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**Infant Temperament, Maternal Attributions, Mood and Rumination,
in Predicting Maternal Problem-solving and Mother-Infant Bonding
in the Postnatal Period**

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1. Introduction

There has been a considerable amount of research into depression and its underlying mechanisms, in particular the relationship between depression and rumination. However there is a shortage of literature which considers the underlying mechanisms involved in postnatal depression (PND) and in particular the role that rumination may play in PND. This literature review aims to look at the relationships between certain maternal and infant factors and their affect upon maternal problem solving, maternal confidence in problem solving and the mother-infant bond, in a postnatal population. In particular this review aims to consider the role that maternal rates of rumination may have in PND, highlighting the lack of research within this area and in particular proposing further research in relation to problem solving in the postnatal period.

2. Postnatal Depression

Childbirth represents a significant life event for many mothers and their families. It is a crucial time for both the mother and their infant and can be disrupted by many internal and external factors. Depression, at any time in a person's life can be debilitating, so depression in the postnatal period can have serious implications for both mother and her infant.

Depression and PND are characterised by chronic low mood, loss of interest or pleasure in pleasurable activities and decreased energy or increased fatigue. Lifetime prevalence rates of depression have been recorded at between 10-25% for

women and 5-12% for men (Carr & McNulty, 2006). It is estimated that PND affects around 10-15% of women following child birth (Cox, Murray & Chapman, 1993; Lane et al., 1997), with up to 30% of postnatal women exhibiting emotional distress (Hipwell, Reynolds & Crick, 2004). Point prevalence rates (the rate at a particular point in time) stand between 1% and 5.7% in the first 12 months postnatally, with the highest rates at 2 months and 6 months (Carr & McNulty, 2006).

3. Implications of Postnatal Depression

Depression in the postnatal period has been linked to poor outcomes for children, such as cognitive delay and a range of emotional and behavioural difficulties (Bonari et al., 2004; Field, 2011; Nulman et al., 2002). In particular, chronic PND has been linked to lower infant cognitive and psychomotor development (Cornish et al., 2005). Effects of PND on the child can also include developmental disturbances, behavioural, emotional, attentional and interpersonal disturbances and that these changes outlast the maternal depressive episode and continue throughout childhood (Moehler, Brunner, Wiebal, Reck & Resch, 2006). Long-term effects have also been noticed in children of postnatally depressed mothers, including cognitive delay and chronic illness in adulthood (Field, 2011).

In looking to understand the link between PND and these poor infant outcomes there is a growing body of research indicating that depression during the perinatal period can have a detrimental impact upon the mother-infant relationship. Bonding and attachment, the tie between the parent and the infant, is vitally important for infants, in order to ensure healthy growth and development. Attachment is described as the innate behaviours furnished to infants to ensure their survival (Bowlby, 1988). Impairment or interference in this process may be associated with

the poor infant outcomes previously mentioned. Maternal depression has been consistently shown to have a negative impact on the development of attachment strategies (Benvenuti, 2001). A mother's mood is an important factor in a healthy mother-infant interaction (Benvenuti, 2001) and PND has consistently been shown to have a negative impact upon this (Edhborg, Mattiesen, Lundh & Widstrom, 2005; Loh, & Vostanis, 2004). Higher levels of PND have been associated with lower infant security and maternal dissatisfaction with the mother-infant interaction (Coyl, 2002). Mothers who are depressed have also been found to perceive the bonding with their baby more negatively (Hornstein, et al., 2006). PND has also been associated with undesirable parenting practices, such as unresponsiveness, inattentiveness, intrusiveness, inept discipline and negative parental perceptions of their children (Gelfund & Teti, 1990). In addition, PND has been linked to less responsive maternal behaviours and difficult interaction styles, such as being withdrawn or intrusive (Field, Miguel & Hernandez-Reif, 2009). There is evidence that mothers with depression spend less time looking at their infants, touching them, talking to them and show more negative emotions on their faces (Field, 1995). Mothers with depression have reportedly shown diminished emotional involvement with their infants, impaired communication, disaffection, increased hostility and resentment towards their child (Lovejoy, Grayczyk, O'Hare & Neuman, 2000).

