Mothers' Experiences of their Child: the Validation of a Self-Report Antenatal and Postnatal Questionnaire

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1. Abstract

The concept of Mind-Mindedness has important implications for the parenting relationship and infant outcomes (McMahon & Meins, 2012; Meins, Centifanti, Fernyhough, & Fishburn, 2013; Meins et al., 2012). Recent research has indicated that Mind-Mindedness is amenable to change in the antenatal period and thus indicates that targeted interventions should be provided to mothers to improve maternal Mind-Mindedness (Kondel-Laws & Greenwood, 2014; Kondel-Laws, Parkinson, Hensman, & Laws, 2012). However, no expedient method of assessing Mind-Mindedness exists. This study attempts to address this by developing two questionnaires to assess Mind-Mindedness during pregnancy and after birth. The questionnaires were administered via an online survey. The Mind-Mindedness Antenatal Questionnaire (MMAQ) was administered to a sample of 273 pregnant mothers in their first, second and third trimester of pregnancy, whereas, the Mind-Mindedness Postpartum Questionnaire (MMPQ) was administered to 397 mothers with a child between one month and six years old. Participants completed either the MMAQ or MMPQ and a demographic questionnaire. An exploratory factor analysis (EFA) conducted on the MMAQ indicated a three-factor solution. The three subscales (Future Baby, Mother Baby Interaction and Baby's Feelings) of the MMAQ, as well as the overall total score, showed good internal reliability. An EFA on the MMPQ also indicated a three-factor solution. Good internal reliability was found for two of the subscales (Child's Mind and Negative Emotions). However, the third subscale (Future Aspirations) had low internal reliability. A hierarchical multiple regression analysis was conducted to assess the variables related to the questionnaires in order to start to establish the external reliability and validity of the MMAQ and MMPQ. The concepts underpinning the MMAQ and MMPQ were discussed, as well as, the variables associated with the measures and the clinical implications.

2. Introduction

The following introduction will firstly consider the mother-infant relationship postpartum as defined by attachment theory. It will then go on to consider this relationship in the antenatal period. After this it shall outline the key concepts suggested by the literature as important in the transmission of attachment. Then it will provide a detailed review of the concept of Mind-Mindedness (MM) and, finally, will provide a rationale for this study and outline the research aims.

2.1. Definition of terms

Mind-Mindedness (MM)

This term refers to the ability of a mother to recognise their infant as a 'mental agent'. That is, as an individual with a mind of their own who has thoughts, emotions and desires (Meins, 1997).

Mother-Foetus Attachment (MFA)

This term refers to the attachment relationship that develops through reciprocal interaction between the expectant mother and her foetus from conception to birth.

Parental Reflective Function (PRF)

This term refers to the extent to which mothers recognise their infants and their own mental states, the interaction between these states and behaviour, and the difficulty in truly knowing others' mental states (Slade, 2005).

Postpartum

This term has been used to refer to the time after the birth of the infant.

2.2. Search Strategy

A preliminary literature search was conducted using the key word 'Mind-Mindedness' in the Web of Science, Pubmed and PsyInfo search engines. A list of relevant papers was compiled by a review of the abstracts. A second search was then conducted using the terms 'Mind-Mindedness', 'Mentalization', 'Reflective Function', 'Attachment', 'Foetus', 'Pregnancy', 'Prenatal', 'Antenatal' and 'Perinatal'. These terms were again entered into Web of Science, Pubmed and PsyInfo search engines. Papers which were not written in English were excluded. A review of the grey literature was conducted using the above terms in the OpenGrey database and PsyEXTRA. Relevant authors were contacted if articles were not available.

2.3. Attachment Theory

Attachment theory was conceptualised by Bowlby in 1958 and first outlined in his paper *The Nature of The Child's Tie to His Mother*. Attachment theory was developed to explain the nature of the relationship between the mother and infant from birth onwards. Bowlby's original theory was based on his observations of children from his work as a psychiatrist. He became interested in the effects of maternal deprivation early in life through his study of juvenile delinquents (Bowlby, 1944) and children separated from their mothers in hospital (Bowlby, Robertson, & Rosenbluth, 1952). These studies along with animal studies, which investigated the imprinting of ducklings (Lorenz, 1935) and the effects of maternal deprivation on the behaviour of rhesus monkeys (Harlow & Suomi, 1974), led Bowlby to conclude that the role of the mother-infant relationship went far beyond the mother's role in feeding the infant (Bowlby, 1958). Bowlby (1958) saw the purpose of the mother-infant attachment relationship to be to enable the infant to maintain proximity to the mother in order to increase its chances of survival.

Mary Ainsworth, as part of Bowlby's research team, enabled further development of attachment theory through her intensive observational studies of normal child

development in Uganda (Ainsworth, 1964) and Baltimore (Ainsworth, 1978). Ainsworth (1978) introduced the idea that there are individual differences in mother-infant attachment relationships. She looked to quantify these differences through the development of the Strange Situation Test. Ainsworth (1978) initially determined three distinct categories of mother-infant attachment. However, after observation of children who had previously been determined to be unclassifiable, Mary Main (1986) identified a fourth classification. The classifications are as follows:

- Secure: the infant is distressed on separation, and on reunion greets and looks to be comforted by their mother. The infant's distress quickly reduces and they return to exploration of the environment.

- Avoidant: the infant shows no distress on separation from their mother and on reunion the infant ignores them.

- Resistant-ambivalent: the infant is distressed on separation and on reunion the infant seeks their mother but resists their comforting interactions. The infant's distress is prolonged.

- Disorganised-disoriented: the infant may show a range of behaviours in the presence of their mother including freezing all movement, appearing vacant and seeking physical closeness while leaning away.

It was proposed by Bowlby (1973) that the mother-infant attachment relationship developed through repeated interactions between the mother and infant. Over time the repeated interactions resulted in the development of 'internal working models' (Bowlby, 1973). These cognitive structures guide the infant's expectations of the mother's behaviour in relation to their own, and culminates in the mother-infant attachment styles identified by Ainsworth (1978) and Main (1985). Bowlby (1973) hypothesised that an individual's attachment style, or 'internal working model' is transmitted through the generations (intergenerational transmission) and provides a blueprint for all other

attachment relationships.

Main (1985) furthered this postulation by suggesting that the behavioural differences observed during the Strange Situation Test should be thought of as a consequence of the mental representations (or internal working model) that a mother holds about her relationship with her infant. A mental representation was defined as a "set of conscious and/or unconscious rules for the organization of information relevant to attachment and for obtaining or limiting access to that information, that is, to information regarding attachment-related experience, feelings and ideations" (Main et al., 1985, p. 67).

Several measures were subsequently designed to assess mental representations. The Adult Attachment Interview (AAI) (George, Kaplan, & Main, 1985) (Muller, 1990)was designed to assess an adult's mental representation of their relationship with their parents and classified the interviewees into one of four attachment styles: autonomous/secure, dismissing, preoccupied, or unresolved/disorganised. The development of the AAI enabled confirmation of Bowlby's intergenerational hypothesis and showed that an adult's mental representation of their relationship with their parents was strongly associated with their attachment relationship to their infant (Benoit & Parker, 1994; Fonagy, Steele, & Steele, 1991; Pederson, Gleason, Moran, & Bento, 1998; Ward & Carlson, 1995),

Taking this a step further, measures were designed to specifically assess maternal representations. A maternal representation is the mother's perception of her infant and her relationship with that infant (Main et al., 1985). These measures were developed to enable a better understanding of the way in which maternal representations mediate adult mental representations, and parenting behaviour. One of these measures was the Parent Development Interview (PDI) (Aber, Slade, Berger, Bresgi, & Kaplan, 1985). This was based on the AAI, and asked questions about the mother's representation

of themselves as parents, the infant and their relationship with the infant. Subsequently, the Working Model of the Child Interview (WMCI) (Zeanah, Benoit, Hirshberg, Barton,

& Regan, 1994) was also developed. This classified maternal representations into three categories:

- Balanced, a coherent account including positive and negative descriptions of the relationship and recognition of the infant as an individual
- Disengaged, emotionally detached from the infant and does not recognise the infant as an individual
- Distorted, an inconsistent account of the infant, in which expectations may be developmentally inappropriate or excessively negative

Research using the WMCI and PDI indicated that a mother's maternal representation was associated with adult attachment, parenting behaviour and the mother-infant attachment relationship (Aber, Belsky, Slade, & Crnic, 1999; Benoit et al., 1997; Cox, Hopkins, & Hans, 2000; Slade, Belsky, Aber, & Phelps, 1999; Van Ijzendoorn, 1995; Vreeswijk, Maas, & van Bakel, 2012). This added further insight into the intergenerational transmission of attachment and suggested that a mother's mental representation of her relationship with her parents influenced her maternal representation and in turn, her behaviour towards her infant.

2.3.1. The Impact of Attachment

Since the development of Attachment Theory (Bowlby, 1958) the impact of the mother-infant attachment relationship on outcomes throughout the life span has been increasingly recognised. Bowlby first alluded to this in his report *Maternal Care and Mental Health* written for the World Health Organisation in 1951. This outlined his concerns about the failure of clinicians to recognise the lifelong impact of maternal deprivation.

Today, research is still accumulating on the effects of this relationship. Due to the extent of this literature, a full review of the impact of attachment is not possible.

However, the attachment relationship is known to impact on: brain development (Insel & Young, 2001; Lenzi et al., 2013; Riem, Bakermans-Kranenburg, van IJzendoorn, Out, & Rombouts, 2012; Schore, 2005); the risk of mental health difficulties including Borderline Personality Disorder (Agrawal, Gunderson, Holmes, & Lyons-Ruth, 2004), eating disorders (Ward, Ramsay, & Treasure, 2000) and internalising problems (Brumariu & Kerns, 2010); future relationships (Schneider, Atkinson, & Tardif, 2001); the risk of involvement in crime (Hoeve et al., 2012); education outcomes (Granot & Mayseless, 2001); and poor physical health (McWilliams & Bailey, 2010). In recent times there has been an emphasis placed on the importance of preventive interventions to break the intergenerational transmission of insecure attachment and avoid the long term adverse outcomes of insecure attachment (Allen, 2011; Wave Trust, 2013). The delivery of such interventions is hoped to provide better outcomes for infants and their future families as well as cost savings for the UK government (Allen, 2011; Department for Education and Department for Health, 2011).

2.4. Antenatal Attachment

2.4.1. The Mother-Foetus Relationship: One of Attachment?

Attachment theory (Bowlby, 1958) was developed to explain the mother-infant relationship after birth. However, this theory fails to provide an explanation of the mother-infant relationship in the antenatal period. The idea that the mother-foetus relationship represents an attachment relationship has been the subject of debate. An attachment relationship by definition requires repeated behavioural interactions between the mother and infant in order for the infant to develop an 'internal working model', which is the basis for the different styles of attachment (Laxton-Kane & Slade, 2002). Thus some argue that the mother-foetus relationship lacks the reciprocal interaction needed for an attachment relationship (DiPietro, 2010; Laxton-Kane & Slade, 2002; Van den Bergh & Simons, 2009).

Nevertheless, there are several reasons to suggest that the mother-foetus relationship is one of attachment. Mothers, in the months leading up to the birth, have been physically and intellectually aware of the foetus (Cranley, 1981). They will have engaged in health behaviours to protect their foetus, responded to foetal movement via physiological changes in skin conductance (DiPietro, 2010; Dipietro, Irizarry, Costigan, & Gurewitsch, 2004), and will have started to develop their maternal representation of the relationship with the foetus, which remains relatively stable from the last trimester of pregnancy to one year postpartum (Benoit, Parker, & Zeanah, 1997; Theran, Levendosky, Anne Bogat, & Huth-Bocks, 2005). This suggests that, to some extent, unique reciprocal interactions occur between the mother and foetus during this period, and therefore an attachment relationship may begin at conception. Thus, throughout this study the relationship will be referred to as mother-foetal attachment (MFA).

2.4.2. The Concept and Operationalisation of MFA

The concept, and consequently the operationalisation, of MFA has seen several redesigns over the years. Cranley (1981) was one of the first to define MFA as "the extent to which women engage in behaviours that represent an affiliation and interaction with their unborn child" (p.181). He hypothesised that the relationship was multi-dimensional in nature and outlined six dimensions (Cranley, 1981), which he used to develop the Maternal Foetal Attachment Scale (MFAS) (Cranley, 1981). During the development of the scale the proposed six dimensions were refined to five as the 'nesting' subscale was unreliable and deemed to represent a different concept from the other five subscales. The remaining subscales were: differentiation of self from the foetus; interaction with the foetus; attributing characteristics; giving of self; and role-taking (Cranley, 1981). Subsequently, the literature has queried the validity of the MFAS, for several reasons: other studies have not supported the five subscales proposed (Muller, 1993); themes identified by expectant mothers in relation to MFA during semi-structured interviews were not fully reflected in the MFAS (Muller &

Ferketich, 1992); and studies have found inconsistencies with the variables associated with the MFAS (Muller, 1992).

Muller (1993) later redefined MFA as a uni-dimensional construct, defined as “the unique affectionate relationship that develops between a woman and her foetus” (p. 11 Muller, 1990) . Focusing more on the thoughts and feelings of the mother toward the foetus, Muller (1993) developed the Prenatal Attachment Inventory (PAI). However, additional studies have not supported the uni-dimensional structure, finding between three and five dimensions (Pallant, Haines, Hildingsson, Cross, & Rubertsson, 2014; Siddiqui, Hagglof, & Eisemann, 1999). This suggests that further research is needed to determine the best structure for the PAI.

Condon (1993) also developed an alternative MFA scale, the Maternal Antenatal Attachment Scale (MAAS). This was based on the theoretical understanding that the primary component of MFA was ‘love’, with five further facets mediating the relationship between love and behaviour: the wish to know more about the infant; interact with the infant; prevent parting, loss or harm; and care for the needs of the infant. The MAAS focuses on the thoughts, feelings and behaviours of the mother towards the foetus, and contains two subscales, which focus on the quality of the attachment and preoccupation with the foetus. Unlike the MFAS and PAI, the MAAS allows mothers to indicate if their thoughts are positive or negative towards the foetus. While the MAAS has been widely used in the literature, the two factor structure of the MAAS has not been investigated further. However, the satisfactory internal reliability of the scale and subscales has been confirmed (Van Bussel, Spitz, & Demyttenaere, 2010).

Most recently, Doan and Wang (2010) have developed an alternative model to represent MFA. They proposed that MFA is characterised by cognitions (e.g. recognition of the foetus as a separate person), emotions (e.g. affection and concern

for the foetus), and behaviours (e.g. interaction with the foetus). It could be that this new model MFA may provide and overarching conceptualization of MFA which can consolidate the concept. However, to date there is a lack of consensus in the literature regarding the theoretical concept and measurement of MFA.

2.4.3. The Impact of the MFA

The importance of MFA lay in its influence on maternal behaviour during pregnancy and postpartum. Several reviews of the area found that mothers with low MFA scores are consistently less likely to engage in health behaviours during pregnancy (Alhusen, Gross, Hayat, & Sharps, 2012; Cannella, 2005; Lindgren, 2001, 2003; Yarcheski, Mahon, Yarcheski, Hanks, & Cannella, 2009). Additionally, MFA has been found to be associated with the degree of maternal involvement (Siddiqui & Hägglöf, 2000), sensitivity (Shin, Park, & Kim, 2006), and affection (Bloom, 1995) between the mother and infant after birth, as well as having a modest effect on postpartum mother-infant attachment and infant outcomes (Alhusen, Hayat, & Gross, 2013; Muller, 1993; Van Bussel et al., 2010).

2.4.4. The Development and Antecedents of MFA

The impact of MFA on maternal behaviour indicates the importance of understanding the antecedents of this relationship. Foetal movement (Mikhail et al., 1991), gestational age (Yarcheski et al., 2009), maternal social support (Yarcheski, et al., 2009) and family mutuality (Wilson et al., 2000) have all been found to exert significant influence over MFA. The use of ultrasounds have also been shown to have an important positive impact (Yarcheski, et al., 2009), especially if shown early on in the pregnancy (Sedgmen, McMahon, Cairns, Benzie, & Woodfield, 2006). However, the type of

ultrasound used (2D, 3D and 4D) has been found to have no additional benefits (Alhusen, 2008; Van den Bergh & Simons, 2009).

Antecedents specifically relating to the expectant mother have been explored. Some factors such as ethnicity and marital status have been suggested to have a small or trivial effect (Yarcheski et al., 2009). Other variables such as the planning of the pregnancy and the age of the mother have also been found to have a small effect. The effects of depression and anxiety on MFA are conflicted, with some reviews indicating a negative impact (Alhusen, 2008; Yarcheski et al., 2009), and others reporting no or an inverse relationship (Cannella, 2005). Maternal personality has also, in one study, been found to affect MFA, with higher scores on extroversion, conscientiousness and agreeableness predicting higher MFA (Maas, Vreeswijk, Braeken, Vingerhoets, & van Bakel, 2014).

One antecedent of particular interest is maternal attachment style. Mikulincer and Florian (1999) found that expectant mothers with a secure adult attachment style demonstrated higher levels of MFA (assessed by the MFAS) in the first and second trimesters, in comparison to other attachment styles. However, by the third trimester, there was no difference in MFA between secure and resistant expectant mothers. Avoidant mothers showed higher MFA in the second trimester and low MFA in the first and third trimesters (Mikulincer & Florian, 1999). In a longitudinal study, Van Bussel, Spitz and Demyttenaere (2010) reported a weak relationship between maternal adult attachment and MFA (assessed by the MAAS). In support of previous findings, Priel and Besser (2000) found that mothers with a secure adult attachment style had higher MFA (assessed by the MAAS) than insecure mothers. These findings suggest that despite the use of different MFA scales, MFA is consistently related to the mother's adult attachment style. This could indicate that the intergenerational transmission of attachment postulated by Bowlby (1973) may begin in the antenatal period.

2.5. The Transmission of Attachment

It is clear that empirical research has supported Bowlby's (1973) assertion that attachment is transmitted through the generations and that attachment styles have implications for the wellbeing of the individual and their future relationships. However, the question still remains how attachment is transmitted in the antenatal period and postpartum. This section will review the primary concepts, which have been hypothesised to transmit attachment including Maternal Sensitivity (MS), Mentalization and Reflective Function, and MM.

2.5.1. Maternal Sensitivity (MS)

MS (Ainsworth, 1978) was the first concept generated, which was believed to explain the transmission of attachment. Ainsworth (1978) developed a rating scale, which looked at four types of maternal behaviour: "sensitivity-insensitivity, acceptance-rejection, co-operation-interference and accessibility-ignoring" (Ainsworth, Bell, & Stayton, 1974, p. 106). It was subsequently found that the "sensitivity-insensitivity" dimension was the most important, as mothers who scored low on this rating had children who demonstrated a reduced ability to explore their surroundings (Ainsworth et al., 1974). Later the sensitivity-insensitivity scale was termed MS and defined as "the mother's ability to perceive and to interpret accurately the signals and communications implicit in her infant's behaviour, and given this understanding, to respond to them appropriately" (Ainsworth et al., 1974, p. 127).

Ainsworth (1978) found that mother-infant attachment classification was strongly (r = .78) associated with MS. Mothers with securely attached infants were more sensitive than those with insecure infants. However, MS could only distinguish between secure and insecure mother-infant attachment rather than the three categories of mother-infant attachment. Subsequently, several studies attempted to replicate the strength of the association seen, without success (Grossmann, Grossmann, Spangler, Suess, & Unzner, 1985; Isabella, 1993). A meta-analysis on the topic suggested a medium effect

size (between *r* = .24 and *r* = .27) (Atkinson et al., 2000; DeWolff & van Ijzendoorn, 1997) and it was later found that the association was even lower for disorganised styles of attachment (van Ijzendoorn, Schuengel, & Bakermans-Kranenburg, 1999). This suggested that other factors, as well as MS were involved in the transmission of attachment.

2.5.2. Mentalization and Reflective Function

Mentalization and reflective function have a strong association with adult attachment (Fonagy, Target, Steele and Steele, 1998) and consequently have become important concepts in the search to find the mechanisms behind the transmission of attachment. Mentalization is defined as the ability to both mentally recognise others internal states (including their intentions, emotions and cognitions), and emotionally experience their own and others feelings (Fonagy & Target, 1997).

Mentalization has been operationalised in two forms: adult reflective function and parental reflective function (PRF). Adult reflective function is considered the adult's ability to use mentalization in discourse when recalling past and present experiences of their relationship with their parents (Katznelson, 2014; Sharp & Fonagy, 2008). PRF is the same ability used within the context of the mother-infant relationship; mothers that are high on PRF recognised their infants and their own mental states, the interaction between these states and behaviour, and the difficulty in truly knowing others' mental states (Sharp & Fonagy, 2008; Slade, 2005). In comparison, mothers low in PRF are thought to fail to recognise their infant's capacity for mental states and tend to deny their own feelings (Slade, 2005).

The ability to mentalize is a skill that all people have the capacity to develop (Sharp & Fonagy, 2008). It evolves through interactions between the mother and infant, with the mother markedly mirroring her infant's internal states and later through play and conversation (Katznelson, 2014; Slade, 2005). Marked mirroring is the ability of the

mother to accurately interpret the infant's mental state and represent these states to the infant (Sharp & Fonagy, 2008; Slade, 2005). It is through this process that the infant begins to recognise and understand their own mental states (Sharp & Fonagy, 2008).

2.5.2.1. Operationalisation of Reflective Function

Reflective functioning has been operationalised through a series of adapted scales designed for use with existing interview protocols, scales originally designed to assess maternal representations. These scales have a similar basic scoring system that rates the extent to which the interviewee: shows an awareness of mental states; attempts to interpret behaviour in light of mental states; acknowledges the development of mental states; and uses mental states in relation to the interviewer (Katznelson, 2014; Sharp & Fonagy, 2008). These scores are then collapsed into one overall reflective functioning score. While, this process has been criticised for creating a uni-dimensional score from a multidimensional concept (Choi-Kain & Gunderson, 2008), a recent analysis of the structure of the Reflective Functioning Scale (Fonagy, Target, Steele, & Steele, 1998) indicated that a one factor model was an appropriate fit for the data (Taubner et al., 2013), which suggests this is a valid scoring method.

Adult reflective functioning is assessed via the Reflective Functioning Scale used with the AAI (RF-AAI) (Fonagy et al., 1998). PRF can be assessed with the Addendum to the Reflective Functioning Scoring Manual (Slade et al., 2004), which can be used with the WMCI and PDI postpartum, and in the antenatal period with the Pregnancy Interview Coding System (PI) (Slade et al, 1994).

The validity of the RF-AAI is well established and although not extensive, the validity of measuring PRF on the PDI has also been provided (Fonagy et al., 1991; Kelly, Slade,

& Grienenberger, 2005; Slade, Grienenberger, Bernbach, Levy, & Locker, 2005). However, while studies have assessed PRF using the WMCI no information on the validity and reliability of this measure could be found (Schechter, 2013). Overall, these methods of measuring reflective function have been criticised for being time consuming, cumbersome and often expensive due to the training needed to administer many of the interviews on which the scales are based (Schiborr, Lotzin, Romer, Schulte-Markwort, & Ramsauer, 2013).

A recent addition to the literature is the Parental Reflective Functioning Questionnaire (Luyten et al., 2009). This is a self-report measure which is reportedly still in development (Ordway, Sadler, Dixon, & Slade, 2014). The measure is composed of three subscales: parents' interest in mental states; parents' understanding of the opaqueness of mental states; and the inability to mentalize (Ordway, Sadler, Dixon, & Slade, 2014; Rutherford, Goldberg, Luyten, Bridgett, & Mayes, 2013). The scale reportedly has good internal consistency for the three subscales between .70 to .82. However, reports of the exact composition of the scale vary from 18 to 39 items, and the validity of the scale is unknown in terms of its relationship to other reflective functioning measures and with mother-infant attachment security (Ordway, et al., 2014; Rutherford, et al., 2013).

2.5.2.2. Attachment and Reflective Function

Reflective functioning has been found to be an important mechanism in the transmission of attachment. Adult reflective functioning has been shown to have a strong association with both adult and mother-infant attachment classification (Fonagy et al., 1991). PRF has also demonstrated a strong relationship with adult and mother-infant attachment security (Slade, Grienenberger, Bernbach, Levy, & Locker, 2005), as well as the parenting capacity of the mother (Kelly et al., 2005). Kelly et al. (2005)

found that mothers' parenting abilities partially mediated the relationship between PRF and mother-infant attachment classification (Kelly et al., 2005). This suggested that PFR exerts its influence on the mother-infant attachment directly and indirectly, which suggests there may be more than one mechanism involved in the transmission of attachment.

2.5.3. Mind-Mindedness (MM)

Previously proposed concepts related to the transmission of attachment have either focused on maternal behaviour or assessed the ability of the mother to use mental states to reflect on their mental representations of their infants and their relationship with their infants. In this section we will consider the role of MM and its ability to bridge the gap between representations and maternal behaviour via maternal mental state language. MM is defined as the ability of a mother to recognise their infant as a 'mental agent', that is, as an individual with a mind of their own who has thoughts, emotions and desires (Meins, 1997).

2.5.3.1. Development and historical underpinning

The concept of MM was developed to explain the differences in securely and insecurely attached children's abilities to complete cognitive tasks and benefit from the support of an adult. It draws on Vygotskian ideas of child development, in particular the "general genetic law of cultural development" (Vygotsky, 1980, p. 57) and the "proximal zone of development" (Vygotsky, 1986, p. 187). The former postulates that interactions in the social world enable an infant to develop higher cognitive functions. It suggests that an infant learns from experiences through interaction with others and the environment (interpsychologically)(Vygotsky, 1980). The meaning placed on these interactions then becomes internalised by the infant (intrapsychologically), which, over time, develops their higher cognitive functions (Vygotsky, 1980).

Central to the idea of “general genetic law of cultural development” (Vygotsky, 1980, p. 57) is the concept of the “proximal zone of development” (Vygotsky, 1986, p. 187). The proximal zone of development is considered to be the gap between the problem solving abilities of the infant in isolation and the infants potential abilities when assisted by a more advanced individual (Vygotsky, 1986). By making use of the assistance, the infant can internalise greater problem solving abilities than they previously possessed (Vygotsky, 1986). This develops their higher cognitive functions and enables the interpsychological to become intrapsychological.

Meins (1997) applied Vygostskian theory of child development to the transmission gap posed by those in the attachment field, and saw the importance of attachment being the way in which a secure base allows the infant to more effectively explore and interact with the world. This suggests that some infants develop more advanced cognitive functions that allow them a greater sense of efficacy in the world than other infants. It was proposed that mothers with a higher level of MM have a greater sense of the zone of proximal development within which their infant resides (Meins, 1997). Therefore, they are more able to adjust their interactions to allow their infant to better learn and internalise effective strategies. In contrast, mothers with low MM are less effective in enabling their infants to learn effective strategies.

2.5.3.2. Operationalisation of MM

The concept of MM was primarily developed to explain the transmission of attachment from birth onward. The different methods used to measure MM postpartum can be separated into online and offline MM (Schiborr, Lotzin, Romer, Schulte-Markwort, & Ramsauer, 2013). The first of these, online MM, involves measuring MM in real time as it happens within an interaction. The second of these, offline MM, is a representational measure, with MM being measured through the mother’s mental representation of her

infant accessed by her comments when describing the infant. Throughout the discussion of MM, online MM, and offline MM will be considered separately.

2.5.3.2.1. The Measurement of Online MM

The online MM measure was originally designed to be used with infants from birth up to 12 months old. However, it has been used with infants between the ages of 3 months and four years (Lundy, 2013; McQuaid, Bigelow, McLaughlin, & MacLean, 2008; Sethna, Murray, & Ramchandani, 2012). This measure requires the mother and infant to be videoed interacting together for a minimum of five minutes. The mother is given the instruction to "Please play with your baby as you would do if you had some free time together at home" (Meins & Fernyhough, 2010, p. 3). Responses are coded into mental, behavioural, physical and general comments. The mental comments are considered evidence of MM and are assessed by their proportional use within the interaction.

Mental comments are coded for accuracy by being segregated to appropriate and non-attuned comments (Meins & Fernyhough, 2010). Appropriate comments are those that the coder deems to be congruent with the infant's mental state and relevant to the activity in hand. Non-attuned comments are those when the mother's mental state comment is not congruent with the infant's mental state or not relevant to the activity, or the entity being referred to is unclear. Coding the accuracy of online MM comments has been conducted since the development of the online MM measure (Meins, Fernyhough, Fradley, & Tuckey, 2001). However, it was not until relatively recently that the significance of the non-attuned MM comments was considered. The proportions of appropriate and non-attuned comments have been found to be unrelated to each other (Meins et al., 2012; Meins et al., 2001; Meins et al., 2002) and each have significantly different patterns of expression, with appropriate MM comments occurring more

frequently than non-attuned comments in mothers with a secure mother-infant attachment relationship (Meins et al., 2012; Meins et al., 2003).

2.5.3.2.2. The Measurement of Offline MM

The offline measure of MM has been used less in the literature than its online counterpart. The offline measure was originally designed for use with mothers of infants over twelve months. However, in the research this measure has been used with mothers of infants between the ages of 6 months and 8 years (Bernier & Dozier, 2003; Farrow & Blissett, 2014; Meins, Fernyhough, & Harris-Waller, 2014). The offline measure was designed as an interview with the mother of the infant. During the interview the mother is asked one question "Can you describe [child's name] for me?" (Meins & Fernyhough, 2010, p. 14), then all comments that make reference to the child are coded as mental, behavioural, physical or general. Comments that are coded as mental are considered evidence of MM.

