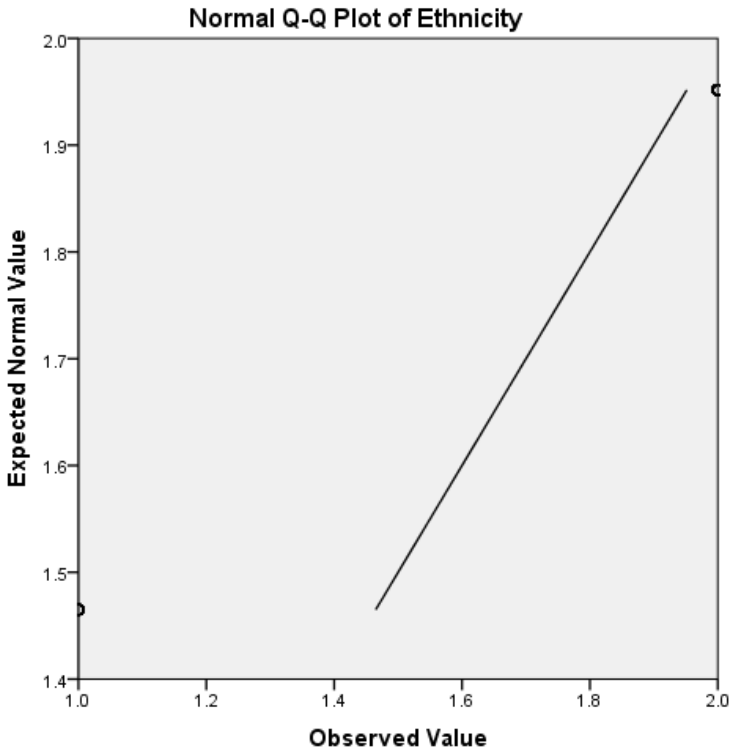
	Kolmogorov-Smirov Statistic	Shapiro-Wilk Statistic	Skewness	Kurtosis
Age	.07*	.98*	-.33	-.11
DAS-A-17	.09 **	.97 **	.56	-.14
PRBQ-8	.06	.99	.22	-.35
Antenatal EPDS	.10 **	.94 **	.81	.52
Postnatal EPDS	.09**	.95**	.78	.82

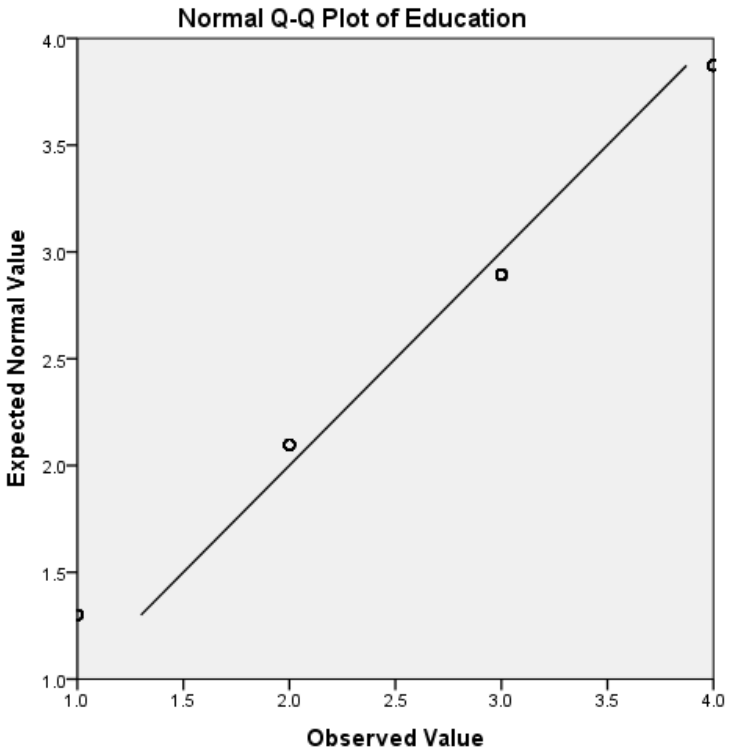
** sig ≤ .001 * sig ≤ .05

Note: N = 344; DAS-A-17 = Dysfunctional Attitudes Scale-Revised; PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised; Antenatal EPDS = Edinburgh Postnatal Depression Scale measured in the second trimester; Postnatal EPDS = Edinburgh Postnatal Depression Scale measured six-eight weeks after the birth of the baby

Appendix 19. Normal Probability Plots for Study Two Data






Normal Q-Q Plot of Education
Expected Normal Value
Observed Value
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3.5
3.0
2.5
2.0
1.5
1.0
1.0
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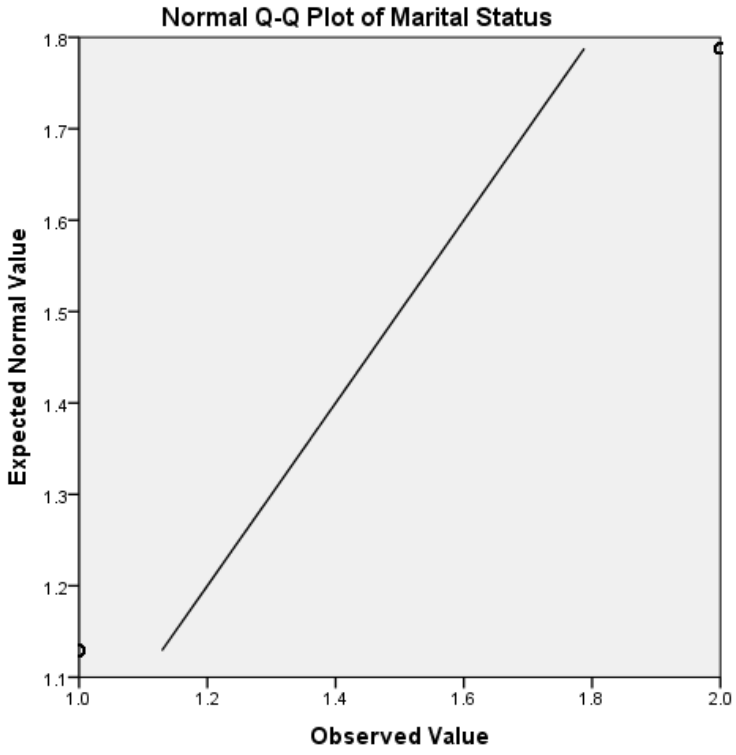
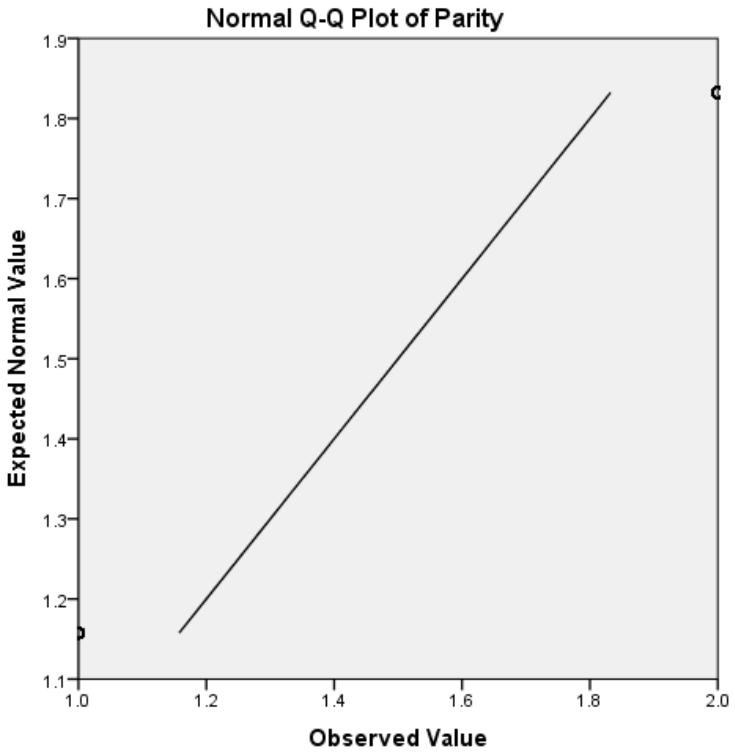
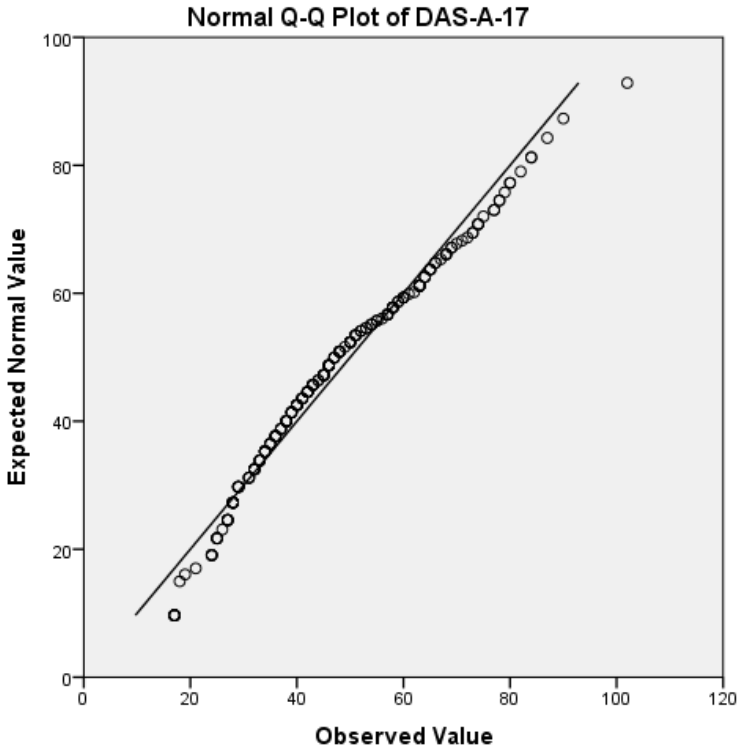
3.5
4.0