Infants of mothers with depression have shown less attentiveness, familiarity with sad faces (Field, 2009; Hernandez-Reif, Field, Deigo, Vera, & Pickens, 2006), protest more, vocalise less, are less active, look away more frequently and show fewer positive faces. Evidence also suggests that these infant reactions are generalised to non-depressed adults, indicating that these infant interaction disturbances may become generalised to all infant-adult interactions not just the

infant-mother dyad (Field, 1995). These disturbances in the interaction of mothers with depression and their infants also appear to be universal across cultures and occur despite socio-economic status (Field, 2010).

3.1 Postnatal depression and bonding. This effect on the mother-infant interaction has the potential to disrupt the mother-infant bond. The process of bonding has been described as the development of the relationship between a parent and infant. The formation of this relationship is essential for a child's social and cognitive development as well as their mental health.

A study found that even mild or unrecognised depression, could reduce the quality of bonding between mother and infant (Moehler *et al.*, 2006). The impact of PND observed in the first four months of life was predictive of poor bonding fourteen months later. This may also suggest that there is a particularly sensitive bonding period in the first few months of life. It is not just PND that has been found to have an effect upon bonding but also mild depressive symptoms, or the 'baby blues' have been found to impair bonding (Edhborg *et al.*, 2005).

4. Mechanisms Underlying Postnatal Depression

Considering the detrimental effects that PND can have upon a mother and her infant, it is vital to fully understand the mechanisms involved in PND, in order to design and deliver effective interventions. It seems sensible in the first instance to look towards the general depression literature for potential areas of interest.

4.1 Depression and gender. Depression research has shown that prevalence rates for depression indicate women are twice as likely to show depressed mood and one and half times more likely to be diagnosed with a major

depressive episode compared to men (Butler and Nolen-Hoeksema, 1994). Women appear to have more episodes of depression, which are longer in duration and are more likely to respond to their depressed mood by focusing their attention on their affective state. It has been suggested that women experience more chronic strain, have reported lower levels of mastery and may ruminate more. These factors have been suggested to mediate this gender difference in depression (Nolen-Hoeksema, Larson & Grayson, 1999). Butler and Nolen-Hoeksema (1994) found that females chose to engage in emotion-related tasks significantly more than males and that they were more likely than males to have an emotion-related ruminative coping style, in response to their depressed mood. As rumination has been linked with dysphoria and depression, this may help to explain these gender differences in rates of depression. If women are more likely to ruminate, then this may be a central mechanism underlying PND.

4.2 Rumination. A large amount of research has endeavoured to understand the underlying mechanisms in depression. Rumination is one mechanism which has been shown to be linked with depression, chronicity of depressive disorders and anxiety symptoms (Nolen-Hoeksema, 2000). Rumination has been defined as a process through which a person responds to their distress (Nolen-Hoeksema, 1991). It has been described as a process whereby an individual repetitively and passively focuses on their symptoms of distress, including the possible causes and consequences. It has been suggested that individuals may differ in how they respond to negative mood and that one way of responding is to ruminate. Research has suggested that people who engage in a ruminative response when depressed stay depressed for longer and may be more severely depressed (Nolen-Hoeksema, 1991).

There are several theories surrounding the role of rumination in depression, one theory is the response styles theory suggested by Nolen-Hoeksema (1991). This theory suggests that rumination worsens depression through its interaction with negative mood, to interfere with problem solving, enhance negative thinking, negatively affect social support and impact on helpful behaviour. Specifically it is suggested that rumination enhances the negative effect that low mood can have upon thinking.

People who ruminate in response to low mood are likely to experience low mood for longer and with increased severity. It is thought that rumination has this effect because it causes a person to bring negative thoughts and memories to the fore-front of their thinking (Lyubomirsky, Caldwell & Nolen-Hoeksema, 1998). Research where rumination has been experimentally induced, has shown that participants experiencing dysphoria demonstrate a further decrease in mood. This is in comparison to non-dysphoric participants, who when induced to ruminate, show no observed effect on their mood (Lyubomirsky & Nolen-Hoeksema, 1995; Nolen-Hoeksema, Wisco & Lyubomirsky, 2008; Watkins & Baracaia, 2002). Distraction has been shown to have a beneficial effect on mood in participants experiencing dysphoria but again, non-dysphoric participants show no changes (Lyubomirsky & Nolen-Hoeksema, 1995).