2.5.3.2.3. Modifications to the Measurement of MM – Valence

In the research literature, several adaptions have been made to the coding of MM, both online and offline, in an attempt to refine the coding of this concept. This has included coding for the emotional tone of responses (valence), the richness of the description given by the mother and the type of MM comment (cognitive, desire and emotion) (Demers, Bernier, Tarabulsy, & Provost, 2010a; Demers, Bernier, Tarabulsy, & Provost, 2010b; Laranjo, Bernier, Meins, & Carlson, 2010; Sethna, et al., 2012).

The modification that has produced the most interesting findings is valence; coding responses into positive, neutral and negative emotional tone. This modification has

generally been used with higher risk populations including adolescent mothers and clinical samples (Demers et al., 2010a; Demers et al., 2010b; Walker, Wheatcroft, & Camic, 2012). The inclusion of valence is in line with other representational measures of the mother-infant relationship such as the WMCI, which similarly emphasises the importance of being able to assess positive and negative attributions made by the mother in reference to their child's characteristics.

2.5.3.2.4. The Measurement of Antenatal MM

To date only one study has explored MM in the antenatal period (Arnott & Meins, 2008). This study used an adapted version of the offline MM interview asking mothers "What do you think your baby will be like at 6 months old?" (Arnott & Meins, 2008, p. 649). Changing the tense of the question to a future focus is a method used with other assessments such as the WMCI when adapted for use during pregnancy (Benoit et al., 1997). This question was designed to capture the ability of the parents to think about the foetus as a separate entity and an intentional being. Antenatal MM was assessed by the proportion of mental comments made (Meins & Fernyhough, 2006).

2.5.3.3. MM and Attachment

MM was developed to explain the difference in securely and insecurely attached children's cognitive development, and in doing so also explain the transmission of attachment between the mother and infant. It was seen by Meins (2013) as a way of re-operationalizing the concept of MS and bridging the transmission gap. Therefore, the relationship between MM and attachment is vital to the validity of MM. In this section we will review the relationship between online and offline MM and mother-infant attachment. Section 2.5.3.5 will then proceed to look at the relationship between MM and adult attachment security.

2.5.3.3.1. Online MM and Mother-Infant Attachment

Online MM has been shown in the majority of studies to independently contribute to mother-infant attachment security (Meins et al., 2002). Appropriate and non-attuned MM comments at 8 months have been found to independently predict the mother-infant attachment at fifteen months old (Meins et al., 2012). They have been found to differentiate mother-infant dyads that were secure, resistant, avoidant and disorganised, although mothers of resistant and avoidant infants could not be distinguished from disorganised dyads (Meins et al., 2012). This finding was replicated by Meins (2013), when old data previously published by Meins (2001), was reanalysed to include non-attuned comments that were initially not thought to contribute to attachment.

Conversely, two studies have suggested the relationship between online MM and mother-infant attachment is less well defined, with the relationship between MM and attachment being found to be mediated by synchrony (Lundy, 2003) and MS (Laranjo, Bernier, & Meins, 2008). Both of the studies that have contradicted the direct relationship between online MM and mother-infant attachment have used the Q-Sort attachment assessment to assess the security of the mother-infant attachment relationship, which, unlike the Strange Situation Test, is carried out at home rather than in a laboratory. This raises the issue of needing to assess MM in more naturalist settings such as the home environment in order to determine the ecological validity of the concept (Laranjo et al., 2008; Lundy, 2003).

2.5.3.3.2. Offline MM and Mother-Infant Attachment

Offline MM has also been found to be positively associated with mother-infant attachment security (Meins, Fernyhough, Russell, & Clark-Carter, 1998; Ontai & Virmani, 2010). However, one study found a converse relationship between offline MM

and attachment security in infants of 6 months. High proportional use of MM by mothers was found to be negatively associated with attachment security (Bernier & Dozier, 2003). It was suggested by the researchers that using MM with such young infants was potentially developmentally inappropriate. However, research using online MM has suggested this was not the case as it has been found that mothers were no more likely with three month old infants to misinterpret their infant's internal states than at seven months old (Meins, Fernyhough, Arnott, Turner, & Leekam, 2011). Another explanation could be that Bernier and Dozier (2003) are one of the only studies to look at the use of MM with adopted children in foster care. Little is currently known about the impact of MM in this population and the use of MM by foster parents.

2.5.3.3.3. MM, Valence and Mother-Infant Attachment

One study has explored the relationship between online MM, valence and attachment. Demer et al. (2010a) found a significant positive relationship between the use of neutral MM comments and mother-infant attachment security, and a negative relationship between negative MM comments and mother-infant attachment security. This finding adds credence to the idea that coding for valence may assist in increasing the sensitivity of MM to attachment security. To date, no study has assessed the relationship between offline MM, valence and mother-infant attachment.

2.5.3.4. Antenatal MM and MFA

Arnott & Meins (2008) assessed the relationship between antenatal MM and MFA (assessed by the MAAS). This study used an adapted version of the offline MM interview (described in section 2.5.3.2.4). No relationship was found in this study between the number of antenatal MM comments or the overall number of predictions made by the parents and MFA. One possible explanation for this finding is the unknown relationship between MAAS and mother-infant attachment. To the best of the researchers' knowledge, no study has assessed the predictive validity of the MAAS

and mother-infant attachment. Thus it is unclear if the MAAS is associated with postpartum mother-infant attachment. This could explain the lack of relationship between any measure of antenatal MM and MFA.

2.5.3.5. MM and Mothers' Adult Attachment Security

Research into the relationship between online and offline MM and mothers' adult attachment security has been limited. The importance of this relationship lies in MM's ability to demonstrate the transmission of attachment from mother to infant. If attachment is transmitted via MM it would be anticipated that MM would be associated with mother adult attachment as well as mother-infant attachment security. It should be noted that no study has yet investigated the relationship between antenatal MM and mothers' adult attachment security and therefore this will not be discussed in the following section.

Using online MM, one study found that there was no association between the proportional use of MM comments and the mother's adult attachment style (assessed by the AAI) (Arnott & Meins, 2007). The lack of association between mothers' adult attachment security and MM comments could be due to a failure to detect an effect due to the small sample size (*n = 24*). In support of this hypothesis, a medium effect size was seen between autonomous mothers' use of non-attuned MM comments and non-autonomous mothers, with autonomous mothers using proportionally fewer non-attuned comments (Arnott & Meins, 2007).

The lack of a relationship between maternal adult attachment security and online MM is in contrast to offline MM. The use of offline MM (expanded to include valence) demonstrated that the use of positive MM comments was associated with mothers' coherence on the AAI (Arnott & Meins, 2007). It was found that maternal coherence explained 5.7% of the variance in maternal positive MM, with parenting stress

explaining a further 5.1% of the variance (Arnott & Meins, 2007). Mothers who demonstrated greater coherence on the AAI and had lower levels of parenting stress produced a greater portion of positive mind-mindedness comments (Demers et al., 2010a). The finding that positive MM is associated with mothers' adult attachment security is in line with the idea that individuals who have experienced positive relationships tend to make a greater number of positive attributions when processing social information (Dykas, Ehrlich, & Cassidy, 2011).

Overall, it appears that the relationship between MM and mothers' adult attachment style is as yet inconclusive, although there is some suggestion that the concepts are related. Further research is needed to replicate the findings of Demers et al. (2010a) and Arnott and Meins (2007) to clarify the relationship. Future studies should use a MM measure adapted to code valence to increase the sensitivity of such a measure to a mother's adult attachment style.

2.5.3.6. MM and Maternal Sensitivity (MS)

Meins (1999, 2013) considered MM as the refinement of MS and that the ways of measuring MS had moved away from the concept as originally described by Ainsworth (1978). If MM can be considered as a form of MS, it would be expected that the two concepts would be closely associated. In line with this thinking, appropriate online MM comments have consistently been positively associated with MS (Degotardi & Sweller, 2012; Laranjo et al., 2008; Meins, Centifanti, et al., 2013; Meins et al., 2011; Meins et al., 2012; Meins et al., 2003). However, the association between offline MM and MS has been relatively under researched, and subsequent findings have been mixed. Demers et al., (2010a) and McMahon and Meins (2012) found that mothers who are high in MS used a greater proportion of positive MM comments. Similarly, Farrow and Blissett (2014) found a relationship between the original offline MM measure and MS with higher proportional use of offline MM comments associated with higher levels of

MS. However, other studies have found no such relationship (Lok & McMahon, 2006; Meins et al., 2003). This suggests that coding for valence may be a particularly important adaptation for the offline MM measure to increase its sensitivity.

2.5.3.7. The Impact of MM

It is evident from the previous section that MM is an important concept and plays a significant role in maternal sensitivity and mother-infant attachment security, even if its capacity to transmit attachment from the mother to the infant is not yet fully ascertained. While one of the most salient impacts of MM is its influence on the mother-infant attachment, research has suggested that MM may influence other outcomes associated with the mother-infant relationship and infant development. No study has yet investigated the impact of antenatal MM and, therefore, there will be no discussion of this in the following section.

2.5.3.7.1. Parenting Relationship

Research using online MM has been limited when looking at the impact of MM on the parenting relationship in comparison to offline MM. However, one study which has explored this association found that mothers who used a high proportion of appropriate online MM comments had a greater ability to recognise the interests of their infant (mindful facilitation) and reflect the emotions experienced by the infant in maternal behaviour (affect catching) (Ereky-Stevens, 2008). This suggests that online MM has important implications for maternal behaviour.

Offline MM has also been associated with maternal behaviour. For example, mothers high in offline MM have been found to be more sensitive during feeding (Farrow & Blissett, 2014). It has also been associated with lower levels of hostility and intrusiveness in the parenting relationship (Lok & McMahon, 2006; McMahon & Meins, 2012). However, it was found that the relationship between offline MM and hostility and

intrusiveness was mediated by parenting stress (Lok & McMahon, 2006; McMahon & Meins, 2012). This may mean that mothers who recognise their infants as mental agents experience lower levels of parenting stress and, therefore, are less hostile and intrusive in the relationship (McMahon & Meins, 2012). However, the studies investigating this relationship were cross-sectional and therefore the direction of the relationship could not be ascertained. Further longitudinal research is needed to clarify the direction of the relationship between parenting stress and MM.

2.5.3.7.2. Child Development

As well as implications for the parenting relationship, MM has been found to have an important influence on child development outcomes. MM has been associated with the development of "Theory of Mind" (ToM) in children, which is the ability of the child to recognise that others have internal states, which may be similar or different to our own (Premack & Woodruff, 1978). ToM has been found to be an important developmental ability as it relates to later social competency (Watson, Nixon, Wilson, & Capage, 1999). Use of appropriate online MM has been found to consistently predict later ToM (Ereky-Stevens, 2008; Laranjo, et al., 2010; Meins, Fernyhough, Arnott, Leekam, & de Rosnay, 2013; Meins, et al., 1998; Meins, et al., 2003; Meins, et al., 2002; Symons, Fossum, & Collins, 2006) as well as capacities associated with ToM such as executive function (Bernier, Carlson, Deschênes, & Matte-Gagné, 2012; Bernier, Carlson, & Whipple, 2010). However, the mechanism that enables MM to develop superior ToM is as of yet undetermined (Meins, Fernyhough, Arnott, Leekam, & de Rosnay, 2013). Interestingly, non-attuned online MM comments, while not associated with ToM directly, have been found to be related to children's perspectival symbolic play, which is thought to be an early precursor of ToM. This has led Meins et al. (2013) to hypothesise that it is not MM alone that enables ToM, but instead the mother's ability to attune MM comments to the developmental and emotional level of the infant.

Research using offline MM has been used less frequently than online MM and has generated less consistent evidence of the relationship between offline MM and infant developmental outcomes. Meins and Fernyhough (1999) found that offline MM at 3 years old independently predicted ToM at 5 years. This finding was partially supported by Lundy (2013) who found that online MM mediated the relationship between offline MM and ToM. This suggests that offline MM has an indirect effect on infants ToM abilities. However, Meins, et al. (2003) found offline MM at 3 years did not predict ToM performance at 4 years old. Two possible reasons have been suggested for this: firstly, that offline MM is a less direct measure of MM or, secondly, that MM influences ToM only at the early stages of development (Meins et al., 2003). It may be that the offline MM measure would benefit from including the coding of valence. As the online measure of MM has demonstrated different effects of appropriate and non-attuned MM, it could be hypothesised that positive, negative and neutral offline MM may also demonstrate alternative pathways.

Offline MM has also been shown to potentially play a role in reducing the risk of behavioural difficulties and the use of children's mental health services for children. For example, mothers with high levels of offline MM in families of low socioeconomic status (SES) have been found to have children with significantly fewer behavioural difficulties (Meins, Centifanti, et al., 2013). This suggests that MM act as a protective factor against other life stressors which could possibility detract from the quality of the mother-infant relationship. Congruent with this was the finding that mothers in a community sample showed higher levels of positive offline MM and lower levels of negative offline MM in comparison to a clinical sample (Walker, et al., 2012). This may suggest that children of mothers with high levels of MM may be at lower risk of using clinical services.

2.5.3.8. Antecedents of Mind-Mindedness

It is evident that MM is an important concept that has consequences for the mother-infant relationship and infant developmental outcomes. Therefore, identifying the antecedents of MM may be helpful to clinical practice, as mothers at risk of low levels of MM may be identified and targeted interventions provided. Alternatively, the antecedents could become the targeted concept for intervention to prevent the development of low MM. This section will review the antecedents of MM starting with the origin of MM, antenatal MM, obstetrics history, maternal factors, infant factors and family composition.

2.5.3.8.1. The Origin of MM

Recently it has been suggested that MM is an ability which finds its origins in the quality and closeness of a relationship rather than being an innate trait that mothers possess (Meins et al., 2014). This idea has been developed through a series of studies that looked at the extent to which individuals make use of MM in their adult relationships, with public figures and works of art. This suggested that mothers who use offline MM in their thinking about their infant also use MM with their romantic partners and close friends, but to a lesser extent. It was found that students who used offline MM to describe their friends and partners did not utilise this ability with famous people and works of art. This was taken as evidence that MM was a state concept and related to relational closeness, rather than an innate trait residing within the individual. The difficulty with this research is the homogenic sample used in the study. A considerable degree of further research is needed to validate this hypothesis, with a diverse sample to include high risk populations and differing attachment styles. However, if MM is a state it would suggest that the degree of MM shown by mothers may be amenable to change by intervention.

2.5.3.8.2. Antenatal MM

Interestingly, MM as a state rather than a trait may help to explain some findings in relation to antenatal MM. The ability of the mother (in the third trimester of pregnancy) to consider the mental states of the foetus when describing their unborn child in the future at six months old was not found to predict later use of postpartum MM (Arnott & Meins, 2008). However, the ability of the mother to make predictions about their future infant, regardless of the inclusion of mental state comments, was found to predict postpartum MM. This suggests that at this early stage the mother's capacity to imagine their infant as a separate entity during pregnancy may be important for future MM. This could be seen as the beginnings of a mother developing a close relationship with their foetus and lend further weight to the idea of MM as a state. This suggests that antenatal MM may not be present at this stage of development or at least only in a burgeoning state.

Clarifying the role of antenatal MM further, a recent randomised control study conducted in the last trimester of pregnancy has found that a mentalization based intervention can increase the use of MM comments postpartum (Kondel-Laws et al., 2012). This suggests that MM or at least the capacity for future MM is present in the antenatal period and that this capacity can influence later MM in the postpartum period. These findings suggest that a great deal of future research is warranted on antenatal MM. This research should look to further understand the development of antenatal MM through pregnancy, the aspects of antenatal MM important for later postpartum MM and establish a valid measure of antenatal MM.

2.5.3.8.3. Obstetrics history

Meins et al. (2011) systematically reviewed factors relating to obstetrics history and their relationship to online MM. It was found that obstetric risks factors, pregnancy

complications, labour complications and neonatal problems had no association with online MM (Meins, et al., 2011). Nevertheless, mothers who perceived their pregnancy as easy, and had planned their pregnancy used a greater number of appropriate online MM comments than unplanned pregnancies. For those who considered their pregnancy difficult there was no difference with regard to the use of online MM between planned or unplanned pregnancies. Moreover, it was found that mothers with positive recollections of their first meeting with their infant used fewer non-attuned comments. Mein's et al. (2011) elaborated that those mothers who did not show positive recollections commented more on their own experience of the birth rather than meeting their infant. This might suggest that these mothers have greater difficulty in viewing the world from their infant's perspective.

In addition to the findings from online MM, the use of offline MM has suggested that MM is unrelated to the knowledge of foetus gender in the antenatal and postpartum period (Arnott & Meins, 2008). Also, Farrow and Blissett (2014) found that breast feeding has been associated with higher use of offline MM. The direction of this relationship is unknown due to the cross-sectional nature of this study. Therefore, it could be suggested that breastfeeding enables the mother to become more attuned to their infant's mental states, or that a mother high in MM is more likely to decide to breastfeed. This relationship should be explored further as it may have important implications for the use of breastfeeding as an intervention to improve MM.

2.5.3.8.4. Maternal factors

Maternal mental health is a potential antecedent of MM which has been considered in the research literature. Two studies have considered online MM and maternal mental health: Meins et al. (2011) found that mothers who scored higher on the Beck Depression Inventory (BDI) use a greater number of non-attuned MM comments, whereas Pawlby et al. (2010) found no difference between mothers diagnosed with

depression or schizophrenia (in comparison to the control group) in their use of appropriate MM comments. The lack of relationship found between mental health and MM by Pawlby et al.'s (2010) could be due to the context within which the study took place. The study recruited mothers in a mother and baby unit in which the mother was at risk of having the baby removed from her care, which may have confounded the results. Furthermore, the use of diagnostic categories to group participants may not be a helpful method of categorising maternal mental health symptoms.

Offline studies of MM have also found mixed results in relation to maternal mental health; two studies found that mothers experiencing symptoms of depression and those with a diagnosis of borderline personality disorder used significantly fewer MM comments in comparison to controls (Lok & McMahon, 2006; Schacht, Hammond, Marks, Wood, & Conroy, 2013). However, Walker, et al. (2012) found no association between depressive symptoms and overall offline MM. Interestingly, while Walker, et al. (2012) coded for valence in the study,there was no reported analysis of the association between valence and depressive symptoms. It is evident that further research is needed to clarify the relationship between symptoms of mental health difficulties and MM, both online and offline. Future research should also consider including valence of MM comments.

Maternal age and education are two additional antecedents that have been considered in relation to MM. Maternal age has been found to relate to MM: Demers et al. (2010b) found that online MM coded for valence indicated that adolescent mothers used almost no positive MM comments and a significantly higher number of negative MM comments than adult mothers. This suggests that age may impact on the ability of mothers to be MM. It could be hypothesised that adolescent mothers face additional challenges to adult mothers; balancing the challenges of adolescence, such as identity formation,

peer acceptance and autonomy, with parenting is likely to make the experience more stressful (Borkowski, et al., 2007). However, age alone may not account for the differences seen between adolescent mothers and adult mothers as the reasons for becoming an adolescent mother in the first place may further explain this relationship. Explorations of the effects of maternal education on MM have been found to be non-significant using online and offline MM measures (McMahon & Meins, 2012; Meins et al., 2011).

2.5.3.8.5. Infant related factors

The consideration of infant related factors in relation to MM has demonstrated little evidence of their influence since infant behaviour, infant temperament, cognitive ability of the infant and infant gender have been found to be unrelated to MM (Meins et al., 2011; Meins et al., 2001; Meins et al., 2002). This is congregant with Ainsworth's (1978) ideas that sensitive and responsive mothers treat their infant as an individual and thus infant characteristic plays little role in sensitive maternal behaviour.

2.5.3.8.6. Family composition

Antecedents in relation to family composition have found varied results. The number of siblings and social support available have been found to have no relationship with online MM (Meins et al., 2011). The relationship between SES and MM is inconclusive, as some studies indicate no relationship and others suggest that mothers of higher SES use a greater proportion of appropriate MM comments (Meins, et al., 2011). This suggests that the relationship between MM and family factors is unclear and may indicate that MM is not strongly associated with these factors.

2.5.3.9. MM, Change and Intervention

Due to the reported benefits of MM to infant outcomes and the parenting relationship, much of the literature calls for the development of MM interventions (Arnott & Meins, 2007; Demers, Bernier, Tarabulsy, & Provost, 2010). Nevertheless, there has also been debate about the nature of MM and its amenability to change. It has been hypothesised that MM may be a cognitive behavioural trait that is stable within mothers (Meins, Fernyhough, Arnott, Turner, & Leekam, 2011), however recent research suggests it is a state that is influenced by relational closeness (Meins, Fernyhough, & Harris-Waller, 2014). Shedding further light on this debate, Kondel-Laws, Parkinson, Hensman and Laws (2012) investigated the effect of a three hour mentalization-based antenatal intervention (Kondel-Laws, 2009) on MM. The follow-up study, conducted when the infants were nine months old, found that mothers in the intervention group showed higher use of appropriate MM than mothers in the control group who had attended their standard antenatal class. While this study used a between-subjects design, meaning that MM was not assessed prior to the intervention, the large (η^2_p= 1.15) effect size reported and the fact that mothers were randomly allocated to groups suggests that MM is amenable to change. To the best of the researcher's knowledge this is the only intervention that has evidenced that MM is amenable to change through teaching.

2.6. Rational and Clinical Relevance

Research into the attachment relationship before and after birth has consistently shown that the quality of a mother's relationship with her infant has wide reaching effects for the infant throughout its life (Alhusen, 2008; Bowlby, 1952; Field, 2010; Riem et al., 2012; Yarcheski et al., 2009). Evidence continues to accumulate that children who do not receive the social and emotional support they need early in life are likely to have

poorer outcomes (Allen, 2011; Field, 2010; Munro, 2011). This has led the UK government to place greater emphasis on the introduction of preventative healthcare to ensure better outcomes for all children from conception to five years old (Department for Education and Department for Health, 2011). Past meta-analyses have indicated that parenting interventions in the antenatal (Pinquart & Teubert, 2010) and postpartum period can be effective (Bakermans-Kranenburg, van Ijzendoorn, & Juffer, 2003; Kendrick, Barlow, Hampshire, Stewart-Brown, & Polnay, 2008). However, the clear link between MM and infant outcomes, as well as the fact that MM has now been demonstrated to be amenable to change, suggests that MM should be central to the development of preventative interventions, which should ideally take place in the antenatal period (Allen, 2011; Pinquart & Teubert, 2010). However, it may not always be possible to make such interventions accessible to expectant mothers and therefore interventions early in the postpartum period should also be considered.

This study argues that one of the key aspects missing from the MM literature is the development of an expedient method of measuring MM. This is supported by the finding of a recent review into methods assessing the ability of the mother to hold in mind the mental states of the infants (Schiborr et al., 2013), in which it was reported that the current methods of assessing this capacity are cumbersome and time consuming to administer and that this may be holding back research in the area (Schiborr et al., 2013). It is also likely that the time consuming nature of current measures is preventing the use of MM forming part of the assessment and intervention process in clinical settings.

This study aims to address this gap by exploring the development of two offline MM self-report questionnaires. The first will be designed for use in the antenatal period, the Mind-Mindedness Antenatal Questionnaire (MMAQ), and the second will be for use postpartum, the Mind-Mindedness Postpartum Questionnaire (MMPQ). It is thought

that these questionnaires could have several implications for Clinical Psychologists working in clinical practice. After further validation, they could be used as a brief screening tool to identify mothers with low levels of MM, ideally in the antenatal period, but also in the postpartum period. This could allow mothers who may be at risk of developing an insecure attachment with their infant to be identified and allow services to provide targeted interventions to those most in need. Alternatively, the questionnaires could be used as brief outcome measures for assessing the effectiveness of interventions designed to change MM in the antenatal and postpartum period.

2.7. Research Aims

The research aims of this study are as follows:

1. To explore the concept of MM in a structured self-report questionnaire format in the antenatal and postpartum period
2. To explore the internal consistency and structure underlying the MMAQ and MMPQ
3. To start to establish the external validity and reliability of the MMAQ and MMPQ

3. Method

The following section outlines the way in which this study was designed, carried out and analysed to achieve the study's research aims.

3.1. Design

The present study used a cross-sectional non-experimental design. This design was chosen as it enabled the research aims of the study to be achieved. The development of a questionnaire requires the use of a large sample. This is to ensure that the sample is representative of the population and that the results are not disproportionately influenced by variance due to individual participants (DeVellis, 2012). It was felt that a cross-sectional design would allow for the collection of a large sample within the limited time frame available for the study.

A web-based survey was chosen as the medium for the study. Web-based surveys can be advantageous: they allow a large number of participants to respond at one time from different entry points; they reduce the time the researcher spends collecting the data; they can access populations that may be harder to reach such as pregnant mothers, and they reduce the effect of social desirability (Buchanan & Smith, 1999; Wright, 2005). However, it was recognised that there were disadvantages to this method of data collection. In particular, it was not possible to control who participated in the study and, therefore, it was difficult to define the population that took part in the study. This meant that the sample was open to potential bias and could be unrepresentative of the population. This has important implications for the external validity of the questionnaires as well as the development of the questionnaires e.g. the selection of items. Furthermore, it is possible that a web-based format could alter the style of responding by participants in comparison to paper formats, which could place restrictions on the distribution of the questionnaires in the future (Buchanan & Smith, 1999; Coles, Cook, & Blake, 2007; Streiner & Norman, 2008).

3.2. Participants and Sampling

The target population was a community sample of women over sixteen years old. The inclusion criteria for the MMAQ also required women to be pregnant. While, for the MMPQ women needed to have one child under six years old. To ensure that the most representative sample could be achieved no exclusion criterion was specified.

3.3. Measures

3.3.1. Piloting and expert review of the MMAQ and MMPQ

The MMAQ was piloted on one Clinical Psychologist and one Psychiatrist who were acquaintances of the researcher and the MMPQ was piloted on two Trainee Clinical Psychologists who were well known to the researcher. The items were also reviewed by an expert Dr Tejinder Kondel, Consultant Clinical Psychologist and Principal Supervisor. Dr Tejinder Kondel is an expert in the area of perinatal and infant mental health. She has carried out two previous research projects evaluating the effectiveness of an antenatal MM based intervention.

3.3.2. The MMAQ and MMPQ

The MMAQ (see Appendix A) and MMPQ (see Appendix B) contained 42 items per questionnaire. Responses were measured on a scale from one to six: 1 ‘Never’, 2 ‘Very Rarely’, 3 ‘Rarely, 4 ‘Sometimes’, 5 ‘Often’, and 6 ‘Very Often’. A six point response scale was chosen to increase the variability in participants’ responses. Greater variability in a questionnaire is considered advantageous as it increases discriminative ability (DeVellis, 2012).

Participants were asked to rate the frequency with which they had thought about the item over the last two weeks in relation to their foetus or youngest child. The following instructions were given:

"*Below is a list of thoughts you may have had regarding your baby/child. Please read each thought and select the most relevant answer for how often over the last two weeks that thought has run through your mind*."

The MMAQ prompted participants to only hold in mind the baby they were expecting rather than any additional children:

"*Please think only about the thoughts you have had regarding the baby you are expecting when completing this questionnaire*."

The MMPQ prompted participants to only hold in mind their youngest child:

"*When completing this questionnaire please think only about your thoughts regarding your youngest child*."

3.3.2.1. Item Pool Generation

After a review of the literature it was decided that the item pools for the MMAQ and MMPQ should include items that: 1. acknowledge the mind of the baby (Mind-Minded items); 2. do not acknowledge the mind of the baby (Non-Minded items); 3. represent differing valence i.e. differing emotional tone (positive, neutral or negative); and 4. reflect maternal thoughts about the baby in the present and future. The rationale for the inclusion of all of these aspects of MM is outlined below.

1. Mind-Minded items were included in the MMAQ and MMPQ as MM was the construct that the questionnaires were designed to measure and therefore the inclusion of items acknowledging the mind of the infant was vital to the validity of the questionnaires.

2. Non-Minded items were included to act as distractors with the aim of reducing social desirability and the likelihood of hypotheses guessing (Choi & Pak, 2005).

3. Valence was included as it is an important refinement of the measurement of offline MM. Inclusion of valence has been recommended when working with clinical samples (Meins & Fernyhough, 2010) and, while the present study targeted a community sample, it was anticipated that the MMAQ and MMPQ would be used in clinical samples after further validation.

4. The inclusion of both future and present focused items was felt to be particularly important for the development of the MMAQ as the only study to assess antenatal MM concluded that it was the parent's ability to think about their child in the future that later predicted postpartum MM (Arnott & Meins, 2008).

The questionnaire items were developed based on guidance from Lounsbury, Gibson and Saudargas (2005). The construct of MM was defined as the ability of a mother to recognise their infant as a separate entity with a mind of their own (Meins, 1997). This definition was then operationalised using the coding criterion from the Mind-Mindedness Coding Manual Version 2 (Meins & Fernyhough, 2010), which outlines that comments that reflect MM should make reference to the mental states of the infant including the infants preferences e.g. likes and dislikes; cognitions e.g. thinking; and emotions e.g. happiness.

The item pools for the MMAQ and MMPQ were developed in parallel and were designed to match as much as possible with respect to included items. Items were created using verbs and adjectives that did or did not reflect MM. The items were developed that focused on: specific situations (e.g. "I wonder if my baby is confused by their surroundings"); specific characteristics (e.g. "I think my child will grow up to be

lazy"); or were non-specific (e.g. "I think my baby gets excited"). Twenty-three Mind-Minded items were created for the MMPQ each reflecting the preferences, cognitions or emotions of the infant, and a further 19 Non-Minded items were created to reflect the mothers thoughts about the physical and behavioural attributes of the infant. These items were then reviewed to determine their relevance for the MMAQ. Items that were felt to be relevant for the mothers in the antenatal period were retained and items that were less relevant were altered. For example, the item "I think my child likes certain foods" was changed to "I think my baby likes it when I eat certain foods".