Normal Q-Q Plot of Marital Status
Expected Normal Value
Observed Value
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
1.2
1.4
1.6
1.8
2.0


Normal Q-Q Plot of Parity
Expected Normal Value
Observed Value
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
1.2
1.4
1.6
1.8
2.0


Normal Q-Q Plot of DAS-A-17
Expected Normal Value
Observed Value
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60
40
20
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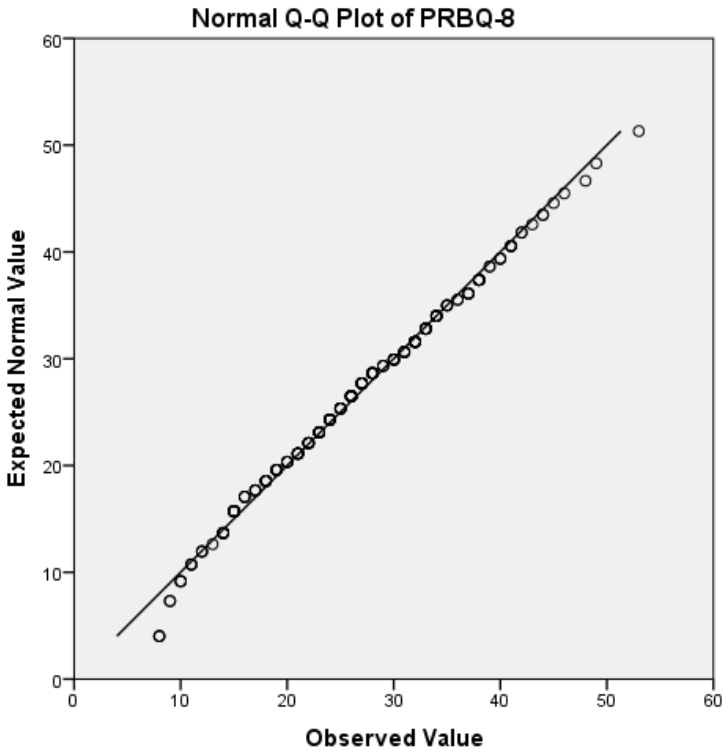
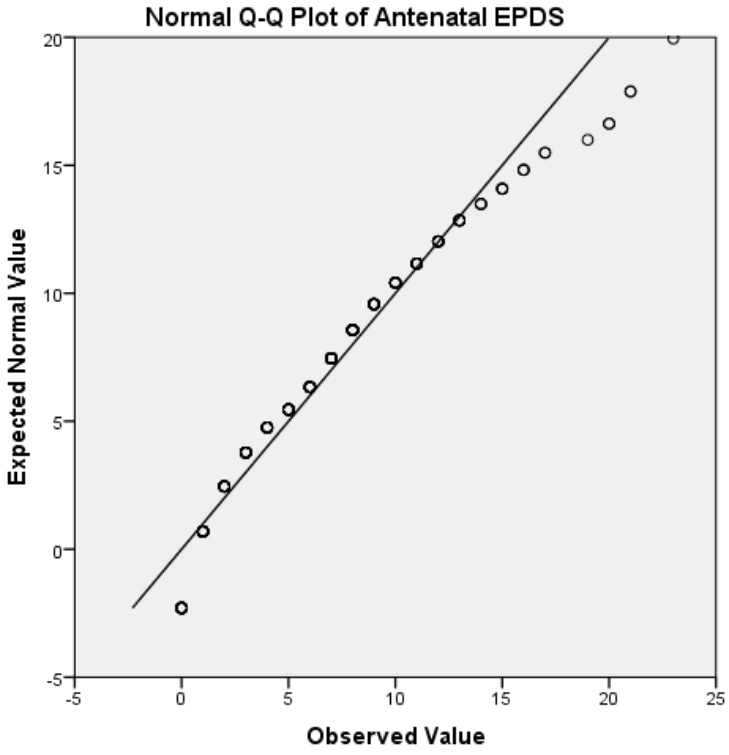
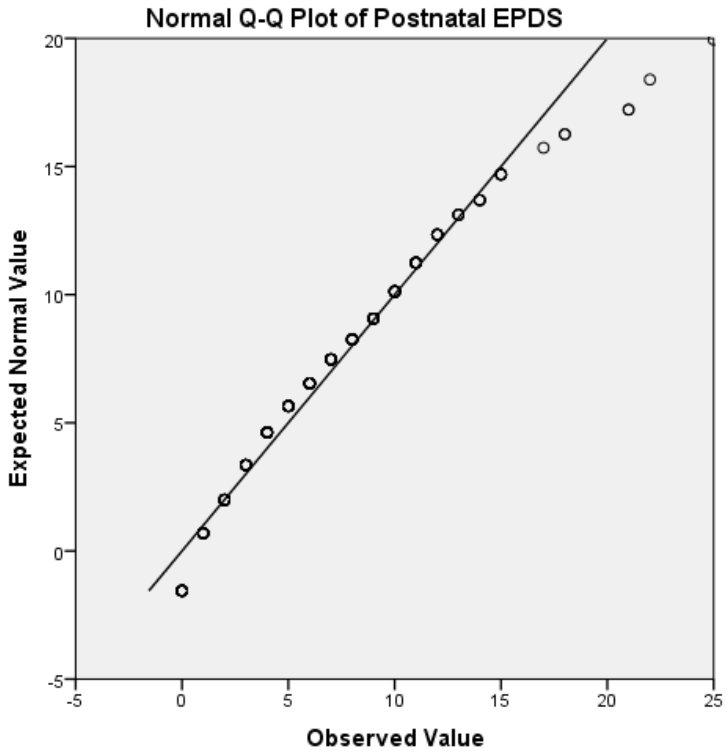
0
20
40
60
80
100
120