Other theories have suggested that rumination might be constructive and functional. Lyubomirsky and Nolen-Hoeksema (1993), found that people reported that ruminating about themselves and their problems makes people experiencing dysphoria feel they understand themselves better. It has been argued that rumination is instrumental and helps people to attain their goals through more effective problem solving (Martin & Tesser, 1996). Treynor, Gonzalez and Nolen-

Hoeksema (2003) have argued that it may depend on how you operationalise rumination. In a study looking at considering different types of rumination, two rumination factors were suggested, brooding and reflection. In this study the reflection factor was associated with lower rates of depression over time, whereas brooding was significantly related to depression (Treyner et al., 2003; Ciesla & Roberts, 2007). Treyner et al. (2003) suggest that reflective rumination may be adaptive in reducing negative affect because it leads to more effective problem solving.

4.3 Rumination and problem solving. Rumination, as well as directly impacting on mood, appears to also affect other areas of functioning. In particular rumination has been shown to affect problem solving ability. For mothers, the first year following birth is a complex time, with many different demands, requiring a mother to be an effective problem solver with a good ability to think flexibly and functionally. If during the postnatal period a depressed woman is vulnerable to ruminate more, we may see these problem solving abilities impaired. This could account for some of the effects that PND appears to have on the mother-infant relationship and poor infant outcomes. This may be a key area to consider in PND, as problem solving around a new infant, is an essential function and any impairment would be important to investigate.

Donaldson and Lam (2004) looked at the effect of both trait and experimentally manipulated rumination, in depressed people, on problem solving. They found that in both conditions, depressed participants gave less effective problem solutions. They also found that distraction improved the mood of all participants and improved the problem solving of participants who were depressed

but did not have high natural rates of rumination. This study also highlights the difficulties some previous studies may have had with naturally occurring rates of rumination interfering with their experimental inductions. Studies suggest that problem solving is not only considered to be a moderator between stressful events and depression but that it may also be an outcome of depression and rumination (Watkins & Baracaia, 2002). Watkins and Baracaia (2002) suggest that as people with past and present depression ruminate more, rumination might explain the deficits that are observed in problem solving in people with depression. In Lyubomirsky and Nolen-Hoeksema's (1995) research it was shown that participants who have never been depressed, any manipulation on their thinking style did not affect their problem solving abilities. However in people recovered from depression and those currently experiencing depression, rumination impaired problem solving performance.

There is however a lack of research investigating problem solving in the postnatal period. As it has been shown to become impaired in the general depression literature, it may also be an important area to consider within PND.

4.4 Further effects of rumination. Rumination has been shown to affect particular processes or mechanisms, such as problem solving ability (Donaldson & Lam, 2004; Kao, Dritschel & Astell, 2006; Lyubomirshy & Nolen-Hoeksema, 1993; Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky, Tucker, Caldwell & Berg, 1999; Singer & Dobson, 2007; Watkins & Baracaia, 2002).

However it has also been shown to affect or interfere with other processes such as cognitive flexibility (Davis & Nolen-Hoeksema, 2000), negative cognitive styles (Ciesla & Roberts, 2007; Riso, et al., 2003), decision making (Radenborg,

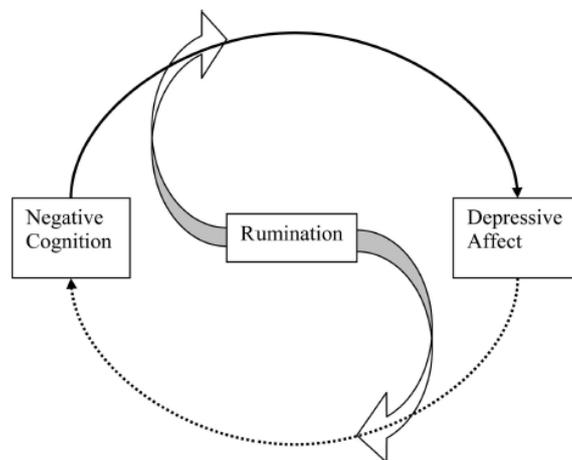
Jong-Meyer & Huffmeier, 2009) and confidence in problem solving ability (McMurrich & Johnson, 2008; Papageorgiou & Wells, 1999). It has been suggested that a lower sense of confidence in problem solving ability can be directly related to a lower experience of positive affect, and then indirectly related to greater depression among pregnant women (Elliot, Shewchuck, Richeson, Pickleman & Franklin, 1996).