The generated items were then reviewed to establish the valence they represented based on the coding criterion outlined by Demers, Bernier, Tarabulsy and Provost (2010a; Demers et al., 2010b) and Walker et al. (2012). An approximately equal balance of positive (e.g. "I think my child likes it when I spend time with them"), neutral (e.g. "I wonder what my baby thinks about inside me") and negative (e.g. "I think my child will grow up to be lazy") items were included in the MMAQ and MMPQ. Finally, items were reviewed and altered to ensure that they reflect either future predictions or present thoughts about the infant, with approximately 50% of items representing each

3.3.2.2. Inter-rater Reliability

Inter-rater reliability was established using the Kappa statistic. Fifty-percent of items (21 items per questionnaire) from the initial item pool of the MMAQ and MMPQ were reviewed by an independent researcher who had no connection to the field of research and was blinded to the original coding of the items. The items for inclusion in the analysis were chosen at random using a random number generator. For the items from the MMAQ there was fair agreement for MM κ = .43 p = *.04,* substantial agreement for valence of items (positive, neutral or negative) κ = .78 p = *.001* and almost perfect agreement for the tense of the items (present or future) κ = .90 p = *.001*. For the items from the MMPQ there was almost perfect agreement for MM κ = .90 p = *.001*, moderate agreement for valence κ = .57 p = *.001* and perfect

agreement for tense Ƙ = 1.0 *p* = *.001*.

3.3.3. Demographic Questionnaires

An antenatal (see Appendix C) and postpartum demographic questionnaire (see Appendix D) were included in the survey for the participants to complete. The antenatal and postpartum questionnaires asked the following questions about participants: their gender, age, ethnicity, first language, employment status, marital status, experience of mental health difficulties[1], gender of the foetus/infant, planning of the pregnancy, subjective experience of the pregnancy, complications during the pregnancy, number of additional children, and ages of additional children. Additionally, the antenatal demographic questionnaire asked about the gestational age of the pregnancy in weeks, and the postpartum demographic questionnaire asked about concerns regarding the health/development of the youngest child since birth as well as the age of their youngest child. If items were considered of a sensitive nature a "prefer not to answer" response option was provided.

3.3.4. Procedure

3.3.4.1. Recruitment

Organisations with access to parents and expectant mothers were contacted via email. They were asked if they would be able to advertise the study. A range of options were offered for electronic advertisement of the study including Facebook, Twitter, blogging, forum posts, embedding in an organisations website, and email. If the organisation was in the local area, the researcher offered to attend a local meeting in person, as well as, posting hardcopies of the survey. A list of the organisations that agreed to advertise the study can be seen in Appendix E. Advertisements for the study were also posted on

[1] *Participants were asked to self-disclose if they, at any point during their life, had a mental health difficulty and if they would consider this difficulty to have had a minor or major impact on their life. Should the participant wish to give further details about their mental health difficulty they were provided with a textbox to expand their answer.*

the researcher's and the Principal Supervisor's personal Facebook pages.

In total, 21 organisations advertised the research, and all the data was collected electronically. The postpartum part of the survey was open for 2 weeks and 2 days. After this time participants who wished to take part in the postpartum survey were directed to a disqualification page, which thanked them for their interest in the study and explained that it was closed. The antenatal part of the survey was open for 5 weeks. The postpartum survey was closed prior to the antenatal survey as the minimum sample size was exceed within a shorter space of time.

3.3.4.2. Web-based Survey

When a potential participant clicked on the electronic link embedded in an advertisement they were taken to the survey within the Survey Monkey website and presented with the participant information sheet (see Appendix F). Figure 1 indicates the process that participants followed as they travelled through the survey. All questions within the survey were compulsory except for one question in the antenatal demographic questionnaire. This meant that participants had to answer every question before they were able to move onto the next page of the survey. If a participant failed to complete all the questions and attempted to move to the next page, an error message would appear indicating that a question had not been completed. Questions were made compulsory as missing data can be problematic during statistical analysis, particularly for factor analysis.

3.3.4.3.. Monitoring Inclusion Criteria

The inclusion criterion for the study was monitored in the following ways: a consent question at the start of the survey asked participants to confirm that they were over 16 years old; filter questions for which, if the participant indicated that they were neither pregnant nor had a child under 6 years old, they were sent to a disqualification page; and the demographic questions, which asked about the participant's gender, age, and the age of their children.

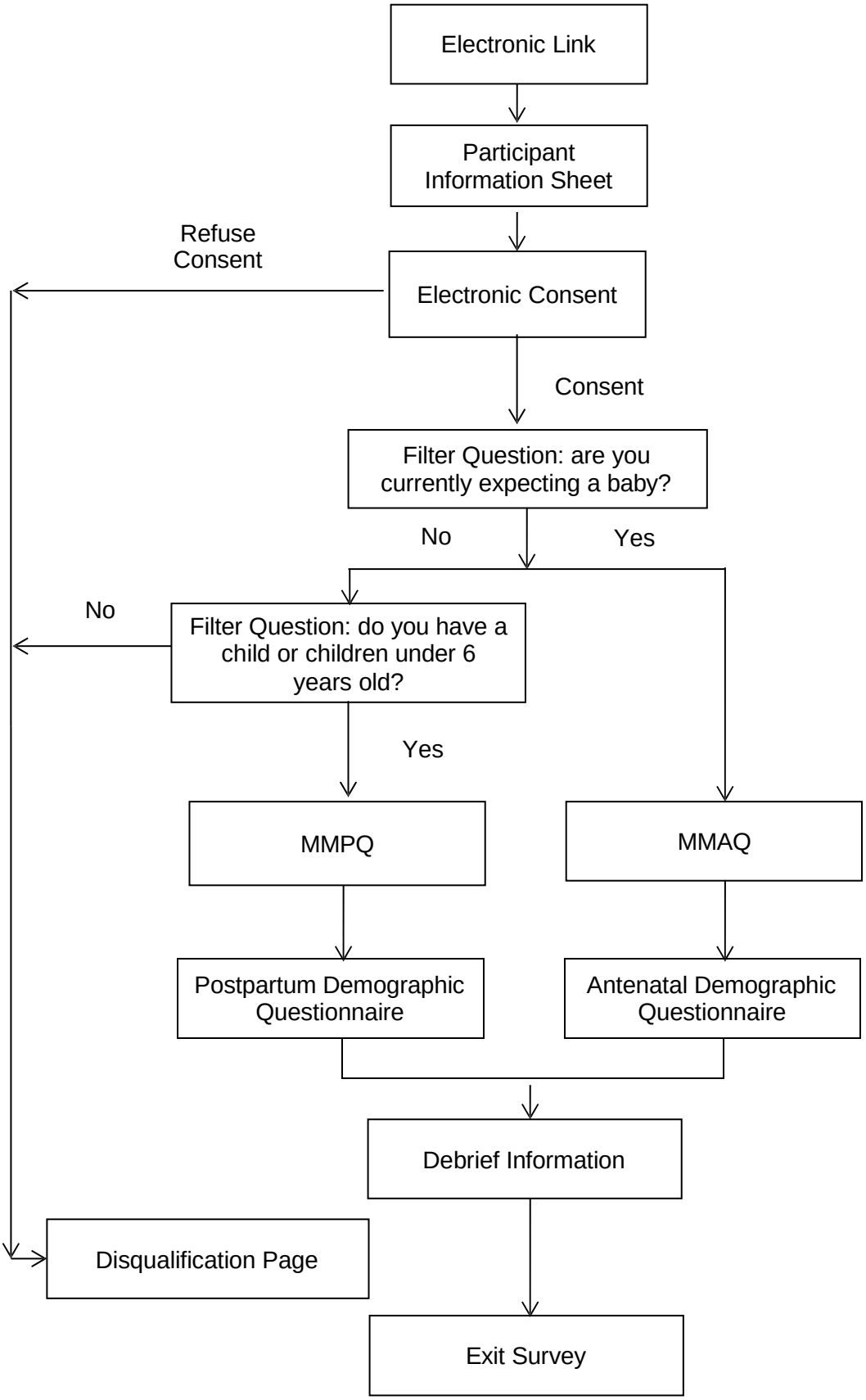

Figure 1. **Flowchart to Show Travel Through Web-Based Survey**

3.3.5. Sample size and response rate

The primary purpose of this study was to develop two MM questionnaires. It was, therefore, important that the sample size was sufficient for a factor analysis to be performed. However, the exact sample size needed for a factor analysis is unclear. Current guidance suggests that the sample size should be determined by the number of items to be analysed. Tinsley and Tinsley (1987) suggests 5 to 10 cases per item to be analysed is sufficient, although once the sample size reaches 300 this rule is considered less important (DeVellis, 2012). It was decided for this study that 210 participants would be the minimum sample size required for each questionnaire based on 5 cases per item. Nevertheless, every effort was made to try and maximise the sample size within the limited time frame of the study. The web-based survey was designed to maximise the sample size by keeping response burden low.

Figure 2 outlines the response rate, dropout and final sample size of the web-based survey. In total 1147 people agreed to take part in the survey; 397 indicated that they were pregnant and so entered the antenatal survey; 478 indicated that they had a child under 6 years old and so entered the postpartum survey. In the antenatal survey 69% people completed both the MMAQ and antenatal demographic questionnaire. In the postpartum survey 83% completed the MMPQ and postpartum demographic questionnaire. In total, 58% of people completed the web-based survey and 42% of people dropped out.

3.3.6. Missing Data

It was decided that participants who had not completed all of the MMAQ (*n* = 51) or MMPQ (*n = 37*) would be excluded from the analysis. Thirteen participants had completed the MMAQ but failed to complete the demographic questionnaire, and eight

participants had completed the MMPQ but failed to complete the demographic questionnaire. It was decided that these cases would be included in the factor analysis to maximise the sample size. Additionally, a further six participants were excluded from the postpartum factor analysis for the following reasons: two apparent participants were known to be the researcher checking the survey, two participants indicated they were male on the postpartum demographic questionnaire, and two participants indicated their youngest child was over 6 years. The final sample size used in the factor analysis was 286 in the antenatal and 399 in the postpartum, and the final sample size for the further analysis of demographic variables was 273 in the antenatal and 391 in the postpartum.

Due to a technical error with the postpartum demographic questionnaire the age of the participant's youngest child was undeterminable in 86 cases. A Chi-square test for independence was conducted to ensure that the cases excluded from the analysis due to this error were not systematically different to those included in the analysis. This indicated that those cases included in the analysis were not significantly different from those excluded on any key variable, including maternal age; maternal education; employment; ethnicity; relationship status; mental health problems; unplanned pregnancy; pregnancy complications; concerns postpartum; pregnancy experience; and number of children.

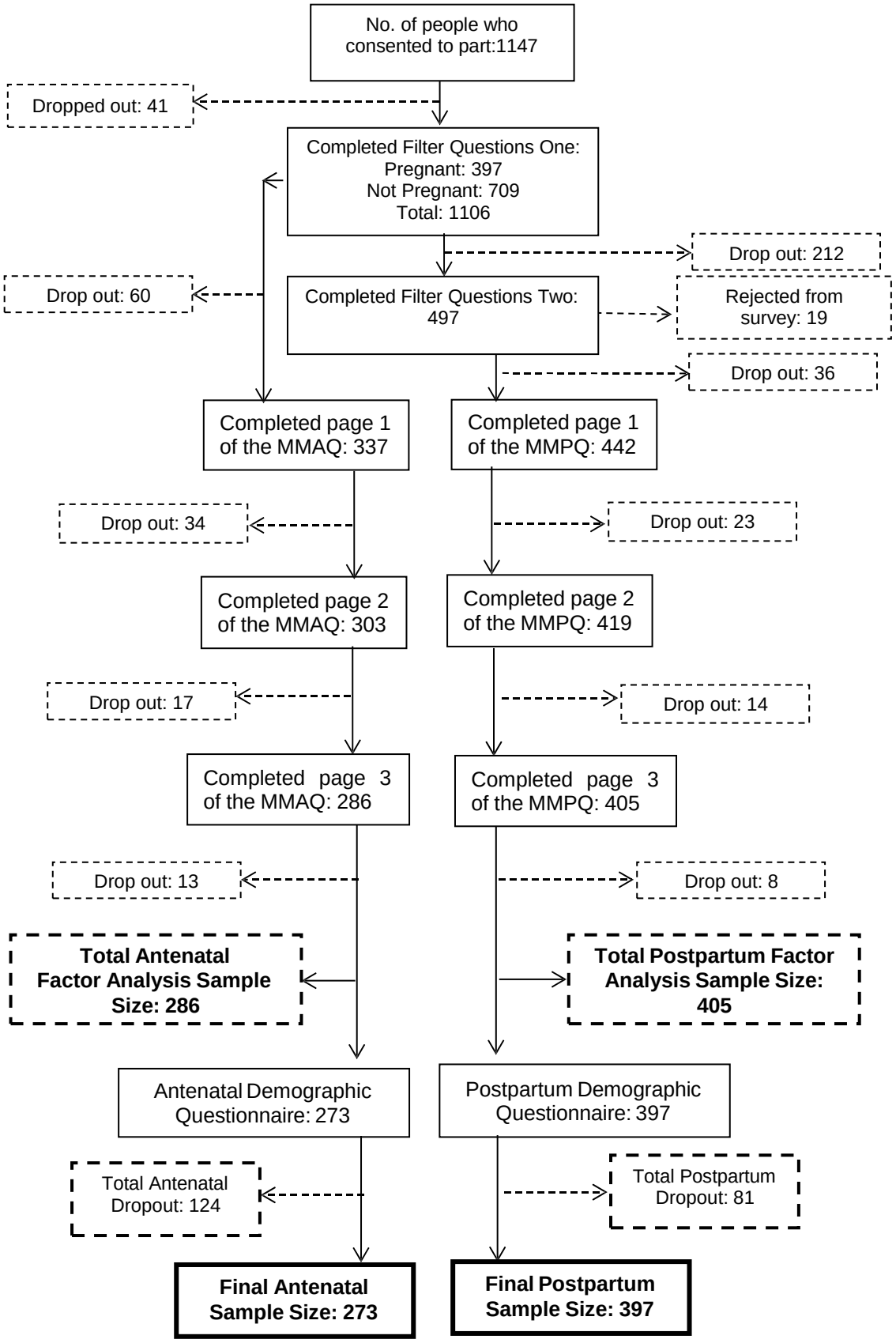

***Figure 2*. Web-based Survey Dropout and Sample size**

3.3.7. Planned Analysis

The following analysis was planned for each questionnaire in turn: item analysis, exploratory factor analysis, and hierarchical multiple regression analysis. This section will outline the processes for each of these analyses after initially explaining the management of ordinal data within the study.

3.3.7.1. Management of Ordinal Data

The data generated from the questionnaires was ordinal. This can be an issue when conducting an analysis as many statistical tests assume the use of interval data. The steps taken during the analysis to manage the use of ordinal data is outlined below.

Pearson's covariance matrix usually underpins an exploratory factor analysis within statistical packages. This assumes the use of interval data with a normal distribution, and therefore, when used with ordinal data it can artificially deflate the relationship between variables (Gadermann, et al., 2012). To manage this a polychoric correlation matrix was used during the factor analysis. This evaluates reliability using the assumed unobserved continuous variables thought to underlie ordinal data (Gadermann, et al., 2012). Furthermore, to assess the internal reliability of the final composition of the MMAQ and MMPQ a Categorical Principal Components Analysis (CATPCA) was used. This is recommended for use with ordinal data as it does not assume the use of interval data or a linear relationship between variables (Meulman, Van der Kooij, & Heiser, 2004).

During the item evaluation the SPSS scale reliability analysis was used. This process uses Cronbach alpha to assess the fit of the items to the questionnaire. Cronbach alpha is underpinned by a Pearson's correlation matrix and, therefore, these values may be deflated. Thus, Cronbach alpha was only used as a part of the cumulative

evidence to decide on the removal of an item from the questionnaire, and no item was removed solely on the basis of these values.

When planning the analysis to determine the variables associated with the questionnaire scores, the use of an ordinal regression or hierarchical multiple regression analysis was considered. Ordinal regression would have been concordant with the data processes previously used in the study. However, the use of such an analysis would mean that the median value would be used as the questionnaire score. This is highly unusual within Clinical Psychology and uncommon in outcome measures used in clinical practice. After an initial analysis was conducted to confirm that the data met the assumptions, it was decided that a hierarchical multiple regression analysis would be used.

3.3.7.2. Item analysis

Items were evaluated on the criterion below to accumulate evidence for their exclusion from the questionnaires:

- Item median: items with a median "close to the centre of the range" (DeVellis, 2012, p. 107) are considered the most desirable as this means a variety of responses are being given to the item and, therefore, the item has greater discriminative ability. In this study a median of 4 was considered the centre of the range. Any items with an extremely high median, 6, or extremely low median, 1, were considered for exclusion.
- Item variance: items that were endorsed using the full range of response options were considered the most desirable (DeVellis, 2012). Therefore, items in this study that were not endorsed across all response options were considered for exclusion.

- Corrected item-total correlation: assesses the items' correlation with all the other questionnaire items including itself (DeVellis, 2012). A low value on this measure was considered less desirable.
- Cronbach's Alpha coefficient with item deleted: if it was indicated that the coefficient would increase by 0.1 or the coefficient was maintained with the item deleted the item was considered for exclusion.
- Kaiser-Meyer-Olkin (KMO): if an item had a KMO of 0.5 or below it was considered for exclusion.
- Face Validity: each item was re-reviewed by the researcher to consider the face validity of the items. If the item was considered to have low face validity it was considered for exclusion.

The following evidence was accumulated to determine the most useful items for inclusion in the MMAQ and MMPQ. SPSS version 20 was used for this aspect of the analysis.

3.3.7.3. Factor Analysis

An exploratory factor analysis was conducted to determine the structure underlying the two questionnaires. An exploratory factor analysis was chosen over that of a confirmatory factor analysis because, to the best of the researcher's knowledge, there has been no previous attempt in the literature to capture MM in a questionnaire format incorporating valence terms. This meant that no hypothesises could be generated about the structure of the questionnaires or the items that may load onto a factor. The factor analysis was conducted in Stata version 10.

In this study the number of factors to be retained was determined by a process of reviewing the Eigenvalues, the scree plot and factor loadings. There are several suggested criterion for deciding the number of factors to be retained. The use of a

scree plot is recommended for data with a sample size of 200+ and over 30 items (Steven, 2002), as was the case in this study. However, some consider the use of the scree plot to be too restrictive and arbitrary, and as this was an exploratory factor analysis, it was decided that further exploration of the factors was appropriate. Therefore, factors with an Eigenvalue of 1 and over (Kaiser, 1960), were also explored. Furthermore, factors with few or no univocal items and many multi-vocal items were considered for exclusion. A factor loading of above
.30 was considered evidence that an item loaded onto a factor.

After the number of factors to be retained was decided, a factor rotation was performed. An oblique rotation was initially performed to determine if there was a relationship between the extracted factors. As advised by Tabachnick and Fidell (2007), if the correlation between the factors exceeded .32 then the factors were considered related and an oblique rotation was performed. If the correlation was at or below .32 it was assumed that there was no relationship between the factors and an orthogonal rotation was be performed.

3.3.7.4. Associated Variables

To assess the external validity and reliability of the questionnaires a hierarchical multiple regression was conducted to determine the variables, which were associated with the MMAQ and MMPQ.

3.3.8. Ethical Considerations

3.3.8.1. Informed Consent

The first page of the survey was the participant information sheet (see Appendix F). This provided participants with important information regarding the purpose of the study, what was involved in taking part, their right to withdraw from the study and how

their data would be stored. This was done to ensure participants were able to provide informed consent. Participants were asked to indicate that they had read all the relevant information and were over 16 years of age before consenting to take part in the study. Participants were also given the researcher's and Principal Supervisor's contact details should they have any questions about the research.

3.3.8.2. Confidentiality and Storage of Data

Participants entering the survey were not asked at any stage for identifying details such as their name or location. This meant that participants could complete the survey anonymously. Additionally, settings within Survey Monkey were altered to ensure that the IP addresses of the participants were not collected. Once the survey was closed, the data was downloaded from Survey Monkey and stored in a password protected database.

3.3.8.3. Participant Distress

It was considered that participants may become concerned about the wellbeing of their baby or their parenting practices when taking part in the study. Therefore, a debrief sheet (see Appendix G) was included at the end of the survey that listed relevant sources of support and the contact details of the Principal Supervisor.

3.3.8.4. Ethical Review

Ethical approval for the study was given by the University of Hertfordshire's Health and Human Sciences Ethical Committee [Protocol number: LMS/PG/UH/00158]. Evidence of approval by the committee can be found in Appendix H.

4. Results

The purpose of this section is to report on the findings of the study in relation to the research aims, which are as follows:

1. To explore the concept of MM in a structured self-report questionnaire format in the antenatal and postpartum period.
2. To explore the internal consistency and structure underlying the MMAQ and MMPQ.
3. To start to establish the external validity and reliability of the MMAQ and MMPQ

The first two research aims will be addressed by conducting an exploratory factor analysis and then a scale reliability analysis for the MMAQ and MMPQ. The third aim will be addressed using a hierarchical multiple regression analysis to explore the variables associated with the MMAQ and the MMPQ.

This section will begin with a description of the demographic data for the antenatal and postpartum samples. The exploratory factor analysis, scale reliability and hierarchical multiple regression analysis will then be presented for the MMAQ, followed by the MMPQ.

4.1. Sample Demographics

4.1.1. Maternal Age and Ethnicity.

Table 1 shows the age and ethnicity of the mothers who participated in the study. The average age in the antenatal sample was 31 years old and ranged from 19 to 48 years old. In the postpartum sample the average age was 33 years old and ranged from 18 to 49 years old. In the antenatal and postpartum samples 94% of participants were white.

Table 1.

Frequencies and Percentages of the Age and the Ethnicity of the Antenatal and Postpartum Sample

Variable	**Antenatal (*n* = 273)**		**Postpartum (*n* = 391)**	
Age in Years	**Frequency**	**Percentage**	**Frequency**	**Percentage**
– 18 – 20	5	2%	5	1%
– 21 – 25	22	8%	33	9%
– 26 – 30	76	28%	86	22%
– 31 – 40	165	60%	223	58%
– 41+	5	2%	40	10%
Sample Total	273	100%	387[a]	100%
Ethnicity				
White:	**257**	**94%**	**364**	**94%**
– *White British*	*241*	*94%*	*338*	*93%*
– *White Irish*	*6*	*2%*	*9*	*2%*
– *White European*	*3*	*1%*	*14*	*4%*
– *White American*	*1*	*0%*	*3*	*1%*
- *White (unspecified)*	*6*	*2%*	*0*	*0%*
Non-White:	**12**	**4%**	**13**	**3%**
– *Mixed*	*5*	*42%*	*6*	*46%*
– *Asian (inc. Asian British)*	*5*	*42%*	*5*	*38%*
– *Arab*	*0*	*0%*	*1*	*8%*
– *Black (inc. Black British)*	*2*	*17%*	*1*	*8%*
Unspecified	**4**	**2%**	**13**	**3%**
Sample Total	273	100%	390[b]	100%

[a] 4 missing cases in maternal age due to participant data entry error.

[b] 1 cases missing due to selecting 'prefer not to answer'

4.1.2. Employment, Educational Attainment, and Relationship Status.

The educational attainment, employment and relationship status of the samples is shown in Table 2. This shows that in the antenatal and postpartum sample the majority of the participants had either a postgraduate qualification (antenatal 43%, postpartum 37%) or an undergraduate degree (antenatal 35%, postpartum 37%). The majority of the antenatal sample were in full-time employment (51%), whereas, in the postpartum sample the majority of mothers were in part-time employment (37%). In terms of relationship status 98% of mothers in the antenatal sample and 90% of mothers in the postpartum sample were in a relationship with the father of their child.

4.1.3. Gestational Age, Age of the Youngest Child and Number of Children

The mean gestational age of the foetus in the antenatal sample was 26 weeks, ranging from 5 to 41 weeks. Twenty-four expectant mothers were in the first trimester (9%), 115 in the second trimester (42%), and 134 in the third trimester (49%). In the postpartum sample the average age of the youngest child was 22 months, ranging from less than 1 month old to 71 months old.

In the antenatal sample, 48% of foetuses had no siblings, 41% had one sibling, and 11% had two to four siblings. In the postpartum sample, 51% of infants had no siblings, 36% had one sibling, and 13% had between two and thirteen[1] siblings.

[1] It was believed one participant who indicated they had 13 additional children may have entered this figure in error.

Table 2.

Frequencies and Percentages of Educational Attainment, Employment and Relationship Status of the Antenatal and Postpartum Sample

Variable	Antenatal (*n* = 273)		Postpartum (*n* = 391)	
Education	**Frequency**	**Percentage**	**Frequency**	**Percentage**
– Postgraduate	117	43%	144	37%
– Undergraduate	94	35%	143	37%
– A levels	39	14%	73	19%
– GCSE/O Levels	20	7%	25	6%
– No qualifications	1	0%	5	1%
– Unspecified	2	1%	1	0%
Sample Total	273	100%	391	100%
Employment Status				
– FT employment	138	51%	102	26%
– PT employment	68	25%	143	37%
– Homemaker	44	16%	95	24%
– Student	4	1%	23	6%
– Self-Employed or Contract	10	4%	15	4%
– Maternity Leave	3	1%	8	2%
– Unemployed	6	2%	5	1%
Sample Total	273	100%	391	100%
Relationship Status				
– With the father of child	267	98%	352	90%
– Other relationship	3	1%	12	3%
– Separated	1	0%	8	2%
– Single	2	1%	19	5%
Sample Total	273	100%	391	100%

Note. FT = Full Time; PT = Part Time

4.2. MMAQ Scale Development

The section below outlines the exploration of the structure and reliability of the MMAQ.

4.2.1. Item Analysis

An initial review of the MMAQ items indicated that items 6, 12, 15, 21, 25, 34, 36 and 38 should be excluded from the questionnaire. These items had either an extreme median of 1 or a poor distribution of responses, with at least 50% of participants responding “never”. The rationale for the removal of all items from the MMAQ can be seen in Appendix I.

4.2.2. Factor Analysis and Item Reliability

Following on from the review of items an initial exploratory factor analysis was conducted to examine the factor structure of the initial model. Thirty-four items were entered into the analysis with items 6, 12, 15, 21, 25, 34, 36 and 38 excluded. The KMO value for the MMAQ was .86, which is considered to be adequate for a factor analysis. All items entered into the model had a KMO value of 0.6 or above, which indicated that they were suitable for factor analysis.

The number of factors to be retained was decided by a process of reviewing the eigenvalues and scree plot. The eigenvalues indicated that four factors should be kept, whereas the scree plot indicated that between one and three factors should be kept. It was decided that a four factor model should be retained, which explained 81% of the variance. An oblique promax rotation was performed on the four factor model to assess the degree to which the factors were associated. This showed that factors one, two and three were correlated above the .32 cut-off. However, factor four showed no relationship with the other three factors. Due to the clear relationship between the first three factors, it was decided that an oblique rotation would be used and that the

relationship between the factors would continue to be reviewed to ensure that the most appropriate rotation was performed.

Subsequently, a scale reliability analysis was performed. This indicated that item 9 and 30 should be removed from the scale as they had a very low item-total correlation, and it was indicated that Cronbach Alpha would improve with their removal. An exploratory factor analysis was then run on this model with 32 items entered. The eigenvalues indicated that three factors should be kept, and the scree plot indicated between one and three factors to be retained. It was decided that a three-factor model should be retained. An oblique promax rotation was used due to the association between the factors.

The scale reliability analysis was then repeated. This indicated that items 3, 16, 28 and 41 should be removed. This was due to low item-total correlation, Cronbach alpha being unchanged by removal, items being multi-vocal or extreme medians. Twenty-eight items were then entered into an exploratory factor analysis in which three factors were retained and an oblique promax rotation performed. This demonstrated that items 2 and 5 did not load onto any factor and so they were removed from the model.

It was then decided that each factor should be reduced to 5 items to minimise the response burden. Items 1, 10, 13, 22, 23, 27, 33, 37, 39, 40, and 42 were selected to be removed. This was due to the items having the lowest factor loading, low item-total correlation, little impact on Cronbach Alpha or theoretically not contributing to the questionnaire.

The final model included 15 items and can be seen in Table 3. The KMO value for the total scale was .87 and all items had a KMO value equal to or greater than .70. The

eigenvalues indicated the retention of a three-factor model and the scree plot indicated between one and three factors (see Figure 3). It was decided to retain a three-factor model. An oblique promax rotation was then performed to allow a final review of the relationship between the factors. This indicated that the three factors positively correlated for: factor one and factor two r = .55; factor one and factor three r = .53 and factor two and factor three r = .57. This was above the .32 cut-off and, therefore, an oblique promax rotation was considered the best fit for the data. The three-factor model explained 100% of the variance (see Table 3).

4.2.3. Questionnaire Reliability

A CATPCA was initially used to assess the reliability of all items in the MMAQ initial item pool (42 items), this was found to have excellent reliability (α = .95). The CATPCA statistic was then used to assess the reliability of the three subscales and the questionnaire as a whole. As can be seen in Table 3 the questionnaire as a whole had excellent reliability (α = .95) and, furthermore, factor one (α = .84), factor two (α = .81) and factor three (α = .81) also had very good reliability.

4.2.4. Interpretation of Factor Loadings

The factor loadings for each item were reviewed and the factor was interpreted on the basis of the highest loading items. Factor one clearly embodied maternal thoughts about the foetus in the future (Future Baby). Factor two related to thoughts and feelings of the foetus in relation to the behaviours and feelings of the mother (Mother Baby Interaction). Finally, factor three related to maternal thoughts about the foetuses emotions (Baby's Feelings). This final factor had two univocal items with high factor loadings and three multi-vocal items. The univocal items reflected negative valence whereas the multi-vocal items reflected positive and neutral valence. This factor was retained as the subscale most closely represented the concept of MM. Additional discussion regarding this subscale can be found in section 5.5.