Normal Q-Q Plot of PRBQ-8
Expected Normal Value
Observed Value
0
10
20
30
40
50
60


Normal Q-Q Plot of Antenatal EPDS
Expected Normal Value
Observed Value
-5
0
5
10
15
20
25


Normal Q-Q Plot of Postnatal EPDS
Expected Normal Value
Observed Value
20
15
10
5
0
-5
-5
0
5
10
15
20
25

Appendix 20: The 30-item Metacognitions Questionnaire (MCQ-30)

Below are a number of beliefs that people have expressed. Please read each item and indicate how much you generally agree with it be circling the one appropriate number that best represents your beliefs. There are no right or wrong answers. Please respond to all items.

	Do not Agree	Agree slightly	Agree moderately	Agree very much
1. Worrying helps me to avoid problems in the future	1	2	3	4
2. My worrying is dangerous for me	1	2	3	4
3. I think a lot about my thoughts	1	2	3	4
4. I could make myself sick with worry	1	2	3	4
5. I am aware of the way my mind works when I am thinking through a problem	1	2	3	4
6. If I did not control a worrying thought, and then it happened, it would be my fault	1	2	3	4
7. I need to worry in order to remain organised	1	2	3	4
8. I have little confidence in my memory for words and names	1	2	3	4
9. My worrying thoughts persist, no matter how I try to stop them	1	2	3	4
10. Worrying helps me to get things sorted out in my mind	1	2	3	4
11. I cannot ignore my worrying thoughts	1	2	3	4
12. I monitor my thoughts	1	2	3	4
13. I should be in control of my thoughts at all times	1	2	3	4
14. My memory can mislead me at times	1	2	3	4
15. My worrying could make me go mad	1	2	3	4
16. I am constantly aware of my thinking	1	2	3	4
17. I have a poor memory	1	2	3	4

	Do not Agree	Agree slightly	Agree moderately	Agree very much
18. I pay close attention to the way that my mind works	1	2	3	4
19. Worrying helps me cope	1	2	3	4
20. Not being able to control my thoughts is a sign of weakness	1	2	3	4
21. When I start worrying, I cannot stop	1	2	3	4
22. I will be punished for not controlling certain thoughts	1	2	3	4
23. Worrying helps me to solve problems	1	2	3	4
24. I have little confidence in my memory for places	1	2	3	4
25. It is bad to think certain thoughts	1	2	3	4
26. I do not trust my memory	1	2	3	4
27. If I could not control my thoughts, I would not be able to function	1	2	3	4
28. I need to worry, in order to work well	1	2	3	4
29. I have little confidence in my memory for actions	1	2	3	4
30. I constantly examine my thoughts	1	2	3	4

Appendix 21: Measure of State Anxiety

About your emotions (STAI Y-1)

A number of statements which people have used to describe themselves are given below. Read each statement and then **circle** the appropriate number to the right of the statement to indicate how you feel right now, that is, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	Not at all	*Somewhat*	*Moderately so*	*Almost always*
1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4
4. I feel strained	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel satisfied	1	2	3	4
9. I feel frightened	1	2	3	4
10. I feel comfortable	1	2	3	4
11. I feel self-confident	1	2	3	4
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4
14. I feel indecisive	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel confused	1	2	3	4
19. I feel steady	1	2	3	4
20. I feel pleasant	1	2	3	4

PLEASE ENSURE THAT YOU HAVE RESPONDED TO ALL ITEMS. THANK YOU.

Appendix 22: Measure of Trait Anxiety

More about your emotions (STAI Y-2)

A number of statements which people have used to describe themselves are given below. Read each statement and then **circle** the appropriate number to the right of the statement to indicate how you *generally* feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel. PLEASE RESPOND TO ALL ITEMS.

	Almost never	*Sometimes*	*Often*	*Almost always*
1. I feel pleasant	1	2	3	4
2. I feel nervous and restless	1	2	3	4
3. I feel satisfied with myself	1	2	3	4
4. I wish I could be happy as others seem to be	1	2	3	4
5. I feel like a failure	1	2	3	4
6. I feel rested	1	2	3	4
7. I am "calm, cool and collected"	1	2	3	4
8. I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4
9. I worry too much over something that really does not matter	1	2	3	4
10. I am happy	1	2	3	4
11. I have disturbing thoughts	1	2	3	4
12. I lack self-confidence	1	2	3	4
13. I feel secure	1	2	3	4
14. I make decisions easily	1	2	3	4
15. I feel inadequate	1	2	3	4
16. I am content	1	2	3	4
17. Some unimportant thought runs through my mind and bothers me	1	2	3	4
18. I take disappointments so keenly that I cannot put them out of my mind	1	2	3	4
19. I am a steady person	1	2	3	4
20. I get in a state of tension or turmoil as I think over my recent concerns and interests	1	2	3	4

PLEASE ENSURE THAT YOU HAVE RESPONDED TO ALL ITEMS. THANK YOU.

Appendix 23: Multi-dimensional Scale of Perceived Social Support (MSPSS)

We are interested in how you feel about the following statements. Reach each statement carefully. Indicate how you feel about each statement by placing a tick in the box that best represents how you feel.

	Totally agree	Agree very much	Agree slightly	Neutral	Disagree slightly	Disagree very much	Totally disagree
1. There is a special person who is around when I am in need.							
2. There is a special person with whom I can share joys and sorrows.							
3. My family really tries to help me.							
4. I get the emotional help and support I need from my family.							
5. I have a special person who is a real source of comfort to me.							
6. My friends really try to help me.							
7. I can count on my friends when things go wrong.							
8. I can talk about my problems with my family.							
9. I have friends with whom I can share my joys and sorrow.							
10. There is a special person in my life who cares about my feelings							
11. My family is willing to help me make decisions.							
12. I can talk about my problems with my friends.							

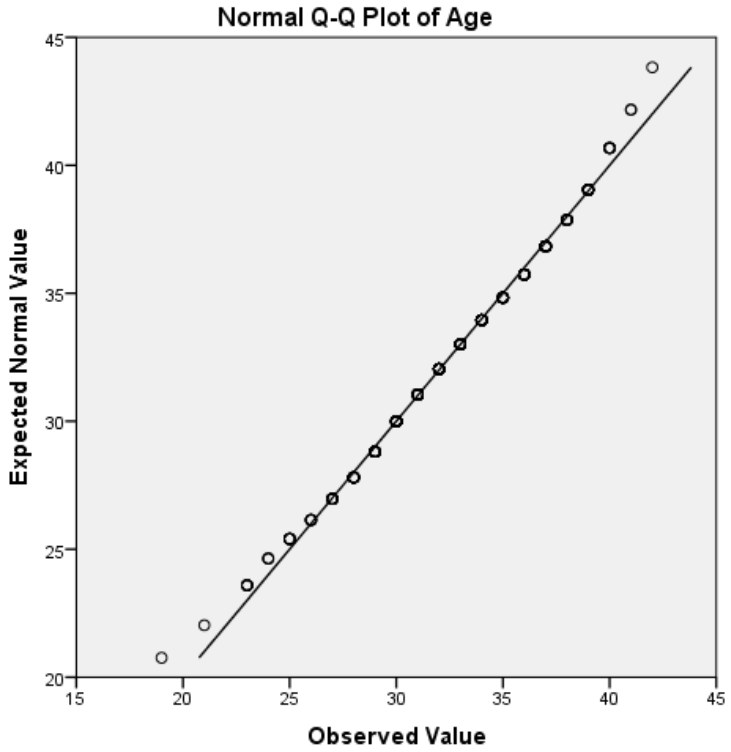
Appendix 24: Normality Tests for Study Four Data

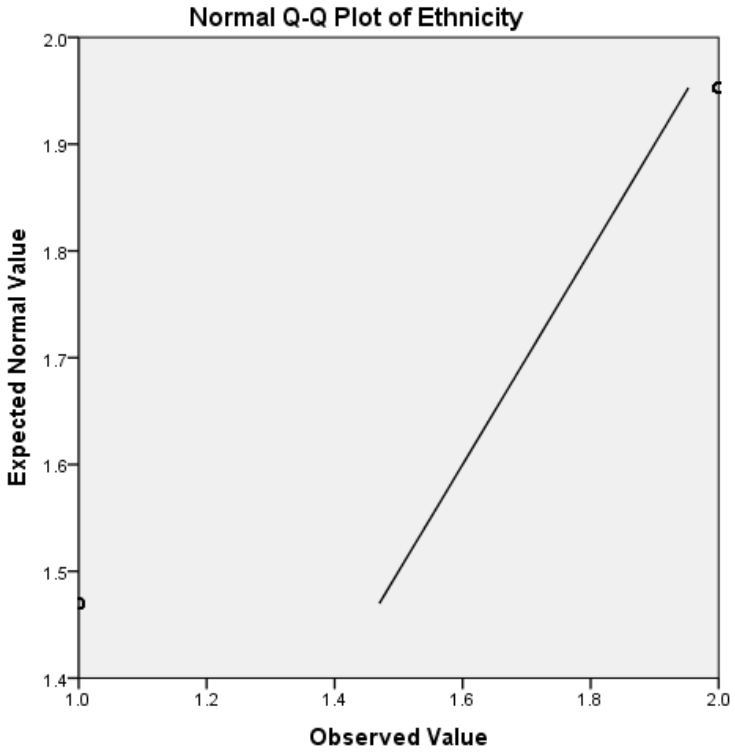
	Kolmogorov-Smirov Statistic	Shapiro-Wilk Statistic	Skewness	Kurtosis
EPDS set 1	.09 **	.93 **	.89	.57
EPDS set 2	.13 **	.92 **	1.09	1.62
EPDS set 3	.09**	.96**	.72	.47
STAI set 1	.11**	.95**	.81	.38
STAI set 2	.12**	.93**	1.05	1.22
STAI set 3	.11**	.94**	.95	.59
MCQ POS	.14**	.88**	1.24	1.75
MCQ NEG	.15**	.89**	.89	.01
MCQ CC	.22**	.79**	1.63	2.45
MCQ NC	.16**	.85**	1.46	2.30
MCQ CSC	.13**	.95**	.72	.08
PRBQ-8	.05	.99*	-.15	-.52
DAS-A-17	.08**	.99**	.56	-.14
MSPSS	.24**	.69**	2.89	11.22
Age	.06*	.99*	-.20	-.06

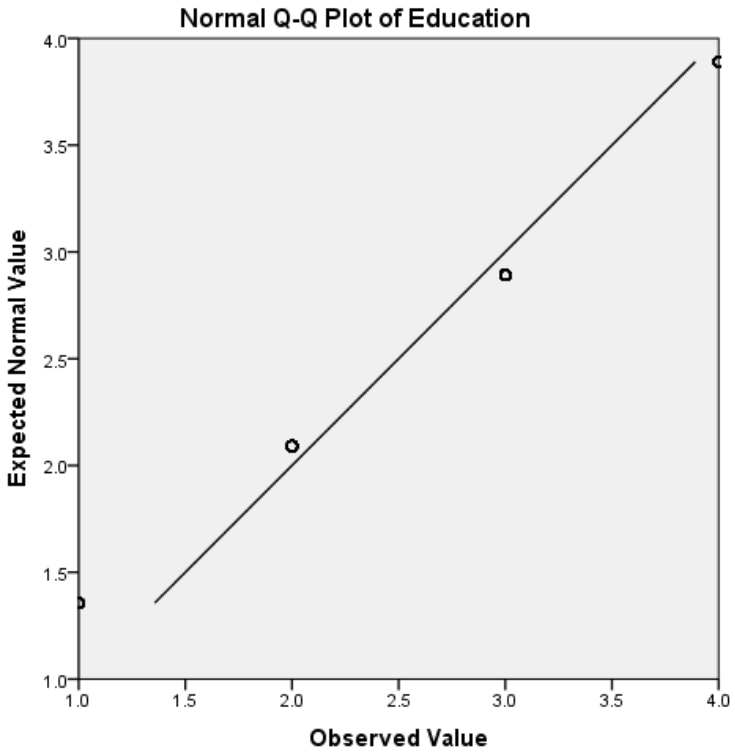
** sig ≤ .001 * sig ≤ .05

Note: *N* = 303, EPDS set 1 = Edinburgh Postnatal Depression Scale assessed during the second trimester; EPDS set 2 = Edinburgh Postnatal Depression Scale assessed during the third trimester EPDS set 3 = Edinburgh Postnatal Depression Scale, assessed within the first five months after birth; MCQ POS = Metacognitions Questionnaire-30 positive beliefs about worry, assessed during second trimester; MCQ NEG = Metacognitions Questionnaire-30 negative beliefs about the uncontrollability and danger of one's thoughts, assessed during second trimester; MCQ CC = Metacognitions Questionnaire-30 cognitive confidence, assessed during second trimester; MCQ NC = Metacognitions Questionnaire-30 need to control thoughts, assessed during second trimester; MCQ CSC = Metacognitions Questionnaire-30 cognitive self-consciousness, assessed during second trimester; PRBQ-8 = Pregnancy Related Beliefs Questionnaire-Revised, assessed during the second trimester; MSPSS = Multidimensional Scale of Perceived Social Support.