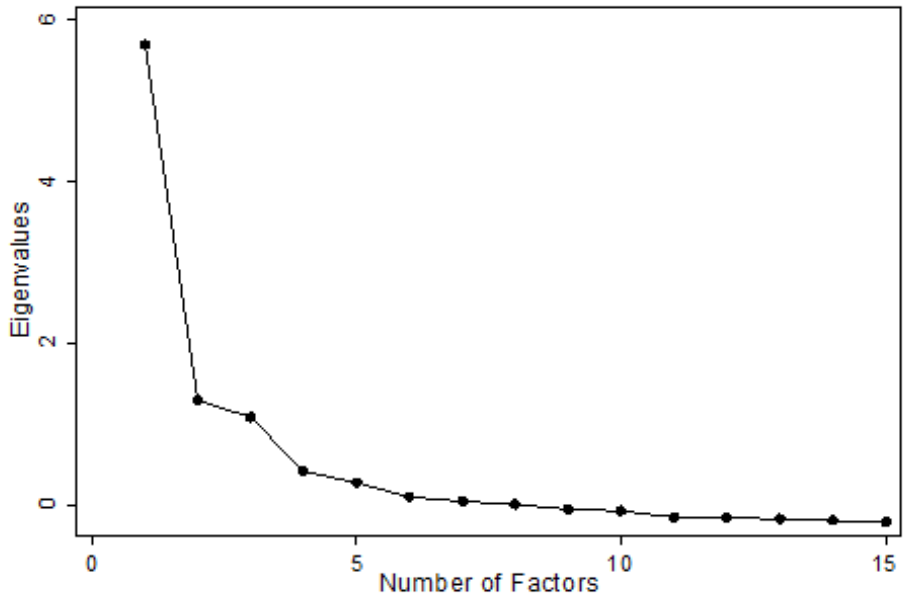

***Figure 3*. Scree Plot of MMAQ Factor Structure**

Table 3.
The Final Composition of the MMAQ Following an Exploratory Factor Analysis

Factor	Items	Promax Rotated Factor Loadings			Cumulative Variance	Alpha	Eigenvalue
		1. Future Baby	2. Mother Baby Interaction	3. Baby's Feelings			
1. Future Baby	8. I think my baby will be clever when they grow up	***0.85***	-0.12	-0.13	71%	.84	5.69
	18. I imagine my baby will be creative when they grow up	***0.79***	0.03	-0.07			
	4. I think about what my baby will want to do when they grow up	***0.76***	-0.13	-0.03			
	24. I imagine my baby will be loving as they grow up	***0.66***	0.25	-0.12			
	20. I wonder what my baby will remember from their childhood	***0.64***	-0.04	0.14			
2 Mother Baby Interaction	31. I think my baby enjoys hearing my voice	-0.02	***0.98***	-0.17	87%	.81	1.30
	35. I think my baby has learnt to recognise my voice	-0.08	***0.89***	-0.05			
	11. I think my baby is comforted when I touch my tummy	-0.07	***0.61***	0.11			
	26. I think my baby is learning while they are inside me	0.25	***0.38***	0.12			
	32. I wonder how my baby feels when I am stressed	0.22	***0.33***	0.16			
3. Baby's Feelings	19. I wonder if the way my baby moves tells me that they are irritated	-0.03	-0.17	***0.95***	100%	.81	1.09
	29. I think my baby gets annoyed when I move in certain ways	-0.20	-0.02	***0.91***			
	7. I wonder what kind of mood my baby is in	***0.35***	0.00	***0.46***			
	14. I think my baby gets excited	0.11	***0.32***	***0.36***			
	17. I wonder what my baby thinks about inside me	***0.31***	0.13	***0.35***			
Total Scale					**100%**	**.95**	

4.3. MMAQ Regression Modelling

The aim of this analysis was to address the third research aim of the study which was to explore the variables that were associated with the scores on the MMAQ. The three subscales of the MMAQ were summed to provide a total score for each subscale. The observed relationship between the subscales meant it was also appropriate to compute a total score for the MMAQ. A higher score on the questionnaire total and subscales was deemed to indicate higher MM.

It was decided to use a hierarchical multiple regression analysis to determine the extent to which variables were associated with the scores on the MMAQ. A core model was developed based on the past literature regarding antenatal attachment and antenatal MM. The model included the variables Gestational Age, Mental Health Difficulties, Pregnancy Planning, Pregnancy Complications and Pregnancy Experience (Easy, Difficult and Don't Know). These variables were entered into the first block of the hierarchical multiple regression analysis in order to control for the influence of the variables.

After entering the core model, a further six demographic variables were explored in turn to determine their association with the scores on the MMAQ. A seventh variable, Relationship Status, was not entered into a regression analysis due to the homogeneity of the sample as 98% of participants were in a relationship with the father of their child. Each variable was inputted separately into a hierarchical multiple regression in the second block after the core model was entered. This was to determine the unique contribution of that variable over and above the core model.

The results of the regression analysis can be seen in Table 4. The core model explained 6% of the variance within the MMAQ total score ($F(6, 257) = 2.85$, $p = .01$).

Of the variables entered into the core model, only Gestational Age was a significantly associated with the MMAQ total score (Beta = .16, *p* = .01). This indicated that as Gestational Age increased so did the total score on the MMAQ, with mothers scoring on average 1% higher on the scale per four weeks of pregnancy. Difficult Pregnancy Experience also approached significance (Beta = .13, *p* = .07) and indicated that mothers who experience their pregnancy as difficult score 5% higher on the MMAQ total score than mothers who experienced the pregnancy as easy or were unsure of their pregnancy experience.

On the Future Baby subscale, the core model explained 8% of the variance ($F(6, 257) = 3.47$, $p = .001$). Of the variables entered into the core model, Mental Health Difficulties (Beta =.14, *p* = .02) and Difficult Pregnancy Experience (Beta =.17, *p* = .02) were associated with the scores on the subscale. This indicated that mothers who had experienced mental health difficulties scored 8% higher on the subscale in comparison to those who had not experienced mental health difficulties. Furthermore, those who had a difficult experience of pregnancy scored 9% higher on the subscale than mothers who had experienced the pregnancy as easy or were unsure of their pregnancy experience.

On the Mother Baby Interaction subscale the core model was non-significant, and explained 4% of the variance ($F (6, 257) = 1.64$, $p = .14$). This indicated that the model was not a good fit for the data. Of the variables, entered only Gestational Age approached significance (Beta = .12, *p* =.06) and indicated that as Gestational Age increased so did the score on the subscale by 1% for every four weeks of pregnancy.

Table 4.

Initial Hierarchical Multiple Regression Analysis Assessing Possible Variables Associated With the Subscales of the MMAQ

		Future Baby		Mother Baby Interaction		Baby's Feelings		MMAQ Total Score	
Variables	***n***	**β**	**t**	**β**	**t**	**β**	**t**	**β**	**t**
Core Model									
Gestational Age	264	-.04	-0.59	.12	***1.89***[a]	.32	***5.29****	.16	***2.59****
Mental Health	64	.14	***2.33****	-.01	-0.14	-.02	-0.29	.05	0.82
Unplanned Preg.	41	.06	0.97	.05	0.79	.02	0.38	.05	0.87
Complications	71	.06	0.84	.09	1.27	.04	0.57	.07	1.08
Pregnancy Experience:									
– ***Difficult***	79	.17	***2.44****	.09	1.32	.05	0.78	.13	***1.85***[b]
– ***Don't Know***	32	.05	0.76	-.01	-0.07	-.05	-0.71	.00	0.01
R^2		***0.08*****		0.04		***0.11*****		***0.06****	
Maternal Age	264	-.26	***-4.26*****	-.14	***-2.16****	-.24	***-4.15*****	-.26	***-4.31*****
R^2 Change		***0.06*****		***0.02****		***0.06*****		***0.06*****	
Ethnicity *(comparison group White)*									
– **Non-White**	16	-.04	-0.59	-.05	-0.72	-.05	-0.91	-.05	-0.89
R^2 Change		0.01		0.01		0.01		0.01	
Education *(comparison group GCSEs or Less)*									
– ***Postgraduate***	116	-.08	-0.71	-.14	-1.19	-.07	-0.57	-.12	-0.99
– ***Undergrad.***	92	-.03	-0.24	-.12	-1.07	-.03	-0.27	-.07	-0.62
– ***A Levels***	35	.02	0.19	-.02	-0.18	.08	0.90	.03	0.37
R^2 Change		0.01		0.01		0.01		0.01	
Employment *(comparison group Employed)*									
– **Unemployed**	6	-.15	***-2.40*****	-.08	-1.29	-.06	-0.92	-.12	***-1.88***[a]
– **Homemaker**	42	.03	0.43	.05	0.72	.05	0.80	.05	0.78
R^2 Change		***0.02****		0.01		0.01		0.02	
Knowledge of Gender *(comparison group No)*									
– **Yes**	120	.06	0.83	.09	1.33	.05	0.76	.08	1.17
R^2 Change		0.01		0.01		0.01		0.01	
No. of Children	264	-.06	-0.97	.08	1.29	-.04	-0.61	-.01	-0.15
R^2 Change		0.00		0.01		0.01		0.01	

Note Mental Health = Mental Health Difficulty; Preg. = Pregnancy; Undergrad = Undergraduate;
** p = .05; ** p =.001; [a] p = .06; [b] p =.07*

On the Baby's Feelings subscale the core model explained 11% of the variance (F (6, 257) = 5.46, *p* = .001). Gestational Age was the only variable significantly associated with the subscale (Beta = .32, *p* = .001). This indicated that as gestational age increased so did the score on the subscale, with mothers scoring on average 3% higher on the subscale per 4 weeks of pregnancy.

Of the additional variables entered into the hierarchical multiple regression, only Maternal Age and Employment Status were significantly associated with the scores on the MMAQ, over and above the core model. Maternal Age significantly improved the model fit across all subscales and the MMAQ total score (Future Baby: F Change (1, 256) = 18.13, *p* = .001; Baby's Feelings: F Change (1, 256) = 17.25, *p* = .001; Mother Baby Interaction: F Change (1, 256) = 4.68, *p* = .03; MMAQ total score: F Change (1, 256) = 18.57, *p* = .001). On the MMAQ total score, Future Baby and Baby's Feelings subscales Maternal Age explained an additional 6% of the variance whereas, on the Mother Baby Interaction subscale Maternal Age explained an additional 2% of the variance. The analysis indicated that older mothers scored lower across all the subscales and the MMAQ total score: mothers scored between 0.6% and 1% lower on the subscales per year of life.

Employment Status was the only other variable which significantly improved the fit of the model. On the Future Baby subscale, Employment Status explained an additional 2% of the variance (F Change (2, 255) = 3.09, *p* = .05). This indicated that mothers who were unemployed (Beta = -.15, *p* = .001) scored 23% lower on the subscale than those mothers who were employed. Employment status did not improve the model fit for any other subscale or the MMAQ total score. However, Unemployed did approach significance as an associated variable on the MMAQ Total Score (Beta = -.12, *p* = .06). This finding indicated that unemployed mothers scored 14% lower on the MMAQ total score than mothers who were employed.

4.3.1. Final Regression Model

After the initial regression analysis, those variables that were found to be significantly associated with the MMAQ were entered into a final hierarchical regression analysis to assess for interactions. In this analysis the core model was entered into the first block followed by Maternal Age and Employment Status in the second block. The results of the analysis are shown in Table 5. and the normative data for the MMAQ subscales and associated variables can be found in Table 6.

The final model significantly improved the model fit for the MMAQ total score and two of the subscales (Future Baby and Baby's Feelings). The final model explained an additional 7% of the variance on the MMAQ Total Score (F Change (3, 254) = 7.24, p = .001), an additional 8% of the variance on the Future Baby subscale (F Change (3, 254) = 7.78, p = .001), and an additional 6% on the Baby's Feelings subscale (F Change (3, 254) = 5.93, p = .001). The final model did not improve the model fit for the Mother Baby Interaction subscale as it only explained 2% of the variance (F Change (3, 254) = 2.13, p = .10).

On the Future Baby subscale Mental Health Difficulties, Difficult Pregnancy Experience, Maternal Age and Unemployed were significantly associated with the scores. Mothers with a mental health difficulty scored 10% higher than mothers without a mental health difficulty (Beta = .19, p = .001), and mothers with a difficult pregnancy experience scored 9% higher on the subscale than mothers with an easy pregnancy experience or those mothers unsure about their pregnancy experience (Beta = .17, p = .01). Older mothers scored 6% lower on the subscale for every five years of age (Beta = -.25, p = .001). Finally, unemployed mothers scored 21% lower on the subscale than mothers who were employed (Beta = -.13, p = .01).

Table 5.

Final Hierarchical Multiple Regression Analysis Assessing Variables Associated with the Subscales of the MMAQ

		Future Baby		Mother Baby Interaction		Baby's Feelings		MMAQ Total Score	
Variables	***n***	**β**	**t**	**β**	**t**	**β**	**t**	**β**	**t**
Core Model									
Gestational Age	264	-.04	-0.59	.12	***1.89***[a]	.32	***5.29****	.16	***2.59****
Mental Health	64	.14	***2.33****	-.01	-0.14	-.02	-0.29	.05	0.82
Unplanned Preg.	41	.06	0.97	.05	0.79	.02	0.38	.05	0.87
Complications	71	.06	0.84	.09	1.27	.04	0.57	.07	1.08
Pregnancy Experience *(comparison group Easy)*									
– ***Difficult***	79	.17	***2.44****	.09	1.32	.05	0.78	.13	***1.85***[b]
– ***Don't Know***	32	.05	0.76	-.01	-0.07	-.05	-0.71	.00	0.01
R^2		***0.08*****		0.04		***0.11*****		***0.06****	
Step 2 Final Model									
Gestational Age	264	-.04	-0.60	.12	***1.87***[a]	.32	***5.46*****	.16	***2.67****
Mental Health	64	.19	***3.06*****	.01	0.16	.01	0.14	.09	1.41
Unlanned Preg.	41	.02	0.24	.02	0.38	-.03	-0.45	.00	0.07
Complications	71	.06	0.94	.08	1.26	.04	0.64	.07	1.15
Pregnancy Experience *(comparison group Easy)*									
– ***Difficult***	79	.17	***2.60****	.09	1.36	.05	0.80	.13	***1.95****
– ***Don't Know***	32	.03	0.48	-.01	-0.18	-.06	-1.02	-.02	-0.28
Maternal Age	264	-.25	***-4.10*****	-.13	***-2.00****	-.24	***-4.01*****	-.25	***-4.13*****
Employment: *(comparison group Employed)*									
– **Unemployed**	6	-.13	***-2.23****	-.07	-1.18	-.04	-0.72	-.10	-1.69
– **Homemaker**	42	0.00	-0.04	0.03	0.48	0.02	0.34	0.02	0.31
R^2 Change		***0.08*****		0.02		***0.06*****		***0.07*****	

Note. Mental Health = Mental Health Difficulty; Preg = Pregnancy

** p = .05; ** p =.001; ap =.06; bp =.07*

Table 6
Means and Standard Deviations of the Variables Associated With the MMAQ Subscales

Variable		Future Baby		Mother Baby Interaction		Baby's Feelings		Total Score	
	n	M	SD	M	SD	M	SD	M	SD
Gestational Age (wks):									
– ***5 – 12***	23	17.4	5.8	16.9	6.2	10.7	4.8	45.0	14.1
– ***13 – 27***	113	17.5	6.0	19.9	5.5	13.2	5.8	50.6	14.5
– ***28 - 41***	128	16.8	5.9	19.9	5.0	15.8	5.3	52.5	13.3
Maternal Age (years):									
– ***18 - 25***	27	19.4	4.9	21.2	4.9	16.2	5.8	56.8	13.2
– ***26 - 30***	76	18.5	5.6	20.6	5.0	15.6	5.4	54.9	12.5
– ***31 - 35***	126	16.9	5.9	19.2	5.1	13.7	5.6	49.8	13.6
– ***36 +***	44	14.5	6.2	18.2	6.6	12.3	5.9	45.0	15.6
Planned Pregnancy									
- **Yes**	231	16.9	6.0	19.5	5.6	14.2	5.8	50.7	14.0
- **No**	42	18.4	5.7	20.3	6.1	14.4	5.6	53.1	14.5
Mental Health Difficulties :									
– ***Yes***	65	19.1	6.2	20.0	5.3	14.5	5.7	53.6	14.7
– ***No***	202	16.6	5.7	19.5	5.4	14.2	5.7	50.2	13.7
Pregnancy Experience:									
– ***Easy***	153	16.1	5.8	19.3	5.3	14.3	5.6	49.7	13.8
– ***Difficult***	79	19.0	5.7	20.6	5.3	14.7	5.9	54.2	13.9
– ***Don't Know***	32	17.6	6.1	19.2	5.9	12.8	5.3	49.5	14.2
Pregnancy Complications:									
– ***Yes***	71	18.5	6.0	20.7	5.1	14.9	5.3	54.1	12.9
– ***No***	193	16.7	5.9	19.2	5.4	14.0	5.8	49.9	14.2
Employment Status:									
– ***Employed***	223	17.1	6.0	19.5	5.4	14.1	5.8	50.7	14.1
– ***Unemployed***	6	13.2	6.9	17.0	6.3	11.8	4.7	42.0	16.6
– ***Homemaker***	44	18.2	5.6	20.6	4.9	15.5	5.3	54.3	12.6
Total Sample	273	17.2	5.9	19.6	5.4	14.3	5.7	51.1	14.1

Note. Wks = Weeks

On the Mother Baby Interaction subscale Maternal Age was the only significant variable, with older mother scoring 3% lower on the subscale for every 5 years of age (Beta = -.13, *p* = .05). Gestational Age approached significance and indicated that scores increased by 1% every four weeks of pregnancy (Beta = .12, *p* = .06).

On the Baby's Feelings subscale Gestational Age (Beta = .32, *p* = .001) and Maternal Age (Beta = -.24, *p* = .001) were significant variables. This indicated that for every four weeks of pregnancy scores increased by 3%, and that scores were 6% lower for every five years of maternal age.

On the MMAQ Total Score Gestational Age (Beta = .16, *p* = .01), Maternal Age (Beta = -.25, *p* = .001) and Difficult Pregnancy Experience (Beta = .13, *p* = .05) were significant variables. This indicated that, for every four weeks of pregnancy, scores increased by 1%, and that scores were 5% lower for every five years of maternal age. Those mothers who had a difficult experience of pregnancy scored 5% higher on the total score than those mothers with an easy experience of pregnancy or who were unsure about their experience.

Interactions were noted on the Future Baby subscale and MMAQ Total Score in the final model. On the Future Baby subscale, Mental Health Difficulties changed in the level of significance from the core model (Beta = .14, *p* = .02) to the final model (Beta = .19, *p* = .001). After further exploration of this interaction it was found that Mental Health Difficulties had a significant positive correlation with Unemployed (*r (262)* = .51, *p* = .01) and being a Homemaker (*r (262)* = .14, *p* = .05). A review of the mean values, shown in Table 7 indicated that mothers with a mental health difficulty scored higher on the subscale than mothers without a mental health difficulty. It also indicated that, regardless of mental health difficulties, unemployed mothers scored lower than

mothers who were employed or homemakers. The mothers that scored the lowest on the subscale were unemployed mothers without mental health difficulties.

On the MMAQ Total Score it was noted the Difficult Pregnancy Experience changed from approaching significance in the core model (Beta = .13, p = .07) to significant in the final model (Beta = .13, p = .05). This interaction was explored further by systematic removal of the variables added to the final model. It was observed that Difficult Pregnancy Experience was significantly associated with the subscale when either Unemployed or Homemaker was entered into the model. A review of the mean values shown in Table 8. indicates that, overall, mothers who experienced their pregnancy as difficult scored higher on the MMAQ Total Score compared to those who found the experience easy or were unsure about their experience. Regardless of their experience of the pregnancy, those mothers who were unemployed scored lower than those who were employed or homemakers. Finally, mothers who had classified themselves as homemakers and had a difficult experience of pregnancy scored the highest on the subscale. On the other hand, mothers who had classified themselves as unemployed and did not have a difficult experience of pregnancy scored lowest on the subscale.

Table 7
Means, Standard Deviation and Mean Difference on the MMAQ Future Baby Subscale for Mental Health Difficulties and Employment Status

	Employed		Unemployed		Home Maker		Employed vs Unemployed	Employed vs Home Maker	Unemployed vs Home Maker
Mental Health (*n*)	***n* (%)**	**M (SD)**	***n* (%)**	**M (SD)**	***n* (%)**	**M (SD)**	**MD**	**MD**	**MD**
- ***Yes (65)***	45 (69)	19.4 (6.2)	4 (6)	15.0 (7.2)	6 (25)	19.3 (6.0)	4.4	0.2	-4.3
- ***No (202)***	173 (86)	16.5 (5.7)	2 (1)	9.5 (6.4)	27 (13)	17.3 (5.3)	7.0	-0.8	-7.8
Total (267)[a]	218 (82)	17.1 (5.9)	6 (2)	13.2 (6.9)	43 (16)	18.1 (5.6)	3.9	-1	-4.9

[a] *6 cases missing due to selecting 'prefer not to answer'*
Note: Mental Health = Mental Health Difficulty; M = Mean MD = Mean Difference; SD = Standard Deviation

Table 8.
Means, Standard Deviation and Mean Difference on the MMAQ Total Score for Difficult Pregnancy Experience and Employment Status

	Employed		Unemployed		Home Maker		Employed vs Unemployed	Employed vs Home Maker	Unemployed vs Home Maker
Difficult Pregnancy Experience (*n*)	***n* (%)**	**M (SD)**	***n* (%)**	**M (SD)**	***n* (%)**	**M (SD)**	**MD**	**MD**	**MD**
- ***Yes (80)***	61 (76)	53.9 (14.0)	3 (4)	52.3 (13.6)	6 (20)	56.6 (14.3)	1.5	-2.8	-4.3
- ***No (189)***	160 (85)	49.6 (14.0)	3 (2)	31.7 (13.6)	26 (14)	52.9 (11.5)	17.9	-3.3	-21.2
Total (269)[a]	221 (82)	50.9 (14.1)	6 (2)	42.0 (16.6)	42 (16)	53.3 (13.1)	8.9	-2.4	-11.3

[a] *4 cases missing due to skipping question*
Note: Mental Health = Mental Health Difficulty; M = Mean MD = Mean Difference; SD = Standard Deviation

4.4. MMPQ Scale Development

The section below outlines the exploration of the structure and reliability of the MMPQ.

4.4.1. Item Analysis

An initial review of the MMPQ items indicated that items 3, 11, 15, 26, 31 and 34 were candidates for removal due to extreme median values and poor endorsement of response options. The rationale for the removal of all items from the MMPQ can be seen in Appendix J.

4.4.2. Factor Analysis and Item Reliability

Following from the item review, the factor structure of the questionnaire was assessed by conducting an exploratory factor analysis that included 36 items and excluded items 3, 11, 15, 26, 31, 34. The KMO value was .84, which is considered adequate for factor analysis. All items with the exception of item 41 had a KMO value of 0.6 or above.

The number of factors to be retained was decided by a review of the eigenvalues and scree plot. Four factors had an eigenvalue of 1 or above, and the scree plot indicated that two factors should be retained. It was decided that a four-factor model would be initially retained, which explained 85% of the variance. An oblique promax rotation was then performed on the four-factor structure to assess the degree to which the factors were associated. Factors two and three were found to be strongly associated but no other factors were related. This made it unclear as to whether an oblique or orthogonal rotation should be performed. It was decided that an oblique rotation would continue to be used and that the relationship between the factors would continue to be reviewed to ensure the most appropriate rotation was performed.

A review of the factor loadings indicated that items 6, 30 and 41 failed to load onto any factor, and item 40 had a weak factor loading. The exploratory factor analysis was subsequently repeated with a four-factor model. The model included 32 items and excluded items 3, 6, 11, 15, 26, 30, 31, 34, 40 and 41.

Following a review of the factor loadings, it was decided to further refine the questionnaire to ensure face validity. The Researcher and Principal Supervisor rated the items for the extent to which they represented MM. On this basis 14 items were removed including items 1, 2, 4, 9, 10, 13, 21, 23, 24, 27, 28, 36, 37 and 42. The factor structure of the scale was then reassessed with 18 items included and items 1, 2, 3, 4, 6, 9, 10, 11, 13 15, 21, 23, 24, 26, 27, 28, 30, 31, 34, 36, 37, 40, 41 and 42 excluded. Subsequently, the eigenvalues and the scree plot indicated that two factors should be retained. An oblique promax rotation was then applied and indicated that factors one and two were related. A review of the factor loadings indicated that item 5 failed to load onto a factor, and the scale reliability analysis indicated that removal of item 32 would improve Cronbach alpha. Therefore, items 5 and 32 were removed from the analysis and the factor analysis was repeated with a two-factor model.

Following the review of the items face validity, it was decided to develop a third factor. This factor was to include items with the lowest MM rating that had previously been found to load onto factor four and were positively correlated with the other items included in the questionnaire. This was performed to enable distractor items to be included in the questionnaire in order to reduce social desirability and hypothesis guessing. Items with extreme median values that failed to be endorsed through the full range of response options were not considered for inclusion. Items 10, 23, and 28 were added to the scale and an exploratory factor analysis was repeated. The eigenvalues and scree plot indicated that two factors were to be retained. However, the development of a third factor was evident with an eigenvalue of 0.9.

Subsequently, item 1, 4 and 40 were added to the model to strengthen factor three. After repeating the exploratory factor analysis, the eigenvalues indicated that three factors were to be retained. However, as can be seen in Figure 4, the scree plot was difficult to interpret. It was therefore decided that three factors would be retained after which an oblique promax rotation was performed. Following the oblique rotation it was observed that there was no relationship indicated between the factors and, therefore, it was decided that an orthogonal varimax rotation was the best fit for the data. It was also observed that item 1 had a low factor loading and had an unacceptably low KMO at 0.5. This item was removed from the scale and the analysis repeated.

Following from the development of a third factor, it was decided that the questionnaire should be refined further to reduce response burden. A scale reliability analysis was conducted to assess each item's contribution to the scale. Items 8, 7, 16, 20, 22 and 33 were removed as they were multi-vocal items with significant factor loadings on more than one factor. Also, these items were not felt to represent an aspect of MM that was not already represented by the other items included in the MMPQ. Item 32 was then added back into the scale as it was felt that this contributed uniquely to the concept of MM in the scale as it represented the preferences of the infant.

The final model included 16 items and can be seen in Table 9. The KMO for the total scale was .78 and all items in the scale had a KMO equal to or greater than .60. The final model retained three factors. This was based on the eigenvalues as the scree plot was difficult to interpret (see Figure 4). An oblique promax rotation was then performed to allow a final review of the relationship between the factors. This indicated that the three factors were positively correlated: factor one and factor two r = .26; factor one and factor three r = .21 and factor two and factor three r = .29. However, this was below the .32 cut-off and, therefore, an orthogonal rotation (varimax) was performed.

4.4.3. Questionnaire Reliability

A CATPCA was initially used to assess the reliability of all the items in the MMPQ item pool (42 items), this was found to have excellent reliability (α = .89). The CATPCA analysis was then conducted for each of the three subscales and the questionnaire as a whole to determine reliability. The total scale was found to have excellent reliability (α = .92), and factor one (α = .74) and factor two (α = .70) had adequate reliability. However, factor three (α = .65) demonstrated a relatively low level of reliability.

4.4.4. Interpretation of Factor Loadings

The factor loadings for each factor were reviewed, and based on the items with the highest factor loadings were interpreted: factor one tended to express thoughts regarding the child's cognitions, emotions and preferences, and tended to be of a positive or neutral valence (Thoughts, Emotions and Preferences); factor two expressed thoughts regarding negative emotions and, in particular, irritability (Negative Emotions); and factor three expressed thoughts about what their child would do or look like in the future (Future Aspirations).