Appendix 25. Normality Plots for Study Four Data






Normal Q-Q Plot of Education
Expected Normal Value
Observed Value
4.0
3.5
3.0
2.5
2.0
1.5
1.0
1.0
1.5
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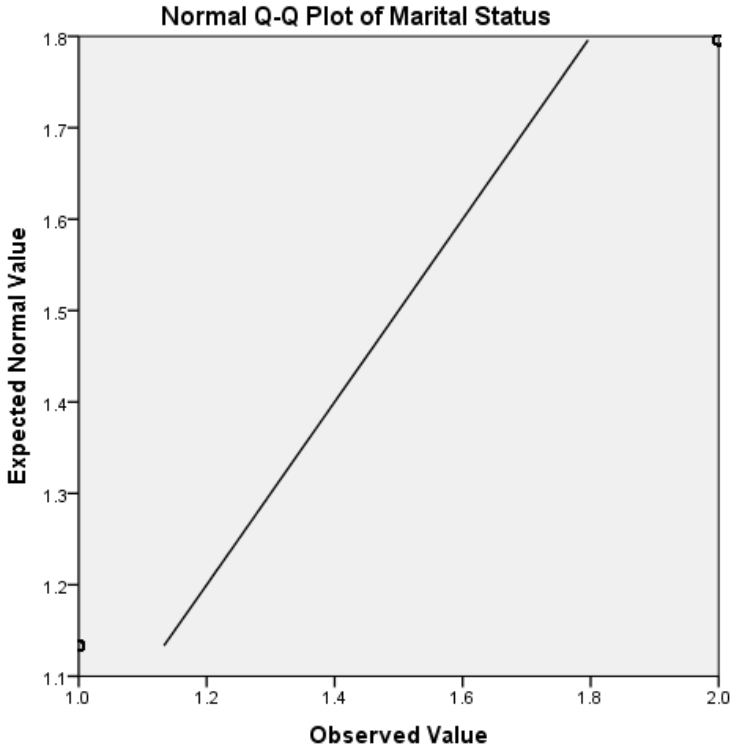
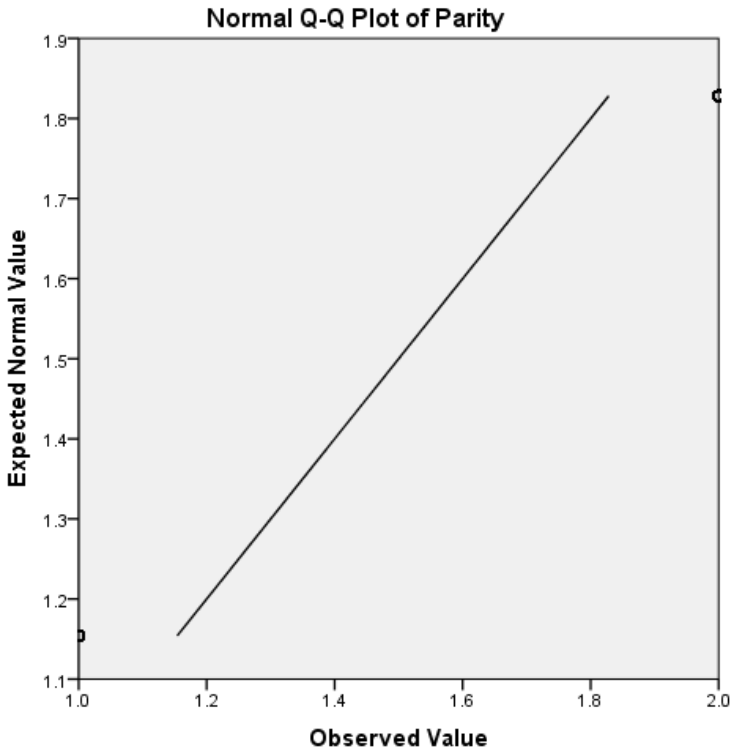
3.0
3.5
4.0


Normal Q-Q Plot of Marital Status
Expected Normal Value
Observed Value
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
1.2
1.4
1.6
1.8
2.0


Normal Q-Q Plot of Parity
Expected Normal Value
Observed Value
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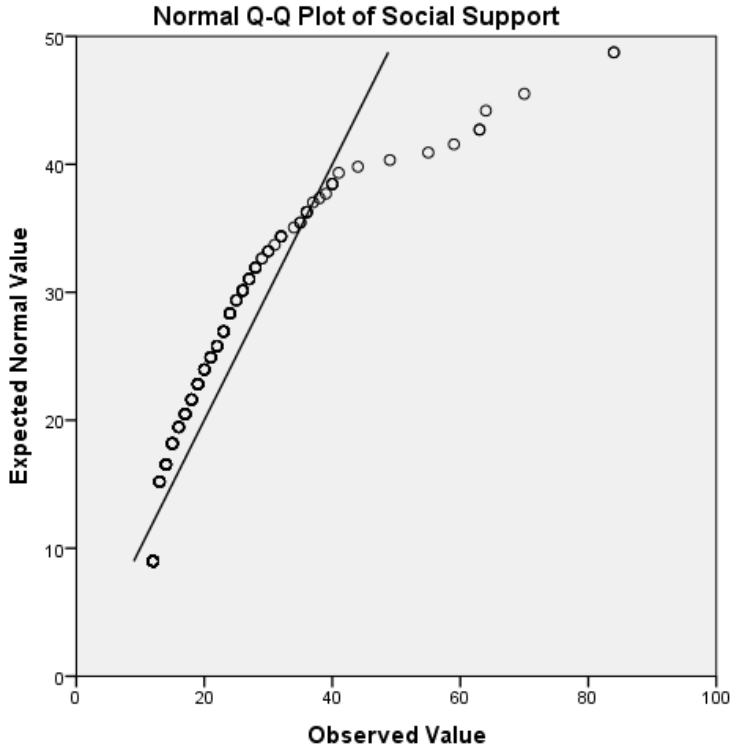
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
1.2
1.4
1.6
1.8
2.0


Normal Q-Q Plot of Social Support
Expected Normal Value
Observed Value
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30
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10
0
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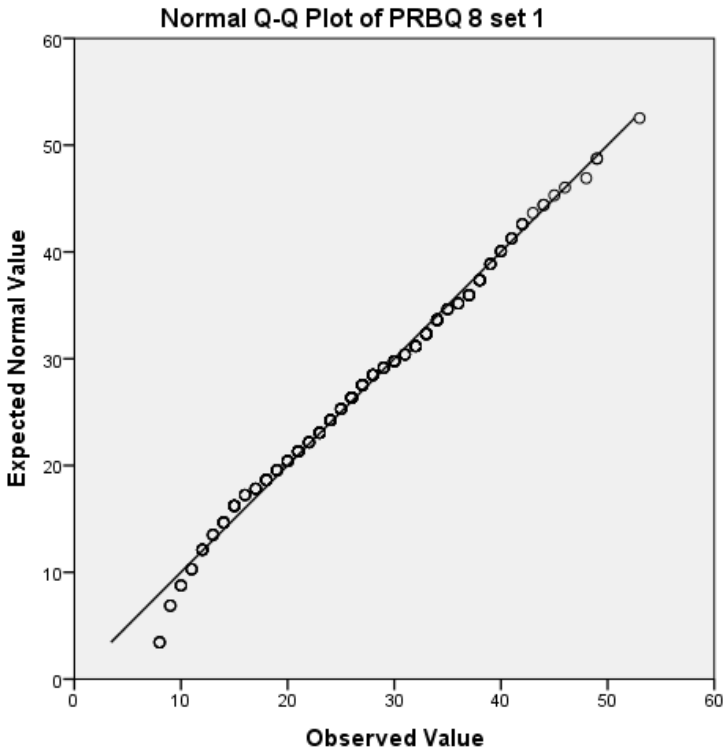
20
40
60
80
100


Normal Q-Q Plot of PRBQ 8 set 1
Expected Normal Value
Observed Value
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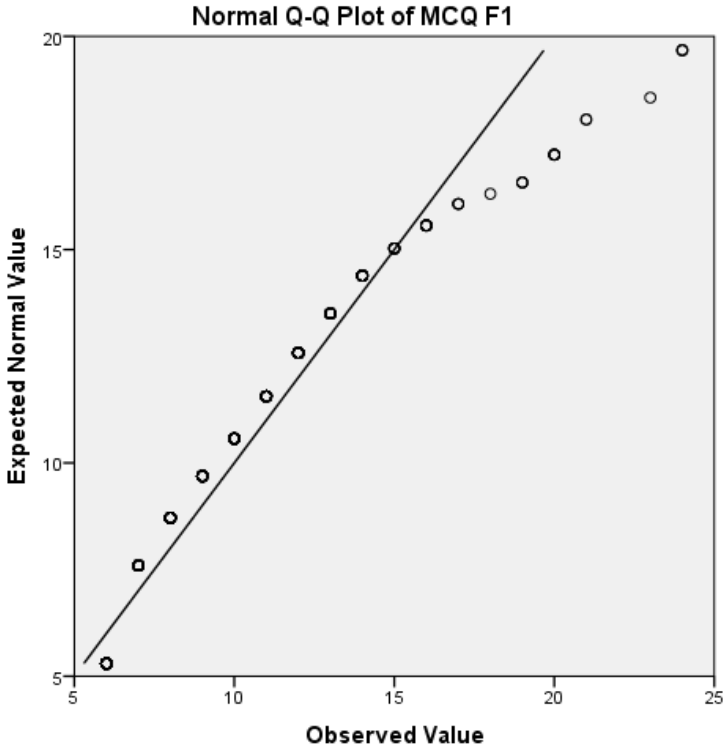
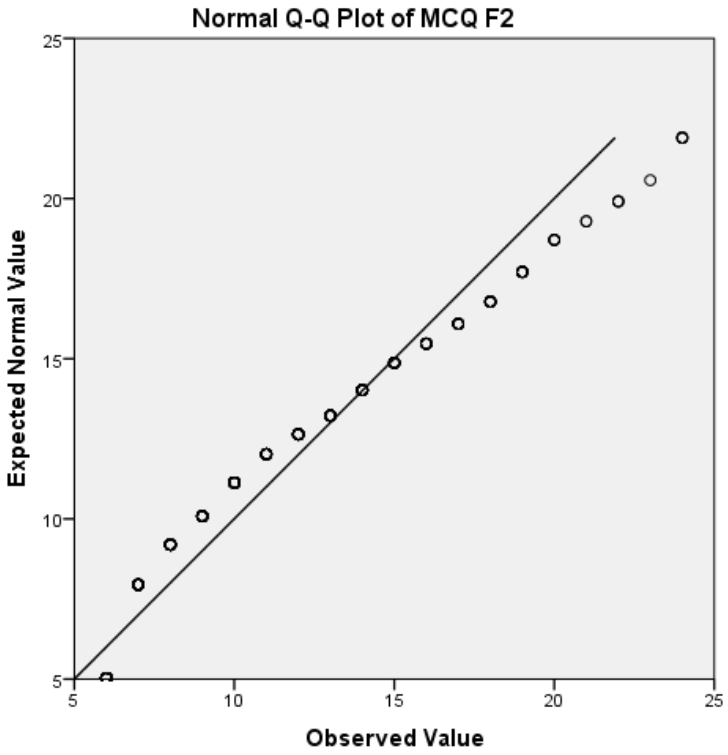
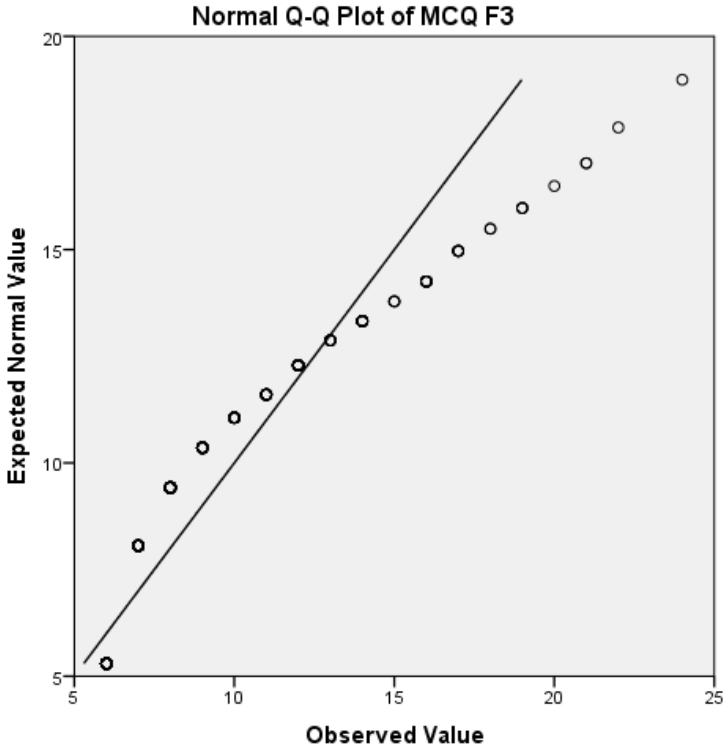
20
30
40
50
60


Normal Q-Q Plot of MCQ F1
Expected Normal Value
Observed Value
5
10
15
20
25


Normal Q-Q Plot of MCQ F2
Expected Normal Value
Observed Value
5
10
15
20
25


Normal Q-Q Plot of MCQ F3
Expected Normal Value
Observed Value
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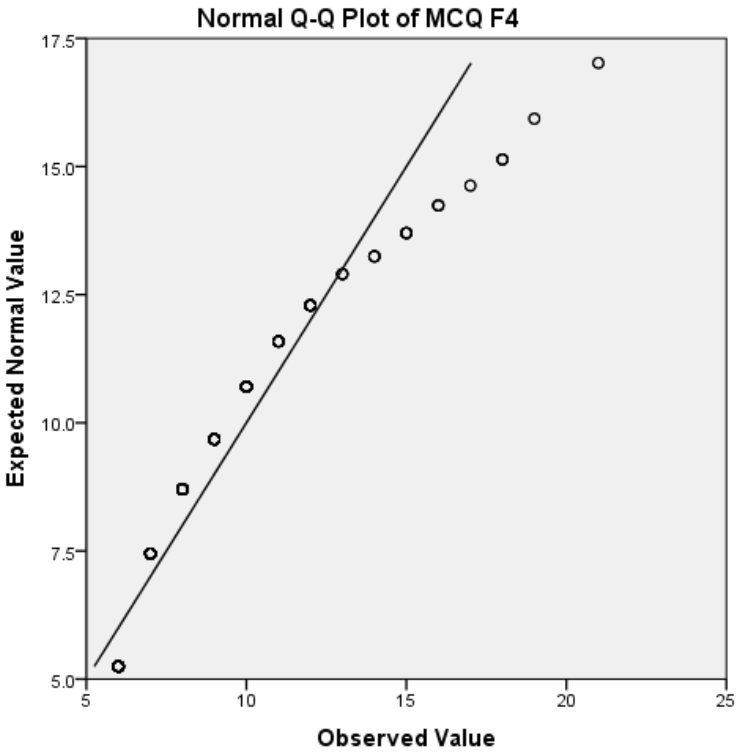
10
15
20
25