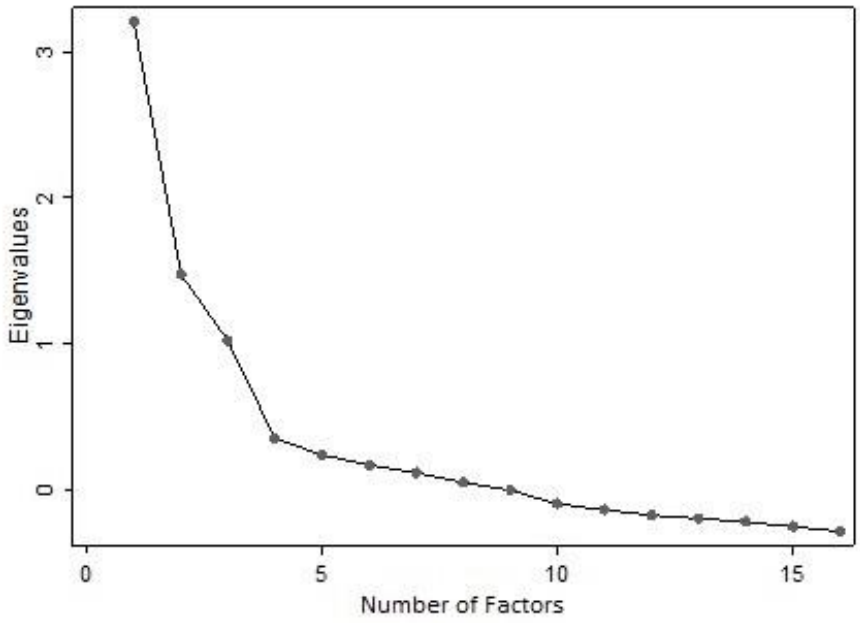

Figure 4. **Scree Plot of MMPQ Factor Structure**

Table 9. The Final Composition of the MMPQ Following an Exploratory Factor Analysis

Factor	Items	Varimax Rotated Factor Loadings			Cumulative Variance	Alpha	Eigenvalue
		1. Child's Mind	2. Negative Emotions	3. Future Aspirations			
1. Child's Mind	39. I think my child will be thoughtful of others as they grow up	**.68**	-.06	.21	61%	0.74	3.20
	18. I think my child will be creative when they grow up	**.62**	.05	**.32**			
	35. I think my child learns from the way I behave	**.61**	.07	-.10			
	17. I wonder what my child thinks about	**.54**	.18	.23			
	14. I think my child gets excited	**.50**	.15	.14			
	32. I think my child has ideas about what they want to do	**.47**	.25	-.17			
2 Negative Emotions	29. I think my child gets annoyed when I do certain things	.05	**.70**	.02	89%	0.70	1.48
	19. I think the way my child behaves shows me that they are irritated	.05	**.61**	.04			
	38. I worry that my child is sad	.08	**.57**	.09			
	25. I think my child is being stubborn	.06	**.54**	.28			
	12. I think my child becomes worried in new situations	.09	**.43**	.07			
3. Future Aspirations	4. I think about what my child will want to do when they grow up	.22	.00	**.59**	100%	0.65	1.02
	10. I wonder what social activities my child will be involved in as they grow up	.28	.07	**.58**			
	23. I wonder if my child will make friends as they grow up	.19	.28	**.50**			
	28. I wonder if my child will grow up to be good looking	-.12	.16	**.43**			
	40. I think about how tall my child is	.03	.14	**.37**			
Total Scale					**100%**	**.92**	

4.5. MMPQ Regression Modelling

The purpose of this analysis was to address the third research aim of the study, which was to explore the variables that were associated with the scores on the MMPQ. The three subscales of the MMPQ were summed to provide a total score for each subscale. A higher score on the 'Child's Mind' and 'Negative Emotions' subscales was thought to represent a higher level of MM. However, the 'Future Aspirations' subscale was not deemed to reflect MM and, therefore, a higher score on this subscale was thought to represent a parent's concerns and wishes for their child in the future. An overall score for the MMPQ was not calculated as the subscales were not strongly associated and not all of the subscales represented MM.

It was decided to use a hierarchical multiple regression analysis to determine the extent to which variables were associated with the scores on the MMPQ. A core model was developed based on the past literature regarding postpartum MM. The model included the variables that were hypothesised to be associated with MM. The variables included in the model were: Planned Pregnancy, Pregnancy Experience, Concerns Postpartum, and Mental Health Difficulties. The variables were entered in the first block of the hierarchical multiple regression analysis. This was carried out in order to control for the influence of these variables.

After entering the core model, a further seven demographic variables were explored to assess their association with scores on the MMPQ subscales. Each variable was inputted separately into a hierarchical multiple regression in the second block after the core model was entered. The variables included: Maternal Age, Ethnicity, Educational Attainment, Employment Status, Relationship Status, Number of Children, and Child Age. This was carried out to determine the unique contribution of each variable over and above the core model. The results of the analysis can be seen in

Table 10
Initial Multiple Regression Analysis Assessing Possible Variables Associated with the MMPQ Subscales

		Child's Mind		Negative Emotions		Future Aspirations	
Variables	***n***	**β**	**t**	**β**	**t**	**β**	**t**
Core Model							
Unplanned Pregnancy	82	.18	***3.52*****	.01	0.17	.07	1.42
Pregnancy Experience *(comparison group Easy)*							
– ***Difficult***	108	.01	0.12	-.01	-0.15	-.06	-1.18
– ***Don't Know***	23	-.06	-1.18	-.03	-0.58	.01	0.18
Concerns Postpartum	118	.06	1.20	.14	***2.63*****	.01	0.13
Mental Health Difficulty	127	-.02	-0.37	.12	***2.25****	.03	0.54
R^2			***.04****		***.04****		.01
Maternal Age *(years, comparison group 18 to 22 years)*							
– **23 - 25**	21	.00	0.00	-.06	-0.80	-.13	-1.63
– **26 - 40**	300	-.09	-0.85	-.06	-0.59	-.23	***-2.16****
– **41 plus**	40	-.01	-0.10	-.02	-0.26	-.23	***-2.52****
R^2 Change			.01		.01		.02
Ethnicity *(comparison group White)*							
– **Non-White**	12	.07	1.40	.04	0.80	.00	-0.01
– **Unspecified**	12	-.01	-0.27	.05	0.88	.07	1.33
R^2 Change			.01		.001		.01
Educational *(comparison group GCSEs or Less)*							
– **Postgrad.**	141	-.10	-0.99	-.07	-0.64	-.13	-1.25
– **Undergrad.**	141	-.11	-1.09	.02	0.22	-.12	-1.14
– **A Levels**	70	-.10	-1.12	.04	0.49	-.04	-0.44
R^2 Change			.001		.001		.01
Employment *(comparison group Employed)*							
– **Unemployment**	5	-.01	-0.18	.07	1.40	.02	0.43
– **Homemaker**	91	.04	0.78	.03	0.50	-.04	-0.78
R^2 Change			.001		.01		.001
Relationship Status *(comparison group With Father of Child)*							
– **Other Relationship**	12	.06	1.10	.09	***1.76***[a]	-.03	-0.51
– **Separated**	7	.01	0.12	.06	1.10	-.11	***-2.08****
– **Single**	19	.01	0.21	.11	***2.12****	-.07	-1.32
R^2 Change			.001		***.02****		.02
No. of Children	391	-.03	-0.56	.00	0.07	-.08	-1.56
R^2 Change			.001		.001		.01
Child's Age *(months, comparison group 49 months plus)*							
– **12 and under**	114	-.37	***-4.09*****	-.31	***-3.38*****	-.07	-0.72
– **13 – 18**	43	-.06	-0.81	-.13	-1.65	-.14	-1.75
– **19 – 24**	35	.03	0.35	-.16	***-2.09****	-.24	***-3.08*****
– **25 – 36**	44	-.02	-0.31	-.04	-0.50	-.04	-0.55
– **37 - 48**	29	-.04	-0.57	.03	0.38	-.07	-0.98
R^2 Change			***.12*****		***.07*****		***.04****

** p = .001; * p = .05; [a] p = .07

The core model explained 4% of the variance on the Child's Mind subscale (F (5, 375) = 2.98, p = .01). Planned Pregnancy was the only significant variable associated with the subscale (Beta = .18, p = .001). This indicated that mothers who did not plan their pregnancy scored 4% higher on the subscale than mothers who planned their pregnancy.

On the Negative Emotion subscale the core model explained 4% of the variance (F (5, 375) = 2.84, p = .02). Of the variables that constitute the core model, Concerns Postpartum (Beta = .14, p = 0.01) and Mental Health Difficulties (Beta = .12, p = .03) were significantly associated with the subscale. Those mothers with Concerns Postpartum scored 5% higher on the Negative Emotions subscale than those without concerns, and those with Mental Health Difficulties scored 4% higher than those without Mental Health Difficulties.

On the Future Aspirations subscale the core model was non-significant and explained only 1% of the variance (F (5, 375) = .73, p = .60). This indicated that the model was not a good fit for the data. None of the variables within the core model were significantly associated with the total score on the Future Aspirations subscale.

Of the additional variables entered into the hierarchical multiple regression analysis, three were significantly associated with the scores on the MMPQ subscales. These variables included: Maternal Age, Relationship Status, and Child's Age. No other variables approached significance.

Child's Age significantly improved the model fit across all three subscales. On the Child's Mind subscale, Child's Age explained a further 12% of the variance (F change (5, 288) = 7.78, p = .001). This indicated that a mother with a child aged 12 months and under scored 11% lower on the Child's Mind subscale than a mother with a child over

12 months old (Beta = -.37, *p* = .001*)*. Similarly, on the Negative Emotions subscale, Child's Age explained a further 7% of the variance (F change (5, 288) = 4.74, *p* = .001) and indicated that mothers with a child aged 12 months and under scored 11% lower on the Negative Emotions subscale than mothers whose child was over 12 months old (Beta = -.31, *p* = .001). Also, on the Negative Emotions subscale it was found that mothers with a child between 19 and 24 months old scored 8% lower on the subscale than mothers with a child of any other age (Beta = -.16, *p* = .04). However, on the Future Aspirations subscale, Child's Age explained only 4% of the variance (F change (5, 288) = 2.67, *p* = .02). On this subscale a mother with a child between 19 and 24 months scored 12% lower than a mother with child over 49 months old.

Relationship Status only improved the model fit on one subscale, which was the Negative Emotions subscale. On this subscale, Relationship Status explained a further 2% of the variance (F change (3, 372) = 2.68, *p* = .05). It indicated that mothers who considered themselves single scored 9% higher on the subscale than those who were in a relationship with the father of their child (Beta = .11, *p* = .04). The variable Other Relationship also showed a trend towards a significant association with the subscale (Beta = .09, *p* = .08). This suggested that mothers who were in a relationship with someone other than the father of their child scored 9% higher on the subscale. On the Future Aspirations subscale, Relationship Status did not significantly improve the model fit (F change (3, 372) = 1.99, *p* = .12). However, mothers that identified themselves as separated (Beta = -.11, *p* = .04) scored 14% lower on the subscale than mothers in a relationship with the father of their child.

The only other variable to influence the MMPQ subscales was Maternal Age. This variable did not improve the model fit on any subscale over and above the core model. However, on the Future Aspirations subscale it was indicated that mothers between the ages 26 and 40 years old (Beta = -.23, *p* = .03), and those over 41 years old (Beta = -

.23, p = .001) scored significantly lower on the subscale than mothers under 23 years old. Mothers between the ages 26 and 40 years old scored 10% lower, and mothers over 41 years old scored 13% lower on this subscale than mothers under 23 years old.

4.5.1. Final MMPQ Regression Model

After the initial regression analysis, those variables that were found to be significantly associated with the MMPQ were entered into a final hierarchical multiple regression analysis to assess for interactions. In this analysis the core model was entered into the first block followed by Maternal Age, Relationship Status and Child's Age in the second block. The results of this analysis for the three subscales are presented in Table 11 and the normative data for the MMPQ subscales and associated variables can be found in Table 12.

The final model significantly improved the model fit for all three subscales on the MMPQ. The final model explain an additional 12% of the variance on the Child's Mind subscale (F change (11, 278) = 3.64 p = .001), 8% on the Negative Emotions subscale (F change (11, 278) = 2.29 p = .01), and 9% on the Future Aspirations subscale (F change (11, 278) = 2.48 p = .01).

On the Child's Mind subscale, Child's Age (12 months and under) was the only significant variable in the final model (Beta -.40, p = .001) with mothers of child aged 12 months and under scoring 12% lower on the subscale than mothers whose child was over 12 months old.

Table 11
Final Model Multiple Regression Analysis Assessing Variables Associated With The Subscales Of The MMPQ

		Child's Mind		Negative Emotions		Future Aspirations	
Variable	***n***	**β**	**t**	**β**	**t**	**β**	**t**
Step 1 Core Model							
Unplanned Pregnancy	59	.15	***2.61****	-.04	-0.71	.02	0.39
Pregnancy Experience: *(comparison group Easy)*							
– ***Difficult***	79	-.02	-0.25	-.01	-0.15	-.10	-1.61
– ***Don't Know***	17	-.04	-0.61	.01	0.21	.03	0.47
Postpart. Concerns	94	.07	1.15	.17	***2.92****	.02	0.40
Mental Health	104	-.05	-0.76	.12	***2.09****	.02	0.24
R^2		.03		***.05****		.01	
Step 2 Final Model							
Unlanned Pregnancy	59	.12	1.90[a]	-.10	-1.60	.06	0.97
Pregnancy Experience: *(comparison group Easy)*							
– ***Difficult***	79	-.02	-0.33	-.03	-0.44	-.07	-1.10
– ***Don't Know***	17	-.03	-0.52	.00	0.05	.02	0.35
Postpart. Concerns	94	.05	0.85	.16	***2.76****	.03	0.43
Mental Health	104	-.05	-0.82	.11	1.84[b]	.04	0.66
Maternal Age *(comparison group 18 to 22 years)*							
– **23 - 25**	18	.03	0.35	-.03	-0.33	-.08	-0.88
– **26 - 40**	232	-.03	-0.25	-.06	-0.50	-.18	-1.54
– **41 plus**	32	-.02	-0.20	-.08	-0.79	-.20	-1.89[a]
Relationship Status *(comparison group With Father of Child)*							
– **Other Relation.**	8	-.03	-0.44	.04	0.62	-.04	-0.71
– **Separated**	5	-.03	-0.45	.01	0.12	-.15	***-2.46****
– **Single**	14	-.06	-1.03	.05	0.77	-.13	***-2.10****
Child's Age *(months, comparison group 49 months plus)*							
– **12 and under**	111	-.40	***-4.03****	-.32	***-3.21****	-.18	-***1.83***[b]
– **13 – 18**	42	-.08	-0.98	-.12	-1.43	-.21	***-2.57****
– **19 – 24**	35	.01	0.14	-.16	***-2.09****	-.31	***-3.83****
– **25 – 36**	44	-.03	-0.40	-.05	-0.58	-.09	-1.14
– **37 - 48**	29	-.04	-0.56	.02	0.31	-.09	-1.14
R^2 Change		***0.12****		***.08****		***.09****	

Note. Mental Health = Mental Health Difficulty; Postpart. Concerns = Postpartum Concerns; Other Relation = Other Relationship

** p = .001, * p = .05, [a] p = .06; [b] p = .07

Table 12
Means and Standard Deviations of Variables Associated with the MMPQ

Variable		Child's Mind		Negative Emotions		Future Aspirations	
	n	M	SD	M	SD	M	SD
Child's Age (months):							
– **12 and under**	115	26.4	4.9	15.2	4.3	17.1	4.3
– **13 - 18**	43	28.7	4.4	16.4	4.5	16.2	3.6
– **19 - 24**	36	30.1	4.4	15.7	4.0	14.7	4.9
– **25 - 36**	44	29.4	3.3	17.3	3.8	17.2	4.3
– **37 – 48**	29	29.2	2.9	18.6	3.2	16.9	3.4
– **49 +**	34	29.9	3.7	17.8	4.5	17.8	4.3
Maternal Age (years):							
– ***18 – 22***	13	28.6	4.5	16.2	5.0	18.3	2.7
– **23 – 25**	19	30.0	4.3	16.3	4.5	16.5	4.3
– **26 – 40**	237	28.1	4.6	16.3	4.3	16.8	4.3
– **41 plus**	32	29.1	3.6	17.1	4.3	16.1	4.4
Planned Pregnancy							
- **Yes**	299	28.0	4.5	16.5	4.3	17.0	4.3
- **No**	82	29.9	3.5	16.7	4.2	17.8	4.2
Mental Health Difficulties							
– ***Yes***	127	28.5	4.8	17.3	4.2	17.4	4.2
– ***No***	254	28.4	4.1	16.1	4.3	17.1	4.3
Pregnancy Experience:							
– ***Easy***	250	28.4	4.4	16.4	4.2	17.3	4.2
– ***Difficult***	108	28.6	4.3	16.8	4.6	16.8	4.4
– ***Don't Know***	23	27.5	3.8	16.3	3.7	17.6	4.7
Postpartum Concerns							
– ***Yes***	121	28.7	3.8	17.6	4.3	17.3	4.2
– ***No***	270	28.1	4.7	16.0	4.2	17.1	4.3
Relationship Status:							
– **With Father of Child**	352	28.2	4.5	16.3	4.3	17.3	4.2
– **Other Relationship**	12	29.8	4.0	18.1	2.8	16.9	2.8
– **Separated**	8	29.4	2.8	18.3	2.3	14.4	5.0
– **Single**	19	29.5	4.6	18.4	4.0	16.4	5.2
Total sample	391	28.3	4.4	16.5	4.3	17.2	4.3

On the Negative Emotions subscale, Child's Age and Concerns Postpartum were significantly associated with the scores. Mothers whose child was 12 months and under (Beta = -.32, *p* = .001) or between 19 to 24 months (Beta = -.16, *p* = .04) scored 11% to 8% lower on the subscale than mothers with child over 49 months. Mothers with Concerns Postpartum (Beta = .16, *p* = .01) scored 6% higher on the subscale than mothers without concerns.

On the Future Aspirations subscale, Relationship Status and Child's Age were significantly associated with scores. Mothers who were separated (Beta = -.15, *p* = .02) scored 19% lower, and mothers who were single (Beta = -.13, *p* = .04) scored 10% lower on the subscale than mothers in a relationship with the father of their child. Additionally, mothers with a child between 13 to 18 months old (Beta = -.21, *p* = .01) and 19 to 24 months old (Beta = -.31, *p* = .001) scored 10% to 16% lower on this subscale than mothers with a child over 49 months.

Interactions were noted on the Child's Mind subscale, Negative Emotions subscale and Future Aspirations subscale. On the Child's Mind subscale Planned Pregnancy changed from significant in the core model (Beta = .15, *p* = .01) to non-significant in the final model (Beta = .12, *p* = .06). This indicated that the subscale was better explained by other variables in the model. On the Negative Emotions subscale, interactions were noted with Mental Health Difficulties and Relationship Status. Mental Health Difficulties changed from significant in the core model (Beta = .12, *p* = .04) to non-significant in the final model (Beta = .11, *p* = .07). Similarly, Single (Relationship Status) changed from a significant variable in the initial analysis (Beta = .11, *p* =.04) to a non-significant variable in the final model (Beta = .05, *p* = .44). This indicates that the subscale was better explained by other variables in the model.

On the Future Aspirations subscale, interactions were noted with Single (Relationship Status) and Child's Age (13 months to 18 months). Single (Relationship Status) changed from being non-significant in the initial analysis (Beta = -.07, *p* = .19) to significant in the final model (Beta = -.13, *p* = .04). A review of the correlations indicated that Single (Relationship Status) had a negative relationship with Maternal Age (26 to 40 years) (*r* (293) = - .23, *p* = .001) and a positive association with Maternal Age (41 years plus) (*r* (293) = .18, *p* = .001). An exploration of the mean values, shown in Table 13, demonstrated that single mothers aged 41 and over had a lower score on the subscale than single mothers under 41 years old.

Table 13

Means, Standard Deviations and Mean Difference on the MMPQ Future Aspirations Subscale for Relationship Status and Maternal Age (41+ years)

	Maternal Age (years)				
Variable	**Under 41**		**41+**		**Under 41 vs 41+**
Relationship Status (*n*)	*n* (%)	M (SD)	*n* (%)	M (SD)	MD
With Father of Child (349)	318 (91)	17.3 (4.3)	31 (9)	17.2 (3.6)	0.0
Other Relationship (12)	10 (83)	17.0 (3.0)	2 (17)	16.5 (2.1)	0.5
Separated (8)	6 (75)	16.5 (3.6)	2 (25)	8.0 (0.0)	8.5
Single (18)	13 (72)	17.4 (5.5)	5 (28)	14.2 (4.5)	3.2
Total (387) a	347 (90)	17.2 (4.3)	40 (10)	16.4 (4.1)	1.0

[a]4 missing cases in maternal age due to participant data entry error.

The interaction observed between the Future Aspirations subscale and Child's Age (13 months to 18 months) was explored further by systematic removal of the variables added to the final model. It was observed that Child's Age (13 months to 18 months) was significantly associated with the Future Aspirations subscale with either Maternal Age or Child's Age entered into the model. This suggested that Child's Age (13 months to 18 months) interacted with both of these variables.

The relationship with Child's Age (13 months to 18 months) and Maternal Age was explored first. To do this the variables Child's Age and Maternal Age were collapsed into three groups to allow for better observation of the trends within the scores. The mean values for these categories can be seen in Table 14. This table demonstrated that, regardless of the child's age, mothers aged 18 to 22 years had the highest score on the Future Aspirations subscale. Taking into account Child's Age, mothers aged 41 and over, with a child less than 13 months scored the highest on the subscale within that age category. For mothers over 22 years old, the lowest scores were for those with a child aged 13 to 24 months.

Table 14
Means, Standard Deviation and Mean Difference on the MMPQ Future Aspirations Subscale for Child's Age and Maternal Age

	Maternal Age (years)								
Variable	**18 - 22**		**23 - 40**		**41 +**		**18 - 22 vs 23 - 40**	**18 - 22 vs 41 +**	**23 - 40 vs 41 +**
Child's Age (months)	***n (%)***	**M (SD)**	***n (%)***	**M (SD)**	***n (%)***	**M (SD)**	**MD**	**MD**	**MD**
12 & under[a]	6 (5)	18.2 (3.6)	106 (92)	17.0 (4.4)	3 (3)	18.3 (2.1)	1.2	-0.2	-1.3
13 – 24[b]	4 (5)	18.8 (1.3)	71 (90)	15.4 (4.3)	4 (5)	14.8 (3.8)	3.4	4.0	0.6
25+[c]	3 (3)	18.0 (2.7)	79 (74)	17.7 (3.8)	25 (23)	16.1 (4.7)	0.3	1.9	1.6
Total[d]	13 (4)	18.3 (2.7)	256 (85)	16.7 (4.3)	32 (11)	16.1 (4.4)	1.6	2.2	0.6

Note MD = Mean Difference
[a] *n = 115.* [b]*n* = 79. [c]*n = 107.* [d]*n = 301 with 90* cases missing due to a technical errors with entering child's age

Following from the exploration of the relationship between Child's Age (13 months to 18 months) and Maternal Age, the relationship between Child's Age (13 months to 18

months) and Relationship Status was examined. The variables Child's Age and Relationship Status were collapsed to allow for better observation of the trends with in the scores. The mean values for these categories can be seen in Table 15. Overall this demonstrated that regardless of the age of the child, mothers who were not in a relationship scored lower on the Future Aspirations subscale than mothers in a relationship. However, mothers not in a relationship scored higher on the subscale than those in a relationship if their child was 12 months and under. Finally, regardless of the Relationship Status of the mothers, those whose child was aged 13 to 24 months scored lower on the subscale than mothers with a child of any other age.

Table 15

Means, Standard Deviations and Mean Difference on the MMPQ Future Aspirations Subscale for Child's Age and Relationship Status

Variable	In a Relationship (Yes/No)				
	Yes		No		Yes vs No
Child's Age (Months)	***n (%)***	**M (SD)**	***n (%)***	**M (SD)**	**MD**
12 & under[a]	116 (98)	17.1 (4.3)	2 (2)	18.5 (6.4)	-1.4
13 – 24[b]	78 (97)	15.6 (4.2)	2 (3)	11.0 (4.2)	4.6
25 +[c]	91 (85)	17.8 (3.7)	16 (15)	14.5 (5.0)	3.3
Total[d]	285 (93)	16.9 (4.2)	20 (7)	14.5 (5.1)	2.4

Note. MD = Mean Difference
[a] *n* = 118. [b]*n* = 80. [c]*n = 107.* [d]*n* = 305 with 86 cases were missing due to a technical errors with entering child's age

4.6. Results Summary

After an exploratory factor analysis was performed on the MMAQ, a three-factor model was produced with each factor consisting of five items. The first factor (Future Baby) had an eigenvalue of 5.69 and good reliability α =.84; the second factor (Mother Baby Interaction) had an eigenvalue of 1.30 and good reliability α =.81; and the third factor (Baby's Feelings) had an eigenvalue of 1.09 and good reliability α =.81. Overall the MMAQ had excellent reliability α =.95. A brief summary of the variables associated with the MMAQ and its subscales is provided in Table 16.

Table 16.
Summary of Variables Associated with the MMAQ

MMAQ	Associated Variables	Description of Interactions
Future Baby	– Maternal Age	
	– Difficult Pregnancy	
	– Unemployment	
	– Mental Health	
	– Unemployment* Mental Health	Unemployed mothers without a mental health difficulties had the lowest subscale score
Mother Baby Interaction	– Maternal Age	
	– Gestational Age (AS)	
Baby's Feelings	– Maternal Age	
	– Gestational Age	
MMAQ Total Score	– Maternal Age	
	– Gestational Age	
	– Difficult Pregnancy	
	– Difficult Pregnancy* Employment	Unemployed mothers scored lower than homemakers. Unemployed mothers who did not have a difficult pregnancy had the lowest score.

Note. AS = Approaching significance;

After an exploratory factor analysis was performed on the MMPQ a three-factor model was produced. The first factor (Child's Mind) consisted of six items, had an eigenvalue of 3.20, and had satisfactory reliability α =.74. The second factor (Negative Emotions) consisted of five items, had an eigenvalue of 1.48, and had satisfactory reliability α =.70. The third factor (Future Aspirations) consisted of five items, had an eigenvalue of 1.02, and had low reliability α =.65. A brief summary of the variables associated with the MMAQ and its subscales is provided in Table 17.

Table 17.
Summary of Variables Associated with the MMPQ

MMPQ	Associated Variables	Description of Interactions
Child's Mind	– Child's Age: 12 months & under – Unplanned Pregnancy (AS)	
Negative Emotion	– Child's Age: 12 months and under – Child's Age: 19 to 24 months – Postpartum Concerns – Mental Health (AS)	
Future Aspirations	– Child's Age: 12 months and under (AS) – Child's Age:13 to 18 months – Child's Age:19 to 24 months – Maternal Age: 41 years+ (AS) – Relationship Status: Separated – Relationship Status: Single	
	– Single * Child's Age	Mothers with a child aged 13 to 24 months who were not in a relationship had the lowest score.
	– Single * Maternal Age	Single Mothers, over 41 years scored the lowest on the subscale.
	– Maternal Age * Child's Age	Mothers aged 18 to 22 years scored the highest. Mothers with a child aged 13 to 24 months who were over 41 years old had the lowest score.

Note. AS = Approaching Significance

5. Discussion

The development of attachment theory (Bowlby, 1958) has been seminal in understanding the mother-infant relationship and the consequences of this relationship through life. Since this theory was proposed, much research has focused on the way in which attachment is transmitted from the mother to the infant. One concept that is thought to be important in explaining the transmission of attachment is MM. MM has been found to significantly predict mother-infant attachment (Meins, 2013; Meins et al., 2012), have important implications for infant outcomes (Bernier et al., 2010; Kondel-Laws & Greenwood, 2014; Meins, Fernyhough, et al., 2013), and improve the quality of mother-infant relationships (McMahon & Meins, 2012).

The association between MM and improved outcomes for the infant and parenting relationship has led to the suggestion that MM should form the basis of parenting interventions. Despite this, only one randomised controlled study has explored MM's amenability to change via intervention (Kondel-Laws & Greenwood, 2014). This demonstrated that a three-hour mentalization-based antenatal intervention could: improve levels of MM; reduce hostility in the parenting relationship; increase the pleasure taken by parents in their interactions with their infants (Kondel-Laws, Parkinson, Hensman and Laws, 2012); and improve cognitive outcomes for the infant at 33 months (Kondel-Laws and Greenwood, 2014). These studies highlight the importance of increasing the accessibility of interventions to mothers which can increase levels of maternal MM.

A recent review of measures assessing the mother's capacity to recognise the mental states of the infant highlighted the cumbersome and time consuming nature of these measures (Schiborr et al., 2013). It was suggested that the lack of an expedient method of measuring this ability may be suppressing research in this area (Schiborr et

al., 2013). This indicates the clear need for the development of an expedient measure of MM. Furthermore, in light of recent interest in antenatal MM and evidence that MM is amenable to change in the antenatal period, it was felt that an expedient measure of MM was needed for use both after birth and during pregnancy. Such measures could be used to identify mothers who are low in MM before and after birth in order to provide targeted interventions, track the trajectory of MM from conception to after birth, and evaluate antenatal and postpartum interventions.

To the best of the researcher's knowledge this is the first study to investigate the development of two MM questionnaires for use in the antenatal and postpartum periods. This was an exploratory study which set out to address the following research aims: 1) to explore the concept of MM in a structured self-report questionnaire format in the antenatal and postpartum period, 2) to explore the internal consistency and structure underlying the MMAQ and MMPQ, and 3) to start to establish the external validity and reliability of the MMAQ and MMPQ.

The aims of the study were addressed by conducting an exploratory factor analysis and reliability analysis on the MMAQ and MMPQ, followed by a hierarchical multiple regression analysis to explore the variables associated with the questionnaires. The final structure of the MMAQ and MMPQ that resulted from the analysis can be seen in Table 18. The MMAQ had three subscales: (1) the Future Baby subscale, (2) the Mother Baby Interaction subscale, and (3) the Baby's Emotions subscale. Each subscale was comprised of five items. Similarly, the MMPQ had three subscales: (1) the Child's Mind subscale, (2) the Negative Emotions subscale, and (3) the Future Aspirations subscale. The Child's Mind subscale comprised of six items and the other two subscales comprised of five items.

Table 18 The Subscales and Items Included in The MMAQ and MMPQ

MMAQ		MMPQ	
Subscale	**Items**	**Subscale**	**Items**
Future Baby	8. I think my baby will be clever when they grow up 18. I imagine my baby will be creative when they grow up 4. I think about what my baby will want to do when they grow up 24. I imagine my baby will be loving as they grow up 20. I wonder what my baby will remember from their childhood	**Child's Mind**	39. I think my child will be thoughtful of others as they grow up 18. I think my child will be creative when they grow up 35. I think my child learns from the way I behave 17. I wonder what my child thinks about 14. I think my child gets excited 32. I think my child has ideas about what they want to do
Mother Baby Interaction	31. I think my baby enjoys hearing my voice 35. I think my baby has learnt to recognise my voice 11. I think my baby is comforted when I touch my tummy 26. I think my baby is learning while they are inside me 32. I wonder how my baby feels when I am stressed	**Negative Emotions**	29. I think my child gets annoyed when I do certain things 19. I think the way my child behaves shows me that they are irritated 38. I worry that my child is sad 25. I think my child is being stubborn 12. I think my child becomes worried in new situations
Baby's Feelings	19. I wonder if the way my baby moves tells me that they are irritated 29. I think my baby gets annoyed when I move in certain ways 7. I wonder what kind of mood my baby is in 14. I think my baby gets excited 17. I wonder what my baby thinks about inside me	**Future Aspirations**	4. I think about what my child will want to do when they grow up 10. I wonder what social activities my child will be involved in as they grow up 23. I wonder if my child will make friends as they grow up 28. I wonder if my child will grow up to be good looking 40. I think about how tall my child is

The following section will discuss the final factor structure of the MMAQ and MMPQ. It will subsequently consider the external reliability and validity of the MMAQ and MMPQ. The MMAQ and MMPQ will be considered in parallel through the discussion to allow for a comparison of the two measures. Finally, the section will end with a discussion of the clinical implications, study limitations and recommendations for future research.