Normal Q-Q Plot of MCQ F4
Expected Normal Value
Observed Value
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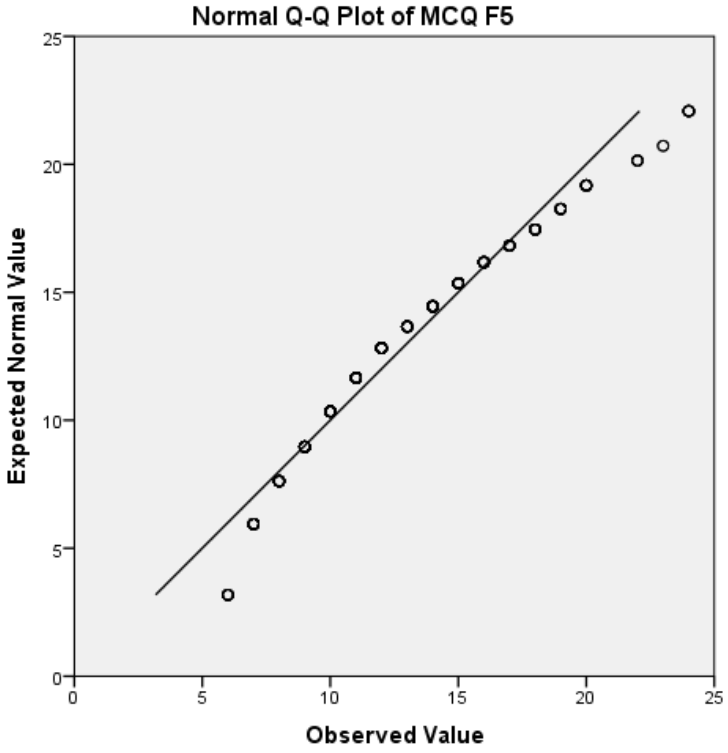
12.5
10.0
7.5
5.0
5
10
15
20
25


Normal Q-Q Plot of MCQ F5
Expected Normal Value
Observed Value
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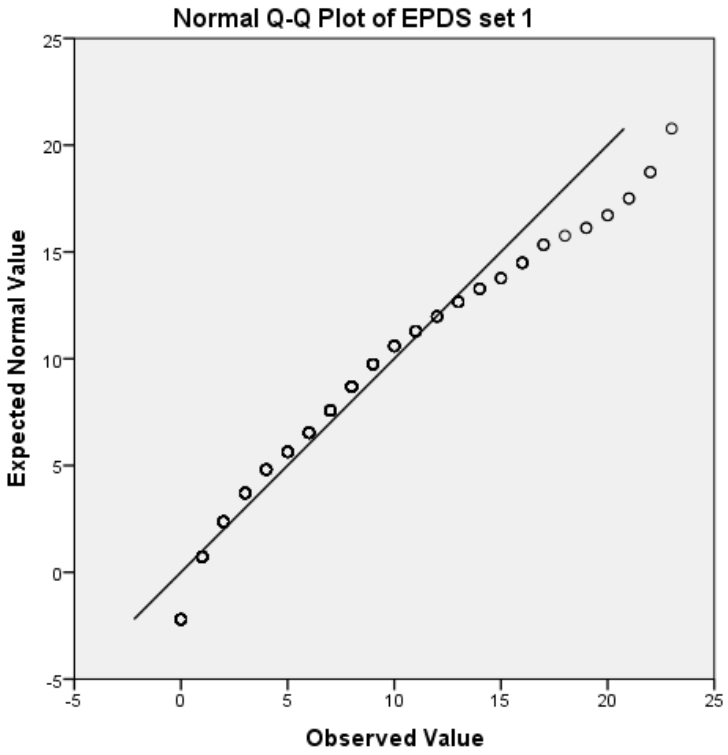
20
15
10
5
0
0
5
10
15
20
25