5.1. The Final Factor Structure of the MMAQ and MMPQ

5.1.1. The Future Focus of MM in the MMAQ and MMPQ

Previous research found that the ability of expectant mothers to think about their foetuses as separate entities in the future was salient to antenatal MM and had a strong association with postpartum MM (Arnott & Meins, 2008). Following the analysis of the MMAQ and MMPQ, both questionnaires included future focused items. In the MMAQ, the Future Baby subscale was the only subscale to represent future focused items, and this subscale explained the greatest proportion of the variance in the data. The development of the Future Baby subscale in the MMAQ in part supports Arnott and Meins (2008) findings, namely that the ability of the mother to think of their child in the future is salient to antenatal MM.

As well as the importance of future focus, Arnott and Meins (2008) found it was not the recognition of the mind of the foetus in the future that was important for the development of postpartum MM but simply the acknowledgement of the foetus as a separate entity in the future. This is in contrast to the Future Baby subscale, as all items within the subscale include reference to the mind of the foetus in the future. This may mean that the Future Baby subscale does not measure antenatal MM.

However, an alternative hypothesis could be that the adapted offline MM measure used by Arnott and Meins (2008) may have failed to tap into an expectant mother's thoughts about the mind of their foetus in the future. For example, it has been suggested that individuals do not always spontaneously use their ToM abilities to attribute mental states to individuals (Apperly, Riggs, Simpson, Chiavarino, & Samson, 2006; German & Cohen, 2012; Meins et al., 2014). Therefore, directly probing this capacity via the MMAQ may be a more accurate assessment of the mother's ability to infer the mental states of the foetus in the future. Thus suggesting the Future Baby subscale may measure antenatal MM.

Another interesting finding in relation to the MMAQ was the development of the two other subscales: Mother Baby Interaction and Baby's Feelings, both of which contained only items focused on the present. This could suggest that the mother's ability to think about the mind of their foetus during pregnancy is important for antenatal MM. This is in contrast to the finding of Arnott and Meins (2008) that future predictions were of primary importance to MM. However, Arnott and Meins's (2008) findings could be due to participants in their study only being asked to describe their foetus in the future rather than in the present. Thus the development of the MMAQ may shed further light on antenatal MM and demonstrate that the ability of the mother to think about the mind of their foetus during pregnancy may also be an important for MM.

In the MMPQ, future focused items also affected the structure of the questionnaire. The Future Aspirations subscale included items solely focused on the future, and the Child's Mind subscale contained two future focused items. Interestingly, the future focused items included in the Future Aspirations subscale focused purely on behavioural and physical thoughts about the child in the future. This subscale was not deemed to represent MM due to the lack of recognition of the mind of the foetus, and instead was thought to represent a parents' concerns and wishes for their child in the

future. In contrast, the future focused items in the Child's Mind subscale made clear reference to the infant's mind and the subscale was deemed to represent MM. In support of the idea that the two subscales represent different concepts, no relationship was found between the subscales during the analysis. The inclusion of these subscales in the MMPQ will allow for further assessment of the relationship between these concepts.

The inclusion of future focused items in the MMPQ Child's Mind subscale was unexpected. Postpartum MM focuses on a mother's ability to recognise the mental states of their infant in the present rather than in the future (Meins & Fernyhough, 2010). However, considering the importance of future focus in antenatal MM it could be suggested that the inclusion of mothers with very young infants under one month old in this study could have led to future focused items entering the questionnaire: mothers of very young infants may still be transitioning from the use of antenatal MM to postpartum MM. To date no study has assessed MM in mothers with infants under three months old (Meins et al., 2011). The inclusion of future focused items in the MMPQ may allow for the assessment of MM in mothers of much younger infants than have been assessed in previous MM studies.

5.1.2. Valence in the MMAQ and MMPQ

Coding the valence of MM comments is thought to be an important step in the refinement of measuring MM (Demers et al., 2010b; Meins & Fernyhough, 2010). The valence of MM comments has been associated with mother-infant attachment, maternal sensitivity, and the use of child mental health services (Demers et al., 2010a; Demers et al., 2010b; Walker et al., 2012). Therefore, items of different valence were included in the MMAQ and MMPQ. However, in the final structure of the questionnaires valence was represented differently.

In the MMAQ, the valence of items did not appear to significantly impact on the structure of the questionnaire. Positive, neutral and negative items were spread throughout the questionnaire (although only three negative items were included). Items of a negative valence were primarily the first to be excluded from the MMAQ during its development. This suggested that few participants reported having negative thoughts about their foetus.

There could be several reasons for the lack of negative valence items in the MMAQ. For example, previous postpartum MM studies have suggested that the use of negative online MM comments is associated with insecure mother-infant attachment and low maternal sensitivity (Demers et al., 2010a; Demers et al., 2010b), whereas the use of neutral MM comments has been associated with a secure mother-infant attachment relationship and secure adult attachment style (Demers et al., 2010a; Demers et al., 2010b). This could suggest that the MMAQ sample was characterised by securely attached expectant mothers. This may have biased the selection of items included in the MMAQ and led to the exclusion of many items with a negative valence.

An alternative hypothesis would be that, participants' failure to endorse items of a negative valence may have been due to social desirability bias. This is when a participant wishes to answer questions in a way they perceive will be viewed positively by society (DeVellis, 2012). This has been found to affect other antenatal measures (Van Bussel, Spitz, & Demyttenaere, 2010). However, the inclusion of negatively worded items in the Baby's Feelings subscale suggests that this may not be the case. Nevertheless, the lack of negative valence MM items in the MMAQ may mean that the MMAQ is less able to identify mothers in need of support.

Unlike the MMAQ, the structure of the MMPQ was strongly influenced by the inclusion of valence items. Negative items were purely represented in the Negative Emotions subscale, with the Child's Mind subscales reflecting positive and neutral valence. The lack of relationship between these subscales may suggest that they are measuring different concepts. Similarly, research into online appropriate and non-attuned MM comments has found these types of comments to be unrelated to each other (Meins et al., 2012). Meins et al. (2012) suggested that non-attuned MM comments represented an inability on the part of the mother to attune to their infant's mind. On the MMPQ it could be hypothesised that a particularly high score on the Negative Emotions subscale could highlight mothers who are not attuned to their infants. Thus, the inclusion of valence terms in the MMPQ may enable mothers to be identified that not only struggle to recognise their infant as a separate entity with their own mind, but, at a subtle level, fail to accurately identify their infants mental states (Demers et al., 2010a; Demers et al., 2010b).

5.1.3. PRF in the MMAQ and MMPQ

The relationship between PRF and MM has not been explored a great deal in the research literature. Although PRF and MM have different theoretical underpinnings, both focus on the ability of the mother to acknowledge the mental states of the infant. MM focuses on the mother's ability to know the mind of the infant and respond appropriately, whereas, PRF takes this a step further and indicates that mothers who are high in PRF are able to recognise the complex interaction between their infant's and their own mental states as well as the interaction of these states with behaviour (Slade, 2005).

In the MMAQ, there was some indication that PRF was reflected in the items that constituted the Mother Baby Interaction subscale. The items in this subscale

demonstrated that mothers were not only thinking about the mind of the child but also about how their behaviours and emotions influenced the infant's internal states. This seemed to take the expectant mothers thoughts beyond MM, and could be considered a form of PRF. Interestingly, this subscale had a strong association with the other two subscales in the MMAQ that were thought to represent MM. This could suggest that MM and PRF may be alternative operationalisations of the same underlying concept.

In the MMPQ, two items (items 35 and 29) also seemed to reflect a form of PRF. These two items loaded onto the Child's Mind and Negative Emotions subscales, both of which were felt to primarily reflect MM. This finding on the MMPQ supports that of the MMAQ and suggests that PRF and MM could be considered related concepts.

To date the relationship between reflective function and MM has been explored by two studies. Arnott and Meins (2007) found that mothers with high adult reflective function used fewer online non-attuned MM comments than mothers with low adult reflective function. Additionally, a study by Roenblum, McDonough, Sameroff and Muzik (2008) found that PRF in mothers with seven month old infants was positively associated with online appropriate MM comments and that PRF explained a significant degree of variance in parenting behaviour over and above MM. However, there were methodological issues with these two studies. For example, Arnott and Meins (2007) had a small sample size and Roenblum, McDonough, Sameroff and Muzik (2008) failed to code for non-attuned MM comments. This suggests that further research is needed to clarify the relationship between the two concepts.

5.2. External Validity and Reliability of the MMAQ and MMPQ

To start to establish the external validity and reliability of the MMAQ and MMPQ, the variables associated with the questionnaires and their subscales were explored. The

MMAQ was found to be associated with maternal age, gestational age, the experience of pregnancy, employment, and mental health. Whereas the MMPQ was found to be associated with the age of the child, pregnancy planning, concerns about the child after birth, mental health difficulties, maternal age, and relationship status. This section will focus the discussion on the most salient topics in relation to MM and the use of the MMAQ and MMPQ in clinical practice.

5.2.1. MM and Relational Closeness

Recent studies have suggested that MM finds its origins in relational closeness rather than as an internal trait within the mother. Meins, Fernyhough and Harris-Waller (2014) found mothers who used offline MM in their descriptions of their infants were more likely to use MM when describing their romantic partners and close friends. However, the proportional use of MM comments made in the descriptions of their close adult relationships was lower than that of their infant. This suggests that MM can change depending on the closeness of the relationship. The fact that MM is a dynamic rather than static concept is supported by the finding that MM is amenable to change through intervention (Kondel-Laws & Greenwood, 2014; Kondel-Laws et al., 2012).

Relational closeness was found to influence the scores on the MMAQ and MMPQ. On the MMAQ, scores on the MMAQ total score and Baby's Feelings subscale increased with the gestational age of the foetus. This suggests that, as the mother becomes more aware of the foetus through pregnancy, the relational closeness increases. In time mothers start to think more about the foetus as a separate entity with a mind as well as the specific emotions of the foetus. No other study has examined the relationship between MM and gestational age so these findings cannot be compared. However, research into MFA has consistently found that the attachment between mother and foetus increases with gestational age (Yarcheski et al., 2009). This finding adds to the

evidence of the external validity of the MMAQ and supports the idea of MM as a concept affected by relational closeness.

Interestingly, the MMAQ Future Baby subscale was the only subscale in the MMAQ to be unaffected by gestational age. Past research has suggested that the ability of the mother to think about the foetus in the future predicts postpartum MM. This could suggest that relational closeness does not impact on the use of antenatal MM. However, there are two difficulties with the study by Arnott and Meins (2008): mothers were only asked about their infant in the future and the study was only conducted in the last trimester of pregnancy. Thus the study was unable to ascertain the importance of present thoughts to postpartum MM or consider how antenatal MM changed over the course of pregnancy. Therefore, further research is needed to clarify the relative contribution of future focused and present focused antenatal thoughts to postpartum MM and how this may alter over pregnancy.

On the MMPQ, the effect of relational closeness on MM was also apparent. Scores on the Child's Mind and Negative Emotions subscales, both thought to measure forms of MM, were lower when mothers had a child in the first year of life in comparison to mothers with an older child. In support of this, several studies have found that mothers of younger infants use proportionally fewer MM comments overall than mothers of older children in offline and online measures of MM (Farrow & Blissett, 2014; Meins et al., 2011). This finding was related to the increasing ability of infants to communicate their mental states in the early years of life (Meins et al., 2011). However, studies have shown that a mother's MM comments are not associated with the expressive verbal abilities of the child (Meins, Fernyhough, et al., 2013). This suggests it is not the expressive verbal ability of the infant that contributes to the increased use of MM.

An alternative hypothesis could be that the increase in MM in the first year of life could be due to the development of relational closeness. Mothers are programmed biologically to be preoccupied with the foetus and infant. However, an affectional bond with an infant does not constitute an attachment bond (Ainsworth, 1989). It could be that thought that the reciprocal interaction, starting in pregnancy, develops the internal working models of the mother's relationship with the infant. Therefore, the increase in MM seen on the MMAQ and MMPQ could be due to MM facilitating the development of the internal working model of the mother-infant relationship. However, it should be noted that this study was cross-sectional, which means that longitudinal research is needed to confirm this hypothesis.

While, the association between relational closeness and MM is interesting it should not necessarily be taken as evidence that MM does not represent a trait construct. Traits are thought only to be relatively stable overtime and within contexts (Haslam, 2007). The fact that an individual may not use MM in the description of people whose mind they do not know or objects, should not negate the possibility that MM is a relatively stable construct (Meins, Fernyhough, & Harris-Waller, 2014). In support of this MM has been found to be relatively stable in mothers descriptions of their infants, with mothers who have a propensity to use MM continuing this trend over time and between close relationships (Meins, Fernyhough, Arnott, Turner, & Leekam, 2011; Meins et al., 2014; Meins et al., 2003).

MM might be best thought of as a cognitive schema, that is, a cognitive structure developed by the mother based on relationships and experiences early on in life (Beck & Alford, 2009). Schemas or core beliefs are thought to remain relatively stable over time and are only activated by specific situations (Beck & Alford, 2009). These schema are thought to guide attitudes and behaviours of the individual and have been shown to be related to individuals attachment styles (Mason, Platts, & Tyson, 2005). Thus, it could be

proposed that a mothers' propensity to use MM is linked to her own schemas about the importance of the recognition of the mind of another in relationships. In support of this mothers who use a higher number of non-attuned MM comments during interactions with their infant have been found to have infants who use less internal state talk (Meins, Fernyhough, Arnott, Leekam, & de Rosnay, 2013). Unhelpful early experiences of others misinterpreting your internal states may lead to low levels of MM in mothers. Further research should explore the use of MM across family generations to determine if the recognition of the mind of the infant is present in family members and the relationships between schema's and MM.

5.2.2. MM and Mental Health

Mental health difficulties have been found to increase the risk of insecure attachment (Hipwell, Goossens, Melhuish, & Kumar, 2000; Wan & Green, 2009). Therefore, determining the process by which this occurs is salient to the development of interventions. It could be hypothesised that a mental health difficulty may make it more challenging for mothers to use MM due to preoccupation with their own distress or a bias towards negative attributions. However, to date, the relationship between mental health and MM is inconclusive. For example, postpartum MM has been shown in several studies to have no relationship with mental health difficulties (Pawlby et al., 2010; Walker, Wheatcroft, & Camic, 2012), whereas other studies have found a weak relationship with an increase in the use of non-attuned comments (Meins, Fernyhough, Arnott, Turner, & Leekam, 2011), or a lower proportional use of MM comments (Lok & McMahon, 2006; Schacht, Hammond, Marks, Wood, & Conroy, 2013). The range of findings in this area could be due to a number of factors including: differing severity of mental health symptoms; different types of mental health difficulties; and different assessment methods.

In this study, mothers who reported a mental health difficulty had a higher score on the MMAQ Future Baby subscale. This indicates that mothers who had experienced a mental health difficulty thought more about their foetus in the future. However, no other study has yet explored the relationship between antenatal MM and mental health. It could be hypothesised that the high score on the Future Baby subscale represents a failure to attune to the mind of the foetus. Stern (1995) indicated that a reduction in the imagining of a future infant is adaptive later in pregnancy to prevent discord between the imagined and actual infant. Furthermore, Meins et al., (2011) found that mothers who did not report a positive experience when first meeting their infant used a higher number of non-attuned MM comments. Thus, spending time imagining or perhaps idealizing the future infant could potentially lead to disappointment if the experience of the actual infant does not meet previous expectations. This could be one mechanism by which mental health difficulties impact on the beginnings of the mother infant attachment relationship.

However, Arnott and Meins (2008) found that the ability to make predictions about the foetus in the future is associated with postpartum appropriate MM. This leads to the alternative hypothesis that the experience of mental health difficulties increases an expectant mother's awareness of the mental states of their foetus. This may allow the mother to make more predictions about the foetus in the future, and generally enable an increased ability to think of the foetus as a separate entity with a mind. However, it should be noted that mental health difficulties in this study were collected by self-report and participants were only asked to indicate if they had experienced a mental health difficulty at some point in their life. Therefore, participants who indicated a mental health difficulty may not have been experiencing symptoms at the time of the study. This may mean that expectant mothers experiencing a current episode of mental health difficulties may show a different response pattern to that in this study.

On the MMPQ, mothers who reported a mental health difficulty scored no differently on the Child's Mind subscale. Only one MM study has considered the valence of MM comments and mental health. This study only used positive MM comments in the analysis and found no relationship with depression scores (Demers et al., 2010a). This provides support for the findings of this study as no relationship was seen with the Child's Mind subscale, which includes positive and neutral MM items.

Additionally, it was found that mothers who reported a mental health difficulty showed a trend towards higher scores on the Negative Emotions subscale. This suggests that mothers who reported a mental health difficulty interpret the infant as experiencing a greater number of negative emotions. To date no study has considered the relationship between mental health difficulty and MM comments of a negative valence. Looking to related concepts, a review by Vreewijk, Maas and Van Bakel (2012) demonstrated that mothers with a mental health difficulty were more likely to be classified as having a distorted maternal representation of their infant, characterised by higher attributions of negative emotions than those without a mental health difficulty. This suggests that the MMPQ is sensitive to a mother's attributions of their infant's mental states, and adds weight to the idea of the MMPQ as a valid measure.

5.2.3. MM and SES

Factors other than mental illness have been found to impact on the mother infant relationship. For example, mothers from low SES have been found to be more distant and detached from their children (van Oort, van der Ende, Wadsworth, Verhulst, & Achenbach, 2011). However, research into MM and SES has been mixed: one study found that mothers of low SES used fewer appropriate online MM comments (Meins et al., 2011), whereas other studies have found no relationship with any measure of MM

(Meins, 1998; Meins, Centifanti, et al., 2013). While Meins, Centifanti et al. (2013) also found no difference in MM between high and low SES groups they did find that mothers of low SES with high MM were less likely to have children with behavioural difficulties. This suggests that although MM may not explicitly differ between mothers of high and low SES, that in adverse circumstance MM can act as a protective factor. This suggests that mother of low SES may benefit from an intervention using MM.

In this study, although the SES of the participants was not calculated, employment status could be taken as an approximate measure. On the MMPQ, employment status had no effect on the scores of any of the subscales. This both supports the findings of Meins et al. (2013) and adds to the validity of the MMPQ as a measure. However, on the MMAQ, mothers who were unemployed scored significantly lower on the Future Baby subscale. Additionally, unemployed mothers who did not have a difficult experience of pregnancy had considerably lower scores on the MMAQ total score in comparison to mothers who were employed or homemakers. This suggests that, unemployed mothers and in particular those with an easy experience of pregnancy, struggle to think about their foetus as a separate entity with a mind in the antenatal period.

The finding that the MMAQ is associated with an approximate measure of SES is in contrast to many postpartum MM studies that have found no such relationship. The discrepancy in findings could be due to several factors. For example, it may be that thinking about the foetus in the future is a particularly difficult task for unemployed pregnant mothers, perhaps due to concerns about how they will manage in the future. Moreover, once the infant is born, they may be more able to think about the mind of the infant in the present moment without a need to look to the future. Therefore, it may be the future focus of the Future Child subscale that results in the lower scores for unemployed expectant mothers.

An alternative hypothesis could be that employment status is not equivalent to measures of SES used in previous studies. Meins, Centifanti, et al. (2013) compared MM in low and high SES groups. They classified those mothers who were either unemployed or employed in unskilled work into the low SES group. It may be that the unemployed mothers in this study represented a particularly deprived population and that this is not identified when employed and unemployed mothers are combined into a low SES group. This may suggest that unemployed mothers are at greater risk of low MM and may benefit from support.

5.2.4. MM and Maternal Age

The impact of maternal age on MM has not been widely reported in the literature. To date only two studies have explored the relationship between MM and maternal age (Demers et al., 2010a and b). These studies looked specifically at MM in adolescent parents and found that mothers over 20 years old used more appropriate and positive online MM comments and more neutral offline MM comments in comparison to adolescent mothers aged 20 years and under (Demers et al. 2010a and b). These findings are concordant with the suggestion that adolescent mothers are more likely to have an insecure attachment relationship with their babies in comparison to adult mothers (Borkowski et al., 2002). While these findings are interesting, other studies exploring MM do not report a relationship between maternal age and MM, and it is unclear if this is due to a lack of an observable relationship or a failure to explore the relationship. Hence the association between MM and maternal age is relatively unknown.

In this study the effect of maternal age differed across the MMAQ and MMPQ. On the MMAQ older mothers scored lower across all subscales in comparison to younger mothers, which suggests that older mothers think less about the mind of the baby

during pregnancy. This finding contradicts Demers et al.'s (2010a and b) postpartum MM studies, which suggested that younger mothers have lower levels of MM than adult mothers. One explanation for this could be that mothers think differently about their infant during pregnancy than after birth. In support of this idea Arnott and Meins (2008) found it was the mother's ability in pregnancy to think about the infant in the future as a separate entity rather than specifically thinking about the mind of the infant that was associated with MM after birth. Additionally, other measures of maternal representations such as the WMCI used in pregnancy has suggested that there may be some change in these representations after birth (Benoit, Parker, & Zeanah, 1997). While no other study has looked at the impact of maternal age on MM in the antenatal period, studies of MFA have found that older mothers are less preoccupied with their baby during pregnancy (Damato, 2004; Van Bussel, Spitz, & Demyttenaere, 2010). It would, therefore, be anticipated that antenatal MM should be associated with MFA and so the relationship between antenatal MM and maternal age in this study may be evidence of the validity of the MMAQ as a measure of antenatal MM.

Understanding the reasons why women decide to delay motherhood may be helpful in determining why older mothers think less about the mind of their baby during pregnancy. It has been suggested that older mothers decide to conceive due to concerns about an increased risk to them and the baby if they delay motherhood any further. This means that mothers may conceive at a time that does not fit with their life plans (Locke & Budds, 2013). Additionally, households of older mothers have been found to be more chaotic, which has been linked to increased parent child conflict (Barnes, Gardiner, Sutcliffe, & Melhuish, 2014). It could be that older mothers experience increased demands due to managing careers and parenting or feeling forced into motherhood due to concerns about risk factors. Therfore it is likely that , older mothers spend less time thinking about the mind of their baby during pregnancy because of a lack of time or because of a concern that they may lose the baby during

the pregnancy. It could also be hypothesised that a lack of preoccupation with the baby during pregnancy is adaptive for older mothers considering the increased risk of baby mortality to mothers over 35 years old (Vohr et al., 2009).

While it appears that older mothers think less about the mind of the infant during pregnancy, an alternate view may be that younger mothers are particularly preoccupied with the infant. Women who enter motherhood earlier in life may choose this path as an alternative to education or a career (Bonell et al., 2005; Borkowski et al., 2002). Furthermore, adolescent mothers have been shown to have lesser knowledge about child development and parenting than older mothers (Borkowski, Farris, & Whitman, 2007). This may lead to younger mothers idealizing the infant rather than having realistic expectations of motherhood. Thinking about the idealized infant during pregnancy may not mean that in the context of parenting after birth they are more able to think about the mind of the infant.

On the MMPQ, maternal age had no relationship with the Child's Mind or Negative Emotions subscales. These subscales are thought to measure MM and this suggests that the age of the mother does not impact on the mother's ability to think about the mind of the baby in the postpartum period. This could add to the evidence of the MMPQ being a valid and reliable measure of offline MM since other MM studies have not reported a relationship between maternal age and postpartum MM. It indicates that, while older mothers think less about the mind of their baby during pregnancy, this does not adversely impact on their ability to think about the mind of the baby in the postpartum period. Indeed older mothers have been found to use less harsh discipline when parenting, and their children have been found to have accelerated language development in comparison to children born to younger mothers (Sutcliffe, Barnes, Belsky, Gardiner, & Melhuish, 2012). Therefore, during pregnancy, it may be that there is a certain level of antenatal MM that represents 'good enough' MM. Alternatively, it

could be hypothesised that, once a mother successfully gives birth to their baby, they are able to activate their ability to use MM. This suggests that levels of antenatal MM may not directly correspond with postpartum MM.

One subscale on the MMPQ, Future Aspirations, which was not thought to measure MM, was related to maternal age. This indicated that older mothers thought less about their concerns and wishes for their child in the future in comparison to younger mothers. In particular, older mothers who were not in a relationship thought the least about their wishes and concerns for their baby in the future. This finding is interesting as it has been suggested that older mothers often delay pregnancy due to waiting to find the right partner (Cooke, Mills, & Lavender, 2012). It could be postulated that this group of older single mothers may have forgone waiting for the right partner and proceeded with pregnancy due to concerns about biological risk factors. However, ann alternative hypothesis would be that this group of mothers have separated from their partner. The lack of a supportive partner and the demands of a career may leave mothers with less time to think about their aspirations for their child in the future. Indeed, it has been suggested that single mothers may use a more negative parenting style, which could be due to increased parenting stress (Barnes et al., 2014). This, coupled with older mothers having a more chaotic household, may mean that single older mothers may benefit from additional support.

5.3. Clinical Implications

MM was developed to explain the transmission of attachment between the mother and infant (Meins, 1997, 2013). Since its conception, high use of MM comments by mothers has been demonstrated to be associated with secure mother-infant attachment, sensitive maternal parenting, low levels of hostility in the parenting relationship, the reduced likelihood of behavioural difficulties in children from families of low SES, and improved cognitive abilities in infants (Kondel-Laws & Greenwood, 2014; McMahon & Meins, 2012; Meins, Centifanti, et al., 2013; Meins et al., 2012; Meins et al., 2002). This clearly demonstrates the importance of MM not only to the development of a secure mother-infant attachment but to a number of other parenting and infant outcomes.

The amenability of MM to change was one debate that may have been holding back the development of MM based interventions. However, one study has already demonstrated that MM can change via intervention and demonstrated improved outcomes for the parenting relationship and infants (Kondel-Laws & Greenwood, 2014). This clearly paves the way forward for further research into interventions with high risk populations and the move towards preventative rather than reactive interventions to stop the cycle of intergenerational transmission of insecure attachment (Allen, 2011; Munro, 2011; Wave Trust, 2013).

This study has looked to facilitate the development and use of MM interventions by the development of two MM questionnaires for use in the antenatal and postpartum period. The next section will outline the implications of the questionnaires for assessment and intervention, as well as the additional findings of the study.

5.3.1. Implications for Assessment

After further validation the MMAQ and MMPQ could be used as a screening tool in the

antenatal and postpartum period. The MMAQ could be used to identify mothers low in MM in the antenatal period, to enable the provision of early, targeted preventative interventions. The development of the MMPQ will also allow for the screening of mothers low in MM at an early stage after birth, which will ensure mothers not assessed during pregnancy are identified postpartum. It is thought that identifying mothers with low levels of MM may reveal those who are likely to go on to form insecure attachments with their infants and, therefore, infants at risk of poorer cognitive outcomes, as well as behavioural difficulties.

Apart from the development of two MM questionnaires, the findings of this study may have tentative implications for the clinical assessment of MM. The relationship between gestational age and the MMAQ may indicate that MM develops through pregnancy. Mothers early in pregnancy show a greater propensity to thinking of their infants in the future, then as the pregnancy continues mothers increasing think about their infant in the present including their interactions with the infant in the womb and the mental states of the infant. This could mean that clinicians working in antenatal services may wish to assess the extent to which a mother is following this trajectory. Since observations that a mother is struggling in the antenatal period to think of the foetus as a separate entity with a mind may be indicative of mothers in need of support.

The study also highlighted that gathering the employment status of expectant mothers may be important. This is because unemployed mothers may find it more difficult in the antenatal period to think about the foetus in the future as a separate entity with a mind. It could be hypothesised that this difficulty may cause negative implications for the parenting relationship and infant outcomes in the future. Providing preventative interventions to unemployed mothers with particularly low levels of MM may be one simple way of building resilience and reducing the likelihood of poor infant outcomes,

especially when the mother-infant relationship is under pressure from other daily stressors that may come along with unemployment (Meins, Centifanti, et al., 2013).

5.3.2. Implications for Interventions

After further validation the MMAQ and MMPQ could be used as outcome measures to assess the effectiveness of MM interventions. The MMAQ could be used pre and post antenatal interventions and the MMPQ pre and post postpartum interventions. Alternatively, they could be used to track the trajectory of MM from the antenatal to the postpartum period, post intervention.

Apart from the development of two MM questionnaires, the findings of this study may have tentative implications for the focus and timing of MM interventions. There has been much debate in the literature regarding the optimal timing for intervention (Allen, 2011; Bakermans-Kranenburg, van Ijzendoorn, & Juffer, 2003; Pinquart & Teubert, 2010). Considering the current emphasis on preventative interventions and the demonstration that MM is amenable to change in the antenatal period, it seems ideal that interventions should take place at this point, although this will not always be possible.

Results from the validation of the MMAQ could suggest that a mother's ability to think about her foetus as a separate entity with their own mind develops over the course of pregnancy. This suggests that antenatal interventions based on MM could be administered in the first trimester of pregnancy to specifically encourage expectant mothers to think about their foetus as a separate entity with a mind.

Regarding the MMPQ, the clear influence of the child's age on the scores of the Child's Mind and Negative Emotions subscales may have implications for the timing of postpartum MM interventions. The finding that mothers with infants under one year old

scored significantly lower on these subscales than mothers with a child over one year old supports past research that the proportion of MM comments used by mothers increases with the age of the child (Meins et al., 2011; Meins et al., 2003). This, coupled with the finding that a mother's use of MM comments when the infant is three months old predicts the mother's use of MM at seven months old (Meins et al., 2011), indicates that postpartum MM interventions should be administered in the first year of life, if not in the antenatal period, to boost the MM capacity of the mother as the child develops.

5.4. Limitations of the study

One of the main limitations of this study is the non-probability convenience sample. The lack of control over the participants who took part in the survey means that the sample population is hard to define and may have been unrepresentative of mothers in the UK. There are several reasons to suggest that the study sample was unrepresentative: 43% of the antenatal sample and 37% of the postpartum sample reported that they had a postgraduate qualification, which indicates an unusually high level of educational attainment; only 1 to 2% of the sample were unemployed, which may indicate that the majority of the sample were of a high SES; and only 4% of mothers were non-white (26.5% of births in the UK are to mothers who were not born in the UK (Office for National Statistics, 2014)). This indicates that the mothers included in the study may have been a particularly privileged group.

During this study a forced-data entry approach was used for data collection. This approach was used to ensure that the data set was complete as missing data can be problematic to manage when conducting an exploratory factor analysis. However, the use of this approach may have contributed to the non-representative sample as participants were not able to move quickly through the survey or skip items that were not applicable to them. This may have made it less likely that particular groups of mothers would have completed the survey. For example, mothers who experience high

levels of daily hassles e.g. single mothers or mothers of low SES, mothers who are more likely to experience high levels of fatigue e.g. those with physical health or mental health difficulties, or mothers who have a tendency to spend less time considering the mind of their baby. Furthermore, this approach may have contributed to the high dropout rate from the survey (42%).

The implications of a potentially non-representative sample are that the MMAQ and MMPQ may be less suitable for use in high risk and diverse populations. It may have led to the inclusion of items in the questionnaires salient to this population such as aspirations for their child in the future and the exclusion of other items such as items of a negative valence. The relative lack of negative items in the MMAQ may make it difficult to identify mothers at particular risk of insecure attachment.

Additionally, no measure of social desirability was used in the study. Previous research has found that social desirability can influence responses on antenatal attachment self-report questionnaires (Van Bussel et al., 2010). Therefore, it is possible that social desirability affected the development of the MMAQ and MMPQ. This could have contributed to the exclusion of negative items from the questionnaire especially in the MMAQ in which many of the negative items were the first to be excluded. However, the inclusion of some negative valence items in both questionnaires suggests that this may not have adversely affected them.

5.5. Future Research

Future research should focus on conducting a confirmatory factor analysis in a large representative sample to replicate the structure of the MMAQ and MMPQ that was seen in this study. In particular, alternative structures should be considered for the MMAQ. A three factor model was retained in this study as this was an exploratory study, and the three factors retained had theoretical relevance. However, considering the number of multi-vocal items on the Future Baby subscale, and the strong

relationship between the subscales, a one factor solution should be considered in later studies.

Further work is needed to establish the validity of the scales, including convergent and divergent validity. Future studies should consider the inclusion of measures to assess the emotional availability and maternal sensitivity of the mother, levels of parenting stress, MFA, and postpartum mother-infant attachment. To ascertain the effects of social desirability on the questionnaires, a measure such as the Crown Social Desirability scale (Reynolds, 1982) should be used.

To develop the MMAQ and MMPQ as a screening tool, a prospective study should be conducted with a large sample size to establish the trajectory of mothers and their infants who were assessed as being low in MM. Cut-off points should be established for the questionnaires to identify mothers with low levels of MM, which may put them at risk of developing an insecure attachment. Additionally, to establish the questionnaires as an outcome measure, the ability of the MMAQ and MMPQ to detect change should be established. Therefore, the MMAQ and MMPQ should be used in a Randomised Control Trial and used pre and post intervention.

6. References

Aber, J. L., Belsky, J., Slade, A., & Crnic, K. (1999). Stability and change in mothers' representations of their relationship with their toddlers. *Developmental Psychology, 35*(4), 1038.

Aber, J. L., Slade, A., Berger, B., Bresgi, I., & Kaplan, M. (1985). The Parent Development Interview. Unpublished manuscript.

Agrawal, H. R., Gunderson, J., Holmes, B. M., & Lyons-Ruth, K. (2004). Attachment studies with borderline patients: A review. *Harvard Review of Psychiatry, 12*(2), 94-104. doi: 10.1080/10673220490447218

Ainsworth, M. D. (1964). Patterns of attachment behavior shown by the infant in interaction with his mother. *Merrill-Palmer Quarterly of Behavior and Development*, 51-58.

Ainsworth, M. D. (1978). *Patterns of attachment : a psychological study of the strange situation*. New Jersey ; New York ; London: [Distributed by Wiley].

Ainsworth, M. D. (1989). Attachments beyond Infancy. *American Psychologist, 44*(4), 709-716. doi: 10.1037//0003-066x.44.4.709

Ainsworth, M. D., Bell, S., & Stayton, D. (1974). Infant-mother attachment and social development: Socialisation as a product of reciprocal responsiveness to signals. In M. Richard (Ed.), *The Integration of a child into a social world* (1 ed.). London: Cambridge University Press.

Alhusen, J. (2008). A Literature Update on Maternal-Fetal Attachment. *Journal of Obstetric, Gynecologic, & Neonatal Nursing, 37*(3), 315-328.

Alhusen, J., Gross, D., Hayat, M., & Sharps, P. (2012). The influence of maternal–fetal attachment and health practices on neonatal outcomes in low-income, urban women. *Research in nursing & health, 35*(2), 112-120.

Alhusen, J., Hayat, M., & Gross, D. (2013). A longitudinal study of maternal attachment and infant developmental outcomes. *Archives of Womens Mental Health, 16*(6), 521-529. doi: 10.1007/s00737-013-0357-8

Allen, G. (2011). Early Intervention: The Next Steps.

Apperly, I. A., Riggs, K. J., Simpson, A., Chiavarino, C., & Samson, D. (2006). Is belief reasoning automatic? *Psychological Science, 17*(10), 841-844.

Arnott, B., & Meins, E. (2007). Links among antenatal attachment representations, postnatal mind-mindedness, and infant attachment security: A preliminary study of mothers and fathers. *Bulletin of the Menninger Clinic, 71*(2), 132-149. doi: 10.1521/bumc.2007.71.2.132

Arnott, B., & Meins, E. (2008). Continuity in mind-mindedness from pregnancy to the first year of life. *Infant Behavior & Development, 31*(4), 647-654. doi: 10.1016/j.infbeh.2008.07.001

Atkinson, L., Niccols, A., Paglia, A., Coolbear, J., Parker, K. C., Poulton, L., . . . Sitarenios, G. (2000). A meta-analysis of time between maternal sensitivity and attachment assessments: Implications for internal working models in infancy/toddlerhood. *Journal of Social and Personal Relationships, 17*(6), 791-810.

Bakermans-Kranenburg, M. J., van Ijzendoorn, M. H., & Juffer, F. (2003). Less is more: Meta-analyses of sensitivity and attachment interventions in early childhood. *Psychological Bulletin, 129*(2). doi: 10.1037/0033-2909.129.2.195

Barnes, J., Gardiner, J., Sutcliffe, A., & Melhuish, E. (2014). The parenting of preschool children by older mothers in the United Kingdom. *European Journal of Developmental Psychology, 11*(4), 397-419. doi: 10.1080/17405629.2013.863728

Beck, A. T., & Alford, B. A. (2009). *Depression: Causes and treatment*: University of Pennsylvania Press.

Benoit, D., & Parker, K. C. (1994). Stability and transmission of attachment across three generations. *Child development, 65*(5), 1444-1456.

Benoit, D., Parker, K. C., & Zeanah, C. H. (1997). Mothers' representations of their infants assessed prenatally: Stability and association with infants' attachment classifications. *Journal of Child Psychology and Psychiatry, 38*(3), 307-313.

Bernier, A., Carlson, S. M., Deschênes, M., & Matte-Gagné, C. (2012). Social factors in the development of early executive functioning: a closer look at the caregiving environment. *Developmental Science, 15*(1), 12-24.

Bernier, A., Carlson, S. M., & Whipple, N. (2010). From External Regulation to Self-Regulation: Early Parenting Precursors of Young Children's Executive Functioning. *Child Development, 81*(1), 326-339.

Bernier, A., & Dozier, M. (2003). Bridging the attachment transmission gap: The role of maternal mind-mindedness. *International Journal of Behavioral Development, 27*(4), 355-365. doi: 10.1080/01650250244000399

Bloom, K. C. (1995). The development of attachment behaviors in pregnant adolescents. *Nursing Research, 44*(5), 284-289.

Bonell, C., Allen, E., Strange, V., Copas, A., Oakley, A., Stephenson, J., & Johnson, A. (2005). The effect of dislike of school on risk of teenage pregnancy: testing of hypotheses using longitudinal data from a randomised trial of sex education. *J Epidemiol Community Health, 59*(3), 223-230. doi: 59/3/223 [pii]

Borkowski, J. G., Bisconti, T., Weed, K., Willard, C., Keogh, D. A., & Whitman, T. L. (2002). The adolescent as parent:Influences on Children's intellectual, academic and socioemotional development. In J. G. Borkowski, S. L. Ramey, & M. Bristol-Power (Eds.), *Parenting and the child's world : influences on academic, intellectual, and social-emotional development.* Mahwah, NJ: Lawrence Erlbaum Associates.

Borkowski, J. G., Farris, J. R., & Whitman, T. L. (2007). *Risk and resilience : adolescent mothers and their children grow up.* Mahwah, N.J.: Lawrence Erlbaum Associates

Bowlby, J. (1944). Forty-four juvenile thieves: Their characters and home life. *International Journal of Psychoanalysis, 25*(19-52), 107-127.

Bowlby, J. (1952). Maternal care and mental health. Geneva: World Health Organisation

Bowlby, J. (1958). The nature of the child's tie to his mother. *Int J Psychoanal, 39*(5), 350-373.

Bowlby, J. (1973). *Attachment and loss*. London: Hogarth Press : Institute of Psycho-analysis.

Bowlby, J., Robertson, J., & Rosenbluth, D. (1952). A two-year-old goes to the hospital. *The Psychoanalytic Study of the Child*.

Brumariu, L. E., & Kerns, K. A. (2010). Parent–child attachment and internalizing symptoms in childhood and adolescence: A review of empirical findings and future directions. *Development and psychopathology, 22*(1), 177.

Buchanan, T., & Smith, J. L. (1999). Using the Internet for psychological research: Personality testing on the World Wide Web. *British Journal of Psychology, 90*(1), 125-144.

Cannella, B. L. (2005). Maternal-fetal attachment: an integrative review. *Journal of Advanced Nursing, 50*(1), 60-68. doi: 10.1111/j.1365-2648.2004.03349.x

Choi, B. C., & Pak, A. W. (2005). A Catalog of Biases in Questionnaires. *Preventing chronic disease. 2*(1).

Coles, M. E., Cook, L. M., & Blake, T. R. (2007). Assessing obsessive compulsive symptoms and cognitions on the internet: evidence for the comparability of paper and Internet administration. *Behaviour Research and Therapy, 45*(9), 2232-2240.

Cooke, A., Mills, T. A., & Lavender, T. (2012). Advanced maternal age: Delayed childbearing is rarely a conscious choice: A qualitative study of women's views

and experiences. I*nternational journal of nursing studies, 49(*1), 30-39.
Cox, S. M., Hopkins, J., & Hans, S. L. (2000). Attachment in preterm infants and their mothers: Neonatal risk status and maternal representations. *Infant mental health journal, 21*(6), 464-480.
Cranley, M. (1981). Development of a tool for the measurement of maternal attachment during pregnancy. *Nursing Research, 30*, 281-284.
Damato, E. (2004). Prenatal attachment and other correlates of postnatal maternal attachment in twins. A*dvances in Neonatal Care 4,* 274-291.
Degotardi, S., & Sweller, N. (2012). Mind-mindedness in infant child-care: Associations with early childhood practitioner sensitivity and stimulation. *Early Childhood Research Quarterly, 27*(2), 253-265. doi: 10.1016/j.ecresq.2011.09.002
Demers, I., Bernier, A., Tarabulsy, G. M., & Provost, M. A. (2010a). Maternal and Child Characteristics as Antecedents of Maternal Mind-Mindedness. *Infant Mental Health Journal, 31*(1), 94-112. doi: 10.1002/imhj.20244
Demers, I., Bernier, A., Tarabulsy, G. M., & Provost, M. A. (2010b). Mind-mindedness in adult and adolescent mothers: Relations to maternal sensitivity and infant attachment. *International Journal of Behavioral Development, 34*(6). doi: 10.1177/0165025410365802
Department for Education and Department for Health. (2011). *Supporting Families in the Foundation Years*. Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/184868/DFE-01001-2011_supporting_families_in_the_foundation_years.pdf.
DeVellis, R. F. (2012). *Scale development : theory and applications* (3rd ed.). London: SAGE.
DeWolff, M. S., & Van Ijzendoorn, M. H. (1997). Sensitivity and attachment: A meta-analysis on parental antecedents of infant attachment. *Child Development, 68*(4). doi: 10.2307/1132107
DiPietro, J. A. (2010). Psychological and psychophysiological considerations regarding the maternal–fetal relationship. *Infant and child development, 19*(1), 27-38.
Dykas, M. J., Ehrlich, K. B., & Cassidy, J. (2011). Links between Attachment and Social Information Processing: Examination of Intergenerational Processes. *Advances in Child Development and Behavior, 40*, 51-94. Retrieved from: <Go to ISI>://WOS:000293799200002
Ereky-Stevens, K. (2008). Associations between Mothers' Sensitivity to Their Infants' Internal States and Children's Later Understanding of Mind and Emotion. *Infant and Child Development, 17*(5), 527-543. doi: 10.1002/icd.572
Farrow, C., & Blissett, J. (2014). Maternal mind-mindedness during infancy, general parenting sensitivity and observed child feeding behavior: a longitudinal study. *Attachment & human development, 16*(3), 230-241.
Field, A. (2009). *Discovering statistics using SPSS: sex and drugs and rock 'n' roll* (3rd ed.). London: SAGE.
Field, F. (2010). The Foundation Years: preventing poor children becoming poor adults, The report of the Independent Review on Poverty and Life Chances: The Stationery Office.
Fonagy, P., Steele, H., & Steele, M. (1991). Maternal Representations of Attachment During Pregnancy Predict the Organization of Infant-Mother Attachment at One Year of Age. *Child Development, 62*(5), 891-905. doi: 10.1111/j.1467-8624.1991.tb01578.x
Fonagy, P., & Target, M. (1997). Attachment and reflective function: Their role in self-organization. *Development and Psychopathology, 9*(4).
Fonagy, P., Target, M., Steele, H., & Steele, M. (1998). *Reflective-functioning manual, Version 5*. Unpublished Manuscript.
George, C., Kaplan, N., & Main, M. (1985). *The Adult Attachment Interview.* Unpublished manuscript, University of California Berkeley
German, T. C., & Cohen, A. S. (2012). A cue-based approach to 'theory of mind': Re-

examining the notion of automaticity. *British Journal of Developmental Psychology, 30*(1), 45-58.

Granot, D., & Mayseless, O. (2001). Attachment security and adjustment to school in middle childhood. *International Journal of Behavioral Development, 25*(6), 530-541.

Grossmann, K., Grossmann, K. E., Spangler, G., Suess, G., & Unzner, L. (1985). Maternal sensitivity and newborns' orientation responses as related to quality of attachment in northern Germany. *Monographs of the Society for Research in Child Development*, 233-256.

Harlow, H. F., & Suomi, S. J. (1974). Induced depression in monkeys. *Behavioral Biology, 12*(3), 273-296.

Haslam, N. (2007). Trait Psychology. In N. Haslam (Ed.), *An Introduction to Personality and Intelligence* (1 ed.). London: SAGE Publication.

Hesse, E. (2008). The Adult Attachment Interview: Protocol, Method of Analysis, and Empirical Studies. In J. Cassidy & P. Shaver (Eds.), *Handbook of Attachment: Theory, Research and Clinical Application* (Second ed.). New York: Guildford Press.

Hipwell, A., Goossens, F., Melhuish, E., & Kumar, R. (2000). Severe maternal psychopathology and infant–mother attachment. *Development and psychopathology, 12*(02), 157-175.

Hoeve, M., Stams, G. J. J. M., van der Put, C. E., Dubas, J. S., van der Laan, P. H., & Gerris, J. R. M. (2012). A Meta-analysis of Attachment to Parents and Delinquency. *Journal of Abnormal Child Psychology, 40*(5), 771-785. doi: 10.1007/s10802-011-9608-1

Insel, T. R., & Young, L. J. (2001). The neurobiology of attachment. *Nature Reviews Neuroscience, 2*(2), 129-136. doi: 10.1038/35053579Isabella, R. A. (1993). Origins of attachment: Maternal interactive behavior across the first year. *Child development, 64*(2), 605-621.

Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and psychological measurement, 20*, 141-151.

Katznelson, H. (2014). Reflective functioning: A review. *Clinical Psychology Review, 34*(2), 107-117.

Kelly, K., Slade, A., & Grienenberger, J. F. (2005). Maternal reflective functioning, mother–infant affective communication, and infant attachment: Exploring the link between mental states and observed caregiving behavior in the intergenerational transmission of attachment. *Attachment & human development, 7*(3), 299-311.

Kondel-Laws, T., & Greenwood, L. (2014). *An evaluation of the impact of a novel psychoeducational antenatal class for parents on the cognitive, emotional and social development of their children*. Paper presented at the World Association of Infant Mental Health (WAIMH), , Edinburgh, UK.

Kondel-Laws, T., Parkinson, A., Hensman, R., & Laws, K. (2012). Attending a Psychoeducational Antenatal Group on the Observed Parent – Infant Relationship: A Randomised Controlled Trial. Conference Proceedings of the British Psychological Society, Division of Clinical Psychology Conference.

Laranjo, J., Bernier, A., & Meins, E. (2008). Associations between maternal mind-mindedness and infant attachment security: Investigating the mediating role of maternal sensitivity. *Infant Behavior & Development, 31*(4). doi: 10.1016/j.infbeh.2008.04.008

Laxton-Kane, M., & Slade, P. (2002). The role of maternal prenatal attachment in a woman's experience of pregnancy and implications for the process of care. *Journal of Reproductive and Infant Psychology, 20*(4), 253-266. doi: 10.1080/0264683021000033174

Lenzi, D., Trentini, C., Pantano, P., Macaluso, E., Lenzi, G. L., & Ammaniti, M. (2013). Attachment models affect brain responses in areas related to emotions and

empathy in nulliparous women. *Human Brain Mapping, 34*(6), 1399-1414. doi: 10.1002/hbm.21520

Lindgren, K. (2001). Relationships among maternal-fetal attachment, prenatal depression, and health practices in pregnancy. *Research in Nursing & Health, 24*(3), 203-217. doi: 10.1002/nur.1023

Lindgren, K. (2003). A comparison of pregnancy health practices of women in inner-city and small urban communities. *Jognn-Journal of Obstetric Gynecologic and Neonatal Nursing, 32*(3), 313-321. doi: 10.1177/0884217503253442

Locke, A., & Budds, K. (2013). 'We thought if it's going to take two years then we need to start that now': age, infertility risk and the timing of pregnancy in older first-time mothers. *Health Risk & Society, 15*(6-7), 525-542. doi: 10.1080/13698575.2013.827633

Lok, S. M., & McMahon, C. A. (2006). Mothers' thoughts about their children: Links between mind-mindedness and emotional availability. *British Journal of Developmental Psychology, 24*, 477-488. doi: 10.1348/026151005x49854

Lounsbury, J., Gibson, L., & Saudargas, R. (2005). Scale Development. In F. Leong & J. Austin (Eds.), *The Psychology Research Handbook: A Guide for Graduate Students and Research Assistants* (2 ed., pp. 125-145). London: SAGE Publications.

Lundy, B. L. (2003). Father- and mother-infant face-to-face interactions: Differences in mind-related comments and infant attachment? *Infant Behavior & Development, 26*(2), 200-212. doi: 10.1016/s0163-6383(03)00017-1

Lundy, B. L. (2013). Paternal and Maternal Mind-mindedness and Preschoolers' Theory of Mind: The Mediating Role of Interactional Attunement. *Social Development, 22*(1), 58-74. doi: 10.1111/sode.12009

Maas, A. J. B., Vreeswijk, C. M., Braeken, J., Vingerhoets, A. J., & van Bakel, H. J. (2014). Determinants of maternal fetal attachment in women from a community-based sample. *Journal of Reproductive and Infant Psychology, 32*(1), 5-24.

Main, M., Kaplan, N., & Cassidy, J. (1985). Security in infancy, childhood, and adulthood: A move to the level of representation. *Monographs of the society for research in child development*.

Main, M., & Solomon, J. (1986). Discovery of an insecure disorganised/disorientated attachment pattern: Procedures, findings and implications for the classification of behaviour. . In M. Yogman & T. B. Brazelton (Eds.), *Affective development in infancy*. Ablex: Norwood, NJ.

Mason, O., Platts, H., & Tyson, M. (2005). Early maladaptive schemas and adult attachment in a UK clinical population. *Psychology and psychotherapy: Theory, research and practice, 78(4),* 549-564.

McMahon, C. A., & Meins, E. (2012). Mind-mindedness, parenting stress, and emotional availability in mothers of preschoolers. *Early Childhood Research Quarterly, 27*(2), 245-252. doi: 10.1016/j.ecresq.2011.08.002

McQuaid, N., Bigelow, A. E., McLaughlin, J., & MacLean, K. (2008). Maternal mental state language and preschool children's attachment security: Relation to children's mental state language and expressions of emotional understanding. *Social Development, 17*(1), 61-83. doi: 10.1111/j.1467-9507.2007.00415.x

McWilliams, L. A., & Bailey, S. J. (2010). Associations between adult attachment ratings and health conditions: evidence from the National Comorbidity Survey Replication. *Health Psychology, 29*(4), 446.

Meins, E. (1997). *Security of attachment and the social development of cognition*: Psychology press.

Meins, E. (1998). The effects of security of attachment and maternal attribution of meaning on children's linguistic acquisitional style. *Infant Behavior & Development, 21*(2), 237-252. doi: 10.1016/s0163-6383(98)90004-2

Meins, E. (1999). Sensitivity, security and internal working models: bridging the transmission gap. *Attachment & human development, 1*(3), 325-342. doi:

10.1080/14616739900134181
Meins, E. (2013). Sensitive attunement to infants' internal states: operationalizing the construct of mind-mindedness. *Attachment & Human Development, 15*(5-6), 524-544. doi: 10.1080/14616734.2013.830388
Meins, E., Centifanti, L. C. M., Fernyhough, C., & Fishburn, S. (2013). Maternal Mind-Mindedness and Children's Behavioral Difficulties: Mitigating the Impact of Low Socioeconomic Status. *Journal of Abnormal Child Psychology, 41*(4), 543-553. doi: 10.1007/s10802-012-9699-3
Meins, E., & Fernyhough, C. (2010). *Mind-mindedness coding manual, Version 2.0.* Durham University, Durham, UK.
Meins, E., Fernyhough, C., Arnott, B., Leekam, S. R., & de Rosnay, M. (2013). Mind-Mindedness and Theory of Mind: Mediating Roles of Language and Perspectival Symbolic Play. *Child Development, 84*(5), 1777-1790. doi: 10.1111/cdev.12061
Meins, E., Fernyhough, C., Arnott, B., Turner, M., & Leekam, S. R. (2011). Mother-Versus Infant-Centered Correlates of Maternal Mind-Mindedness in the First Year of Life. *Infancy, 16*(2), 137-165. doi: 10.1111/j.1532-7078.2010.00039.x
Meins, E., Fernyhough, C., de Rosnay, M., Arnott, B., Leekam, S. R., & Turner, M. (2012). Mind-Mindedness as a Multidimensional Construct: Appropriate and Nonattuned Mind-Related Comments Independently Predict Infant-Mother Attachment in a Socially Diverse Sample. *Infancy, 17*(4), 393-415. doi: 10.1111/j.1532-7078.2011.00087.x
Meins, E., Fernyhough, C., Fradley, E., & Tuckey, M. (2001). Rethinking maternal sensitivity: Mothers' comments on infants' mental processes predict security of attachment at 12 months. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 42*(5), 637-648. doi: 10.1017/s0021963001007302
Meins, E., Fernyhough, C., & Harris-Waller, J. (2014). Is mind-mindedness trait-like or a quality of close relationships? Evidence from descriptions of significant others, famous people, and works of art. *Cognition, 130*(3), 417-427.
Meins, E., Fernyhough, C., Russell, J., & Clark-Carter, D. (1998). Security of attachment as a predictor of symbolic and mentalising abilities: A longitudinal study. *Social Development, 7*(1), 1-24. doi: 10.1111/1467-9507.00047
Meins, E., Fernyhough, C., Wainwright, R., Clark-Carter, D., Das Gupta, M., Fradley, E., & Tuckey, M. (2003). Pathways to understanding mind: Construct validity and predictive validity of maternal mind-mindedness. *Child Development, 74*(4). doi: 10.1111/1467-8624.00601
Meins, E., Fernyhough, C., Wainwright, R., Das Gupta, M., Fradley, E., & Tuckey, M. (2002). Maternal mind-mindedness and attachment security as predictors of theory of mind understanding. *Child Development, 73*(6). doi: 10.1111/1467-8624.00501
Meulman, J., Van der Kooij, A., & Heiser, W. (2004). Principal components analysis with nonlinear optimal scaling transformations for ordinal and nominal data. In D. Kaplan (Ed.), *The Sage Handbook of Quantitative Methodology for the Social Sciences* (pp. 49-70). CA: Sage.
Mikhail, M. S., Freda, M. C., Merkatz, R. B., Polizzotto, R., Mazloom, E., & Merkatz, I. R. (1991). The effect of fetal movement counting on maternal attachment to fetus. *American journal of obstetrics and gynecology, 165*(4), 988-991.
Mikulincer, M., & Florian, V. (1999). Maternal-fetal bonding, coping strategies, and mental health during pregnancy-The contribution of attachment style. *Journal of Social and Clinical Psychology, 18*(3), 255-276.
Muller, M. E. (1990). *The Development and Testing of the Muller Prenatal Attachment Inventory.* Unpublished Doctoral dissertation. University of California, San Francisco.
Muller, M. E. (1992). A critical review of prenatal attachment research. *Research and Theory for Nursing Practice, 6*(1), 5-22.
Muller, M. E. (1993). Development of the Prenatal Attachment Inventory. *Western*

journal of nursing research, 15(2), 199-211; discussion 211-195. doi: 10.1177/019394599301500205
Muller, M. E., & Ferketich, S. (1992). Assessing the validity of the dimensions of prenatal attachment. *Maternal-child nursing journal*.
Munro, E. (2011). The Munro review of child protection: final report, a child-centred system (Vol. 8062): The Stationery Office.
Office for National Statistics. (2014). *Birth Summary Tables, England and Wales, 2013*. United Kingdom.
Ontai, L. L., & Virmani, E. A. (2010). Predicting elements of early maternal elaborative discourse from 12 to 18 months of age. *Early Childhood Research Quarterly, 25*(1), 98-111. doi: 10.1016/j.ecresq.2009.08.001
Ordway, M. R., Sadler, L. S., Dixon, J., & Slade, A. (2014). Parental reflective functioning: analysis and promotion of the concept for paediatric nursing. *Journal of clinical nursing*.
Pallant, J. F., Haines, H. M., Hildingsson, I., Cross, M., & Rubertsson, C. (2014). Psychometric evaluation and refinement of the Prenatal Attachment Inventory. *Journal of Reproductive and Infant Psychology, 32*(2), 112-125. doi: 10.1080/02646838.2013.871627
Pawlby, S., Fernyhough, C., Meins, E., Pariante, C. M., Seneviratne, G., & Bentall, R. P. (2010). Mind-mindedness and maternal responsiveness in infant-mother interactions in mothers with severe mental illness. *Psychological Medicine, 40*(11), 1861-1869. doi: 10.1017/s0033291709992340
Pederson, D. R., Gleason, K. E., Moran, G., & Bento, S. (1998). Maternal attachment representations, maternal sensitivity, and the infant–mother attachment relationship. *Developmental Psychology, 34*(5), 925.
Pinquart, M., & Teubert, D. (2010). Effects of parenting education with expectant and new parents: a meta-analysis. *Journal of Family Psychology, 24*(3), 316.
Priel, B., & Besser, A. (2000). Adult attachment styles, early relationships, antenatal attachment, and perceptions of infant temperament: A study of first-time mothers. *Personal relationships, 7*(3), 291-310.
Reynolds, W. M. (1982). Development of reliable and valid short forms of the Marlowe-Crowne Social Desirability Scale. *Journal of clinical psychology, 38*(1), 119-125.
Riem, M. M., Bakermans-Kranenburg, M. J., van IJzendoorn, M. H., Out, D., & Rombouts, S. A. (2012). Attachment in the brain: adult attachment representations predict amygdala and behavioral responses to infant crying. *Attachment & human development, 14*(6), 533-551.
Rosenblum, K. L., McDonough, S. C., Sameroff, A. J., & Muzik, M. (2008). Reflection in thought and action: Maternal parenting reflectivity predicts mind-minded comments and interactive behavior. *Infant Mental Health Journal, 29*(4), 362-376.
Rosenblum, K. L., McDonough, S. C., Sameroff, A. J., & Muzik, M. (2008). Reflection
Schacht, R., Hammond, L., Marks, M., Wood, B., & Conroy, S. (2013). The Relation between Mind-mindedness in Mothers with Borderline Personality Disorder and Mental State Understanding in their Children. *Infant and Child Development, 22*(1), 68-84. doi: 10.1002/icd.1766
Schechter, D. S. (2013). Understanding the Interplay of Reflective Functioning and Posttraumatic Psychopathology. *40787*, 115.
Schiborr, J., Lotzin, A., Romer, G., Schulte-Markwort, M., & Ramsauer, B. (2013). Child-focused maternal mentalization: A systematic review of measurement tools from birth to three. *Measurement, 46*(8), 2492-2509. doi: 10.1016/j.measurement.2013.05.007
Schneider, B. H., Atkinson, L., & Tardif, C. (2001). Child-parent attachment and children's peer relations: A quantitative review. *Developmental Psychology, 37*(1), 86-100. doi: 10.1037//0012-1649.37.1.86

Schore, A. N. (2005). Back to basics attachment, affect regulation, and the developing right brain: linking developmental neuroscience to pediatrics. *Pediatrics in Review, 26*(6), 204-217.