Normal Q-Q Plot of EPDS set 1
Expected Normal Value
Observed Value
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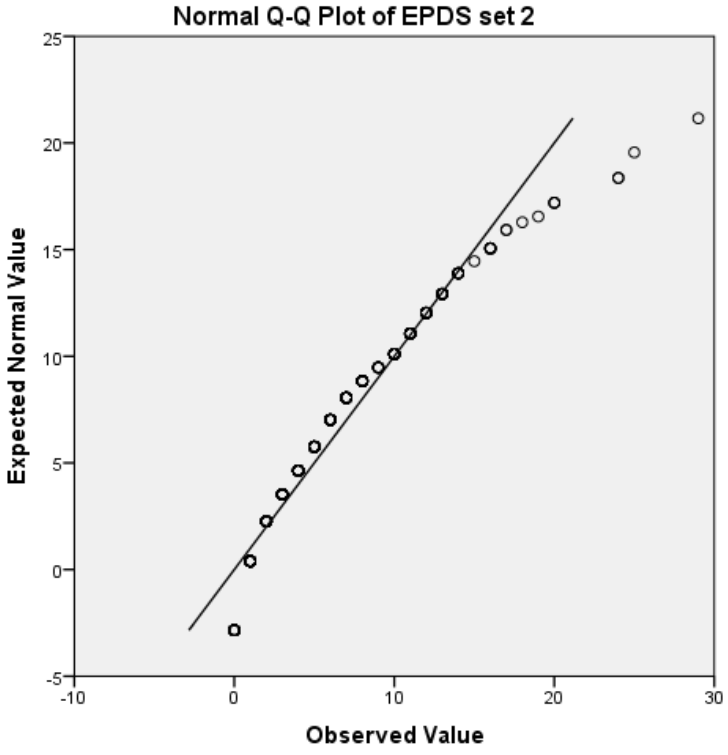
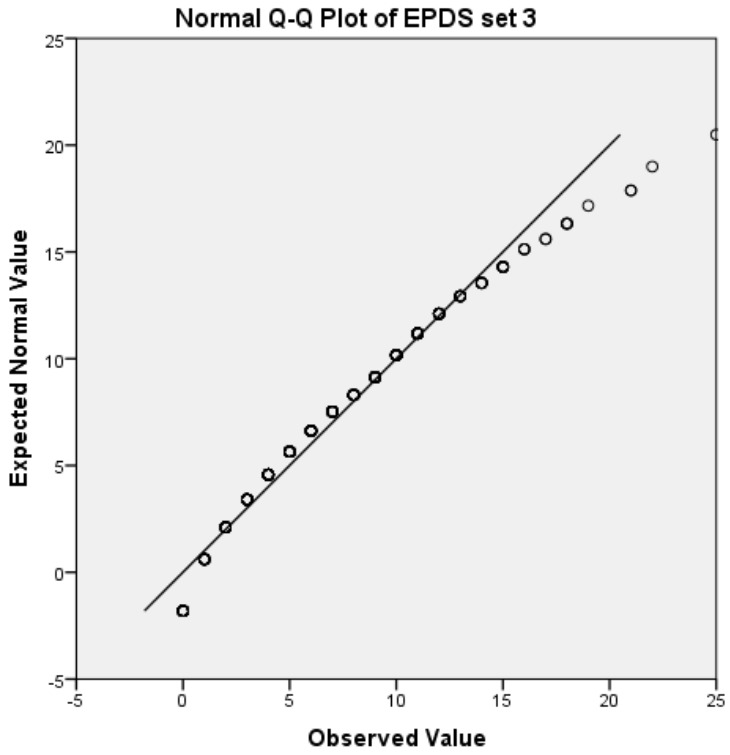
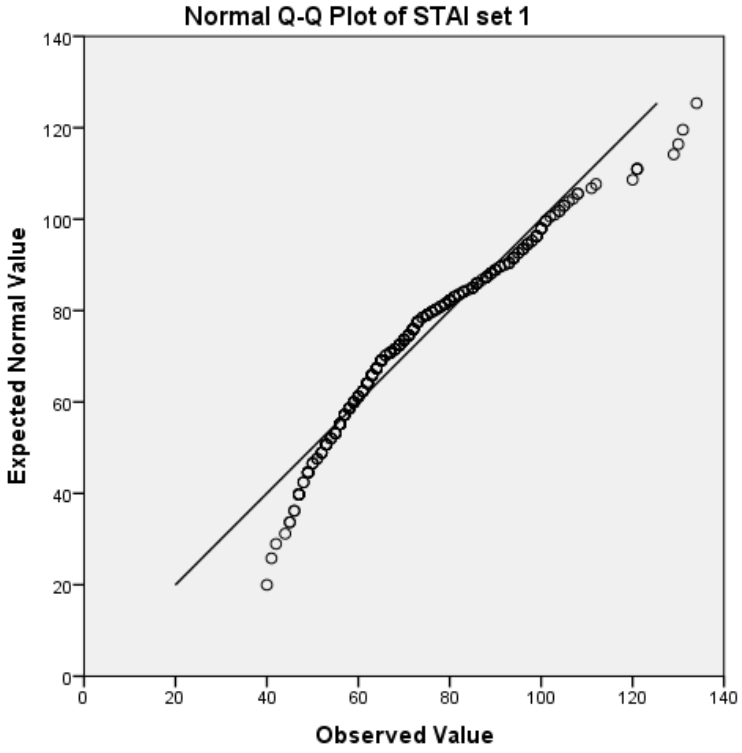
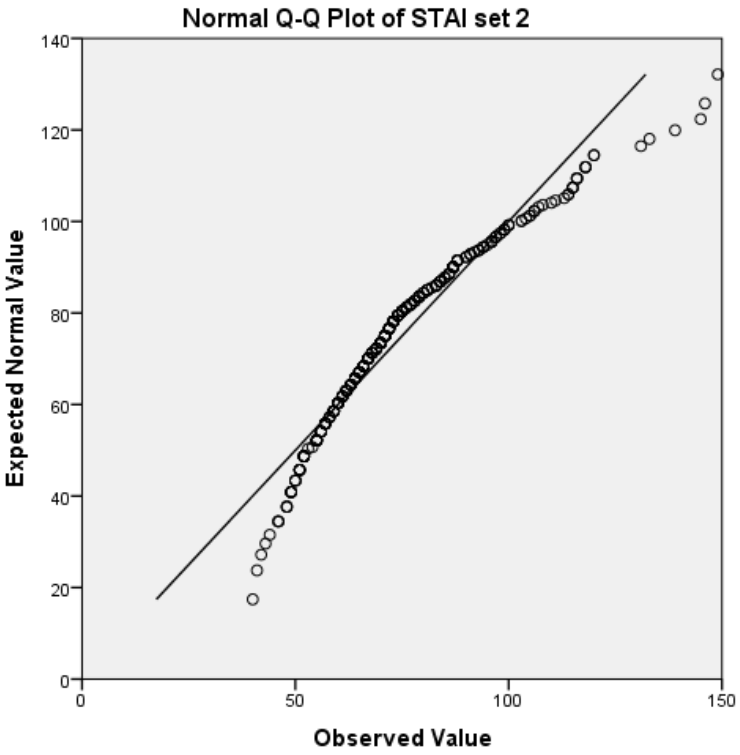
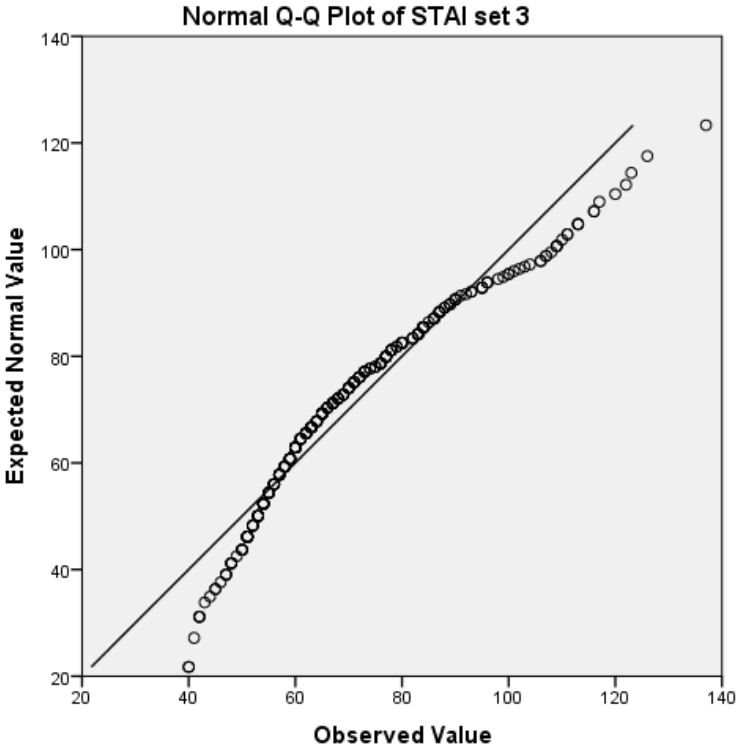
20
15
10
5
0
-5
-5
0
5
10
15
20
25


Normal Q-Q Plot of EPDS set 2
Expected Normal Value
Observed Value
25
20
15
10
5
0
-5
-10
0
10
20
30


Normal Q-Q Plot of EPDS set 3
Expected Normal Value
Observed Value
25
20
15
10
5
0
-5
-5
0
5
10
15
20
25


Normal Q-Q Plot of STAI set 1
Expected Normal Value
Observed Value
140
120
100
80
60
40
20
0
0
20
40
60
80
100
120
140


Normal Q-Q Plot of STAI set 2
Expected Normal Value
Observed Value
0
20
40
60
80
100
120
140
0
50
100
150


Normal Q-Q Plot of STAI set 3
Expected Normal Value
Observed Value
20
40
60
80
100
120
140
20
40
60
80
100
120
140

Appendix 26. Summary of the Rates of Perinatal Depression

Authors (Country; N)	Point Prevalence (%)	Incidence (%)	Measure(s)
Heron et al., 2004 (England; *N* = 8,323)			>12 EPDS
18 weeks gestation	11.4		
32 weeks gestation	13.1	8.2	
8 weeks postpartum	8.9	4.3	
8 months postpartum	7.8	3	
Johanson et al., 2000 (England; *N* = 2000)			>14 EPDS
Antenatal Period	9.8		
3 month postpartum	7.4		
Joseffson et al., 2001 (Sweden; *N* = 1558)			>10 EPDS
35-36 weeks gestation	17		
3 days after birth	18		
6-8 weeks postpartum	13		
6 months postpartum	13		

Appendix 27. Summary of the Rates of Perinatal Anxiety

Authors	Point Prevalence (%)	Incidence (%)	Measure
Heron et al., 2004 (England; *N* = 8,323)			CCEI (Top 15%)
18 weeks gestation	14.6		
32 weeks gestation	15.6	8.6	
8 weeks postpartum	8.2	3.1	
8 months postpartum	9	3	
Grant et al., 2008 (Australia; *N* = 100)			>40 STAI
Third trimester	33		State
Third trimester	33		Trait
8 Months postpartum	33		State
8 months postpartum	26		Trait
Dennis et al., 2013 (Canada; *N* = 522)			>40 STAI
1 week after birth	22.6		State
4 weeks after birth	17.2		State
8 weeks after birth	14.8		State

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