Sethna, V., Murray, L., & Ramchandani, P. G. (2012). Depressed fathers' speech to their 3-month-old infants: a study of cognitive and mentalizing features in paternal speech. *Psychological Medicine, 42*(11), 2361-2371. doi: 10.1017/s0033291712000487

Sharp, C., & Fonagy, P. (2008). The parent's capacity to treat the child as a psychological agent: Constructs, measures and implications for developmental psychopathology. *Social Development, 17*(3), 737-754.

Shin, H., Park, Y. J., & Kim, M. J. (2006). Predictors of maternal sensitivity during the early postpartum period. *Journal of Advanced Nursing, 55*(4), 425-434.

Siddiqui, A., Hagglof, B., & Eisemann, M. (1999). An exploration of prenatal attachment in Swedish expectant women. *Journal of Reproductive and Infant Psychology, 17*(4), 369-380.

Siddiqui, A., & Hägglöf, B. (2000). Does maternal prenatal attachment predict postnatal mother–infant interaction? *Early Human Development, 59*(1), 13-25.

Slade, A. (2005). Parental reflective functioning: An introduction. *Attachment & human development, 7*(3), 269-281.

Slade, A., Bernbach, E., Grienenberger, J. F., Levy, D., & Locker, A. (2004). *An Addendum to Fonagy, Target, Steele & Steele reflective functioning scoring manual for use with the Parent Development Interview*. Unpublished Manuscript. New York: The City College and Graduate Center of the City University of New York.

Slade, A., Belsky, J., Aber, J. L., & Phelps, J. L. (1999). Mothers' representations of their relationships with their toddlers: Links to adult attachment and observed mothering. *Developmental psychology, 35*(3), 611.

Slade, A., Dermer, M., Gibson, L., Graf, F., Grunebaum, L., & Reeves, M. (1994). *The Pregnancy Interview Coding System*. New York: City University of New York.

Slade, A., Grienenberger, J., Bernbach, E., Levy, D., & Locker, A. (2005). Maternal reflective functioning, attachment, and the transmission gap: A preliminary study. *Attachment & Human Devlopment, 7*(3), 283-298.

Stevens, J. P. (2002). *Applied multivariate statistics for the social sciences* (fourth ed.). Hillsdale NJ: Erlbaum.

Streiner, D., & Norman, G. (2008). *Health Measurement Scales: a practical guide to their development and use*. Oxford: Oxford University Press.

Sutcliffe, A. G., Barnes, J., Belsky, J., Gardiner, J., & Melhuish, E. (2012). The health and development of children born to older mothers in the United Kingdom: observational study using longitudinal cohort data. *BMJ: British Medical Journal, 345*.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). London: Pearson.

Taubner, S., Hörz, S., Fischer-Kern, M., Doering, S., Buchheim, A., & Zimmermann, J. (2013). Internal structure of the Reflective Functioning Scale. *Psychological assessment, 25*(1), 127.

Tinsley, H. E., & Tinsley, D. J. (1987). Uses of factor analysis in counseling psychology research. *Journal of counseling psychology*, 34(4), 414.

Van Bussel, J. C., Spitz, B., & Demyttenaere, K. (2010). Reliability and validity of the Dutch version of the Maternal Antenatal Attachment Scale. *Archives of women's mental health, 13*(3), 267-277.

Van den Bergh, B., & Simons, A. (2009). A review of scales to measure the mother-foetus relationship. *Journal of Reproductive and Infant Psychology, , 27*(2), 114-126. Retrieved from:

Van Ijzendoorn, M. H. (1995). Adult Attachment Representations, Parental Responsiveness, and Infant Attachment - A Meta-Analysis on the Predictive-Validity of the Adult Attachment Interview. *Psychological Bulletin, 117*(3), 387-

403. doi: 10.1037/0033-2909.117.3.387
Van Ijzendoorn, M. H., Schuengel, C., & Bakermans-Kranenburg, M. J. (1999). Disorganized attachment in early childhood: Meta-analysis of precursors, concomitants, and sequelae. *Development and Psychopathology, 11*(2), 225-249. doi: 10.1017/s0954579499002035
van Oort, F. V., van der Ende, J., Wadsworth, M. E., Verhulst, F. C., & Achenbach, T. M. (2011). Cross-national comparison of the link between socioeconomic status and emotional and behavioral problems in youths. *Social psychiatry and psychiatric epidemiology, 46*(2), 167-172.
Vohr, B. R., Tyson, J. E., Wright, L. L., Perritt, R. L., Li, L., & Poole, W. K. (2009). Maternal age, multiple birth, and extremely low birth weight infants. The Journal of pediatrics, 154(4), 498-503. e492
Vreeswijk, C. M., Maas, A. J., & van Bakel, H. J. (2012). Parental representations: A systematic review of the working model of the child interview. *Infant Mental Health Journal, 33*(3), 314-328.
Vygotsky, L. S. (1980). *Mind in society: The development of higher psychological processes*: Harvard university press.
Vygotsky, L. S. (1986). *Thought and language*. Massachusetts: MIT press.
Walker, T. M., Wheatcroft, R., & Camic, P. M. (2012). Mind-mindedness in parents of pre-schoolers: a comparison between clinical and community samples. *Clinical child psychology and psychiatry, 17*(3), 318-335. doi: 10.1177/1359104511409142
Wan, M. W., & Green, J. (2009). The impact of maternal psychopathology on child–mother attachment. *Archives of women's mental health, 12*(3), 123-134.
Ward, M. J., & Carlson, E. A. (1995). Associations among Adult Attachment Representations, Maternal Sensitivity, and Infant-Mother Attachment in a Sample of Adolescent Mothers. *Child development, 66*(1), 69-79.
Ward, A., Ramsay, R., & Treasure, J. (2000). Attachment research in eating disorders. *British Journal of Medical Psychology, 73*, 35-51. doi: 10.1348/000711200160282
Wave Trust. (2013). Conception to Age 2 - The Age of Opportunity.
Wright, K. B. (2005). Researching Internet-based populations: Advantages and disadvantages of online survey research, online questionnaire authoring software packages, and web survey services. *Journal of Computer-Mediated Communication, 10*(3), 00-00.
Yarcheski, A., Mahon, N. E., Yarcheski, T. J., Hanks, M. M., & Cannella, B. L. (2009). A meta-analytic study of predictors of maternal-fetal attachment. *International Journal of Nursing Studies, 46*(5), 708-715.
Zeanah, C. H., Benoit, D., Hirshberg, L., Barton, M. L., & Regan, C. (1994). Mothers' representations of their infants are concordant with infant attachment classifications. *Developmental Issues in Psychiatry and Psychology, 1*, 1-14

7. Appendices

7.1. Appendix A: Original Mind-Mindedness Antenatal Questionnaire (MMAQ)

Below is a list of thoughts you may have had regarding your baby. Please read each thought and tick the most relevant answer for how ***often*** over ***the last two weeks*** that thought has run through your mind.

Please think only about the thoughts you have had regarding the baby you are ***expecting*** when completing this questionnaire.

	Never	**Very Rarely**	**Rarely**	**Sometime**	**Often**	**Very Often**
1. I wonder who my baby will look like in the family						
2. I wonder how comfortable my baby is						
3. I think my baby changes position too often						
4. I think about what my baby will want to do when they grow up						
5. I think my baby likes it when I eat certain food						
6. I wonder if my baby will not like the things I've bought for them						
7. I wonder what kind of mood my baby is in						
8. I think my baby will be clever when they grow up						
9. I worry that my baby is not the correct size for their age.						
10. I hope my baby will change position						
11. I think my baby is comforted when I touch my tummy						
12. I wonder if my baby is confused by their surroundings						
13. I wonder about the colour of my baby's eyes						
14. I think my baby gets excited						
15. I worry that my baby will not be attractive when they grow up						
16. I think my baby might be difficult to please as they grow up						
17. I wonder what my baby thinks about inside me						
18. I imagine my baby will be creative when they grow up						
19. I wonder if the way my baby moves tells me that they are irritated						

	Never	Very Rarely	Rarely	Sometime	Often	Very Often
20. I wonder what my baby will remember from their childhood						
21. I think my baby is healthy						
22. I wonder if my baby will grow up to be headstrong						
23. I wonder how my baby is lying inside me						
24. I imagine my baby will be loving as they grow up						
25. I think my baby is being stubborn						
26. I think my baby is learning while they are inside me						
27. I imagine my baby will misbehave as they grow up						
28. I wonder if my baby will be good looking						
29. I think my baby gets annoyed when I move in certain ways						
30. I think about the size of my baby						
31. I think my baby enjoys hearing my voice						
32. I wonder how my baby feels when I am stressed						
33. I wonder if the way my baby moves tells me about their personality						
34. I think my baby is not physically strong						
35. I think my baby has learnt to recognise my voice						
36. I worry that my baby will not do well at school						
37. I think my baby is physically active						
38. I worry that my baby is sad						
39. I wonder what my baby will think is happening during the birth						
40. I think my baby will play nicely with other children as they grow up						
41. I wonder if my baby will keep me awake						
42. I think my baby will be good at playing sports as they grow up						

7.2. Appendix B: Original Mind-Mindedness Postpartum Questionnaire (MMPQ)

Below is a list of thoughts you may have had regarding your child. Please read each thought and circle the most relevant answer for how ***often*** over the ***last two weeks*** that thought has run through your.

When completing this questionnaire please think only about the thoughts you have had regarding your ***youngest*** child.

	Never	Very Rarely	Rarely	Sometime	Often	Very Often
1. I think about who my child looks like in the family						
2. I think my child is physically fit						
3. I think my child will grow up to be lazy						
4. I think about what my child will want to do when they grow up						
5. I think my child likes certain foods						
6. I wonder if my child will not like the things I've bought for them						
7. I wonder how my child is feeling						
8. I think the things my child does shows they will be clever when they grow up						
9. I worry that my child will be overweight as they grow up						
10. I wonder what social activities my child will be involved in as they grow up						
11. I think my child is happy						
12. I think my child becomes worried in new situations						
13. I think my child will grow up to have a good healthy appetite						
14. I think my child gets excited						
15. I worry that my child will not be attractive when they grow up						
16. I think my child might be difficult to please as they grow up						
17. I wonder what my child thinks about						
18. I think my child will be creative when they grow up						
19. I sometimes think the way my child behaves shows me that they are irritated						

20. I wonder what my child will remember from their childhood						
21. I think my child is healthy						
22. I wonder if my child will grow up to be headstrong						
23. I wonder if my child will make friends as they grow up						
24. I imagine my child will be loving as they grow up						
25. I think my child is being stubborn						
26. I think my child is learning all the time						
27. I think my child misbehaves						
28. I wonder if my child will grow up to be good looking						
29. I think my child gets annoyed when I do certain things						
30. I think my child's hair colour has changed						
31. I think my child likes it when I spend time with them						
32. I think my child has ideas about what they want to do						
33. I wonder how my child feels when I am stressed						
34. I think my child is not physically strong						
35. I think my child learns from the way I behave						
36. I think that my child cries too often						
37. I think my child is physically active						
38. I worry that my child is sad						
39. I think my child will be thoughtful of others as they grow up						
40. I think about how tall my child is						
41. I wonder if my child will keep me awake						
42. I think my child will be good at playing sports as they grow up						

7.3. Appendix C: Antenatal Demographic Questionnaire

We will now ask you a number of questions about you, your baby and the experiences you have had. This information is important as it helps us to understand some of the things that may have influenced the way you think about your baby.

1. Please select your gender: *(please circle as appropriate)*

- Female
- Male
- Other

2. What is your age:

_____(in years)

3. Is English your first language? *(please circle as appropriate)*

- Yes
- No

4. What is your ethnic group? *(please circle as appropriate)*

White:

- English / Welsh / Scottish / Northern Irish / British
- Irish
- Gypsy or Irish Traveller

Mixed / Multiple ethnic groups:

- White and Black Caribbean
- White and Black African
- White and Asian

Asian:

- British
- Indian
- Pakistani
- Bangladeshi
- Chinese

Black:

- British
- African
- Caribbean

Other ethnic group:

- Arab
- Any other ethnic group, please describe below:
- Prefer not to answer

5. **What is the highest educational qualification you have achieved?** (e.g. None, NVQ level 2, GCSE)**,** (*please circle the **highest** level you have achieved*)
   - Postgraduate Qualification
   - Undergraduate degree or vocational equivalents
   - A levels, vocational level 3 and equivalents
   - GCSE/O Level, vocational level 2 and equivalents
   - Other qualifications (*please specify*): _____
   - No qualifications

6. **Please choose the answer which best describes your current employment:** *(please circle as appropriate)*
   - Full time employment (at least 35 hours per week)
   - Part time employment (less than 35 hours per week)
   - Apprenticeship Scheme
   - Contract work/variable hours
   - Unable to work due to injury/disability
   - Full time homemaker
   - Currently unemployed
   - Student
   - Other (please specify):_____

7. **What is your current status:** *(please circle as appropriate)*
   - Single
   - In a relationship with the father of your child
   - Married to the father of your child
   - In a relationship with a partner who is not the father of your child
   - Married to a partner who is not the father of your child
   - Separated/divorced
   - Widowed
   - Prefer not to answer
   - Other (please specify): _____

8. **Have you ever been diagnosed with any mental health difficulties (depression, anxiety, addiction or self-harm):** *(please circle as appropriate)*
    - None
    - Minor Difficulties (*please specify below*)
    - Major Difficulties (*please specify below*)
    - Prefer not to answer
    - Other (*please specify*):

_____

_____

_____

9. **Approximately how many weeks into your pregnancy are you?**

_____

10. **Do you know the gender of your baby?** *(please circle as appropriate)*
    - Yes
    - No

If yes, is the child:

- Female
- Male

11. **Was this pregnancy planned?** *(please circle as appropriate)*
    - Yes
    - No

12. From your own perspective would you describe your experience of this pregnancy as: *(please circle as appropriate)*

- Easy
- Difficult
- Don't know

If you would like to expand on your answer please do so in the box below:

_____

_____

_____

13. Have you experienced any complications during this pregnancy? *(please circle as appropriate)*

- Yes
- No

If yes please specify:

_____

_____

_____

14. Apart from this pregnancy, how many other children do you have?

_____

15. If you have children other than the child you are currently expecting, please indicate the ages of your children below (Please specify as accurately as possible e.g. '2 years 5 months' or '4 months' or '7 days' etc.)?

Child One____

Child Two_____

Child Three_____

Child Four_____

Child Five_____

Thank you for completing this questionnaire.

7.4. Appendix D: Postpartum Demographic Questionnaire

We will now ask you a number of questions about you, your child and the experiences you have had. This information is important as it helps us to understand some of the things that may have influenced your thinking about your child.

Please select your gender: (please circle as appropriate)

- Female
- Male
- Other

What is your age:

_____(in years)

Is English your first language? *(please circle as appropriate)*
Yes / No

What is your ethnic group? *(please circle as appropriate)*
White:

- English / Welsh / Scottish / Northern Irish / British
- Irish
- Gypsy or Irish Traveller

Mixed / Multiple ethnic groups:

- White and Black Caribbean
- White and Black African
- White and Asian

Asian:

- British
- Indian
- Pakistani
- Bangladeshi
- Chinese

Black:

- British
- African
- Caribbean

Other ethnic group:

- Arab
- Any other ethnic group, please describe below:

Prefer not to answer

What is the highest educational qualification you have achieved? (e.g. None, NVQ level 2, GCSE), (*please circle the **highest** level you have achieved*)

- Postgraduate Qualification
- Undergraduate degree or vocational equivalents
- A levels, vocational level 3 and equivalents
- GCSE/O Level, vocational level 2 and equivalents
- Other qualifications (please specify): _____
- No qualifications

Please choose the answer which best describes your current employment: *(please circle as appropriate)*

- Full time (at least 35 hours per week)
- Part time (less than 35 hours per week)
- Apprenticeship Scheme
- Contract work/variable hours
- Full time homemaker
- Unable to work due to injury/disability
- Currently unemployed
- Student
- Other (please specify): _____

What is your current status: (please circle as appropriate)

- Single
- In a relationship with the father of your child
- Married to the father of your child
- In a relationship with a partner who is not the father of your child
- Married to a partner who is not the father of your child
- Separated/divorced
- Widowed
- Prefer not to answer
- Other (please specify): _____

Have you ever been diagnosed with any mental health difficulties (such as depression, anxiety, addiction or self-harm): *(please circle as appropriate)*

- None
- Minor Difficulties (please specify below)
- Major Difficulties (please specify below)
- Prefer not to answer
- Other (please specify): _____

How many children do you have?

_____

What are the ages of your children?

_____

For the purposes of this survey please answer the following questions with your youngest child in mind.

What is the gender of your youngest child?

- Female
- Male
- Other (please specify)

Was the pregnancy planned? *(please circle as appropriate)*
Yes/No

From your own perspective would you have described your experience of this pregnancy as: *(please circle as appropriate)*
Easy/Difficult/ Don't know

If you would like to expand on your answer please do so in the box below:

_____
_____
_____

Did you experience any complications during this pregnancy? *(please circle as appropriate)*
Yes/No

If yes please specify:

_____
_____
_____

Since the birth of your child have you had any concerns for example regarding their health or development? *(please circle as appropriate)*

Yes/ No

If yes please specify:

_____
_____
_____

7.5. Appendix E: List of Organisations used for Recruitment

Organisation/Website	Description	Advertised
Active Birth Yoga	Antenatal Services in the South London Area	Email
Attachment Parenting	Provides information and resources on attachment parenting	Facebook Post
Attachment Childcare UK	Provide links to childcare professionals associated with attachment parenting principles	Facebook page
Antenatal Online	Provides online antenatal classes and parenting advice	Facebook page
Doula UK	Support women and their families during pregnancy, childbirth and early parenthood.	Facebook post
Mumsnet	News, product reviews, book club, webchats, special offers, competitions and parenting advice	Forum Post
Mumsnet Manchester and Trafford	View on children, where to go and activities in the local area	Facebook page
NCT Bishops Stortford and Sawbridgeworth	Provides antenatal courses, local support, breastfeeding support and parenting information	Facebook Group
NCT Reading	Provides antenatal courses, local support, breastfeeding support and parenting information	Facebook page
NCT Wokingham	Provides antenatal courses, local support, breastfeeding support and parenting information	Facebook page

NCT Southampton	Provides antenatal courses, local support, breastfeeding support and parenting information	Facebook page
NCT Wirral	Provides antenatal courses, local support, breastfeeding support and parenting information	Facebook page
NCT Gosport and Lee-on-the-Solent	Provides antenatal courses, local support, breastfeeding support and parenting information	Facebook page
NCT Dunmow & Braintree's	Provides antenatal courses, local support, breastfeeding support and parenting information	Facebook page
Cardiff and Caerphilly NCT	Provides antenatal courses, local support, breastfeeding support and parenting information	Facebook page
NCT Brighton and Hove	Provides antenatal courses, local support, breastfeeding support and parenting information	Facebook page
NCT Beckenham and Borders's	Provides antenatal courses, local support, breastfeeding support and parenting information	Facebook page
Calm Beginnings	Pregnancy and Childbirth services in the Hertfordshire area	Facebook page
Prymface	“Promoting Respect for Young Mothers and challenging the stereotypical view of teenage parents”	Website, Twitter, Facebook and Email
Independent Midwives UK	Supporting the work of independent midwives across the UK	Facebook page
Young Mums	A group for young mums to ask for advice and support	Facebook group

7.6. Appendix F: Web Participant Information Sheet

Title of Research Study: Mothers' experiences of their child: the validation of a self-report antenatal and postnatal questionnaire.

Welcome to our online survey.

We are inviting you to take part in a research project. Before you decide if you would like to take part, it is important to understand why the research is being done and what it will involve for you.

What is the purpose of the study?
Research has suggested that the way mothers think about their child can contribute to the development of the mother-infant relationship. The purpose of this research is to develop a questionnaire that explores the way in which mothers think about their children's feelings and experiences. It is hoped that this questionnaire could be used in healthcare to identify mothers who may benefit from additional support.

Why have I been invited?
We are inviting all women (aged 16 years or over) to take part who are expecting a baby and/or have a child or children under six years old.
.

What will happen if I take part?
You will be asked to fill in a questionnaire which will take 20 minutes to complete. Part 1 of the questionnaire will ask you about the ways in which you think and feel about your child or baby. Part 2 of the questionnaire will ask you for general details about your age, gender and mental health, as well as, a few questions regarding your child/baby and their development.

Will my information be kept confidential?
Yes, we will not ask for your name. The questionnaire is completely anonymous and you will not be asked for any identifiable information. Your responses to the questionnaire will be stored on a password protected database and will only be made available to the researchers.

What will happen with the results?
The results of this research will be written in a thesis for the purpose of gaining a qualification in Clinical Psychology. A summary of the main research findings may be published in a research paper.

Do I have to take part?
It is completely up to you whether or not you decide to take part in this study.

If you would like to take part please complete the electronic consent question at the end of this information sheet.

Agreeing to take part in the study does not mean you have to complete the questionnaire. If you decide you do not wish to complete the questionnaire you are free to do so without giving a reason by closing down the webpage.

Who is carrying out the research?
The study is being carried out by Elizabeth Kirby, Trainee Clinical Psychologist, as part of a qualification in Clinical Psychology at the University of Hertfordshire. The study is supervised by Dr Tejinder Kondel, Clinical Lecturer and Chartered Clinical Psychologist at the University of Hertfordshire.

Any Questions or Concerns?
If you have any questions please do not hesitate to contact me Elizabeth Kirby on 01707 286322 or email by e.l.kirby@herts.ac.uk. Alternatively contact Dr Tejinder Kondel on 01707 286322 or by email t.kondel@herts.ac.uk

Although we hope it is not the case, if you have any complaints or concerns about any aspect of the way you have been approached or treated during the course of this study, please write to the University Secretary and Registrar.

Who has reviewed this study?
This study has been given ethical approval by the University of Hertfordshire's Health and Human Sciences Ethical Committee [protocol number insert here]

Thank you for reading this information.

7.7. Appendix G: Debriefing Sheet

Participant Debriefing Sheet

Thank you for taking part in this research project. Your participation is greatly appreciated!

Research has suggested that the way mothers think about their child can contribute to the development of the parent-infant relationship. This project looked to develop a questionnaire which explores the way mothers think about their child. It is hoped that in the future this questionnaire could be used to identify mothers who may benefit from additional support.

If taking part in this research project has brought up an issues or concerns for you, please do not hesitate to contact us, using the contact details below:

Name: Dr Tejinder Kondel
Postal Address:
Department of Clinical Psychology
University of Hertfordshire
College Lane
Hatfield
Herts
AL10 9AB
Telephone No. 01707 286322
E-mail: t.kondel@herts.ac.uk

Further Sources of Support

Thinking about your experiences may have caused you to feel worried, concerned or upset. This is natural and often passes in a few days. Speaking to friends or family is likely to be the most immediate source of support. However if these feelings continue there are organisations that can help:

- Your Midwife or Health Visitor
- Your local GP

- Family Lives

Family Lives can provide confidential information, advice, guidance and support on any aspect of parenting and family life.
Website: www.familylives.org.uk
Telephone No. 0808 800 2222

- National Childbirth Trust (NCT)

The National Childcare Trust provides one to one support to talk through any questions or concerns.
Website: www.nct.org.uk
Telephone No. 0300 330 0700

- Relate

Relate provides support and information for couples and families
Website: www.relate.org.uk
Telephone No: 0300 100 1234

- The Samaritans

The Samaritans is a helpline which is open 24 hours a day for anyone in need. It is staffed by trained volunteers who will listen sympathetically.
Website: www.samaritans.org
Telephone No: 08457 90 90 90

7.8. Appendix H: Letter of Ethical Approval

UNIVERSITY OF HERTFORDSHIRE HEALTH & HUMAN SCIENCES

ETHICS APPROVAL NOTIFICATION

TO **Elizabeth Kirby**

CC **Tejinder Kondel**

FROM Dr Richard Southern, Health and Human Sciences ECDA,Chairman

DATE 10/04/2014

Protocol number: **LMS/PG/UH/00158**

Title of study: Mothers' experiences of their child: the validation of a self-report antenatal and postpartum questionnaire

Your application for ethical approval has been accepted and approved by the ECDA for your school.

This approval is valid:

From: 10/04/2014

To: 01/08/2014

Please note:

Approval applies specifically to the research study/methodology and timings as detailed in your Form EC1. Should you amend any aspect of your research, or wish to apply for an extension to your study, you will need your supervisor's approval and must complete and submit form EC2. In cases where the amendments to the original study are deemed

to be substantial, a new Form EC1 may need to be completed prior to the study being undertaken.

Should adverse circumstances arise during this study such as physical reaction/harm, mental/emotional harm, intrusion of privacy or breach of confidentiality this must be reported to the approving Committee immediately. Failure to report adverse circumstance/s would be considered misconduct.

Ensure you quote the UH protocol number and the name of the approving Committee on all paperwork, including recruitment advertisements/online requests, for this study.

Students must include this Approval Notification with their submission.

7.9. Appendix I: Rational for the Removal of Items from the MMAQ

Item	Reason For Item Removal						
	Poor response distribution	Low Factor Loading	Multi Vocal Item	Low MM	Alpha Level	Item-Total Correlation	Response Burden
1. I wonder who my baby will look like in the family				✓		✓	✓
2. I wonder how comfortable my baby is		✓					
3. I think my baby changes position too often					✓	✓	
5. I think my baby likes it when I eat certain food		✓					
6. I wonder if my baby will not like the things I've bought for them	✓						
9. I worry that my baby is not the correct size for their age				✓	✓	✓	
10. I hope my baby will change position						✓	✓
12. I wonder if my baby is confused by their surroundings	✓						
13. I wonder about the colour of my baby's eyes						✓	✓
15. I worry that my baby will not be attractive when they grow up	✓						
16. I think my baby might be difficult to please as they grow up			✓				
21. I think my baby is healthy	✓						
22. I wonder if my baby will grow up to be headstrong		✓					✓

(Continued) Rational for the Removal of Items from the MMAQ

Item	Reason For Item Removal						
	Poor response distribution	Low Factor	Multi Vocal Item	Low MM	Alpha Level	Item-Total Correlation	Response Burden
23. I wonder how my baby is lying inside me						✓	✓
25. I think my baby is being stubborn	✓						
27. I imagine my baby will misbehave as they grow up		✓				✓	✓
28. I wonder if my baby will be good looking	✓		✓				
30. I think about the size of my baby				✓	✓	✓	
33. I wonder if the way my baby moves tells me about their personality						✓	✓
34. I think my baby is not physically strong	✓						
36. I worry that my baby will not do well at school	✓						
37. I think my baby is physically active			✓			✓	✓
38. I worry that my baby is sad	✓						
39. I wonder what my baby will think is happening during the birth		✓				✓	✓
40. I think my baby will play nicely with other children as they grow up		✓		✓			✓
41. I wonder if my baby will keep me awake					✓	✓	
42. I think my baby will be good at playing sports as they grow up	✓			✓			✓

7.10. Appendix J: Rational for the Removal of Items from the MMPQ

Item	Reason For Item Removal						
	Poor Response Distribution	Low KMO	Low Factor Loading	Multi Vocal Item	Low MM	Alpha Level	Item-Total Correlation
1. I think about who my child looks like in the family		✓	✓		✓		
2. I think my child is physically fit					✓		
3. I think my child will grow up to be lazy	✓						
5. I think my child likes certain foods			✓		✓		
6. I wonder if my child will not like the things I've bought for them			✓				✓
7. I wonder how my child is feeling	✓			✓		✓	✓
8. I think the things my child does shows they will be clever when they grow up			✓	✓			✓
9. I worry that my child will be overweight as they grow up	✓				✓		
11. I think my child is happy	✓						✓
13. I think my child will grow up to have a good healthy appetite					✓		
15. I worry that my child will not be attractive when they grow up	✓						✓
16. I think my child might be difficult to please as they grow up	✓			✓			
20. I wonder what my child will remember from their childhood				✓			
21. I think my child is healthy					✓		
22. I wonder if my child will grow up to be headstrong				✓	✓		

Item	Reason For Item Removal						
	Poor Response Distribution	Low KMO	Low Factor Loading	Multi Vocal Item	Low MM	Alpha Level	Item-Total Correlation
24. I imagine my child will be loving as they grow up					✓		
26. I think my child is learning all the time	✓						
27. I think my child misbehaves					✓		
30. I think my child's hair colour has changed			✓		✓		✓
31. I think my child likes it when I spend time with them	✓						
33. I wonder how my child feels when I am stressed			✓	✓			
34. I think my child is not physically strong	✓						✓
36. I think that my child cries too often	✓				✓		
37. I think my child is physically active					✓		
41. I wonder if my child will keep me awake			✓		✓		✓
42. I think my child will be good at playing sports as they grow up					✓		