4.5 Postnatal Depression and dysfunctional cognitions. Rumination is an important underlying mechanism in depression and may also be important in PND. There may also be further mechanisms underlying PND, which should be considered further. Cognitive theories of depression have highlighted the importance of the content of thought, as another central mechanism underlying depression. The Beck Diathesis-Stress Model suggests that stressful life events lead to the development of negative cognitive schema, which leads to the development of a psychological vulnerability to depression (Church, Brechman-Toussaint & Hine, 2005). Certain stressors may then activate depression, in those with such depressogenic cognitive styles and maladaptive negatively focused cognitions (Church et al., 2005; Milgrom & Beatrice, 2003). Dysfunctional cognitive styles have been shown to act as a risk factor for depression and postnatal depression (Church et al., 2005). Chronically depressed individuals have been associated with elevated dysfunctional attitudes and maladaptive core beliefs (Riso et al., 2003). In some literature it has been suggested that depressed postnatal mothers have specific negative cognitions, which are maternal or motherhood transitional specific, though this was not demonstrated in all women (Church et al., 2005). It suggests that there may be specific maternal dysfunctional cognitions acting within this population, underlying postnatal depression. As such, alongside rumination, negative maternal specific

cognitions may further impact upon infant and maternal outcomes and may interfere with the mother-infant relationship .It suggests that depression is driven, not just by how one thinks but also by what one thinks about, something which may be particularly important within the postnatal period.

Ciesla and Roberts (2007) investigate the concept, that the content of cognition, specifically if it is negative, effects depressive affect. They suggest that this presents people with two different vulnerabilities to depression, rumination and negative cognition and that these two processes interact with each other. This concept is shown diagrammatically in the Interaction rumination model in Figure 1 below.

Figure 1: The Interactive Rumination Model (Ciesla & Roberts, 2007)



The interactive model suggests that negative cognition is a vulnerability to depression, with depressive affect feeding back into negative cognitions. Rumination is presented as a mediator or catalyst for this process, increasing the effect of negative cognitions on depression and increasing the feedback of depressive affect

on negative cognitions. The study uses both self reported naturally occurring rates of rumination and experimentally manipulated rumination to look at the impact of rumination on depressive affect. The results suggest that people who are prone to ruminate and engage in negative cognitions are more vulnerable to depression. They suggest that these two vulnerabilities interact but that they can also act as independent vulnerability factors under certain circumstances.

4.6 Postnatal depression and maternal attributions. One particular type of dysfunctional cognition that may be maternal specific, is the way in which a mother understands her infant's behaviour. Child abuse literature suggests that parental attributions about the causes of a child's behaviour mediate the link between child behaviour and abusive parental behaviour. Studies have demonstrated that parental attributions of child behaviour can have a negative impact upon the parent-child interaction (Martorell & Bugental, 2006), leading to more controlling and harsher parenting practices (Guavain, Fagot, Leve & Kavanagh, 2002). It is suggested that negative child behaviour, which is attributed to internal stable child characteristics, elicits more negative parental affect (Dadds, Mullins, McAllister & Atkinson, 2003; Dix & Reinhold, 1991; Dix, Ruble & Zambarano, 1989). There is evidence which suggests that mothers with depression have attributional biases concerning their children's problematic behaviour, compared to mothers without depression, (White & Barrowclough, 1998). Mothers with depression were also found to be more likely to attribute problematic child behaviour to causes that were personal and perceived to be controllable by the child (White & Barrowclough, 1998).

A study by Slep & O'Leary (1998) found that parents who were told that their difficult child was being naughty on purpose, tended to express more anger and overreact in terms of discipline, in comparison to those parents who were told that

their child was not to blame. In addition it has been suggested that parental attributions are more likely to influence parent-child interaction, when the child's behaviour is seen as ambiguous. A lack of contextual information seems to cause parents to rely on their pre-existing attributions about the child. As such, when children's behaviours are ambiguous or unfamiliar, interactions between parents and infants are more likely to be influenced by parental attributions (Dadds *et al.*, 2003). It is important to note that in the postnatal period, a parent is likely to be faced with ambiguous and unfamiliar behaviour from their infant.

Castro, Ayala & Mayes (2010) suggest that the attribution of infant behaviour is related to how a mother interprets the intentionality of her baby's cues. This ability to accurately interpret the intentionality of a baby's cue is vitally important in the formation of a secure infant attachment through the development of the mother-infant bond. Dysfunctional cognitions, such as attributional errors, or other underlying factors, such as rumination, may interfere with this process, through increasing preoccupation with thoughts and reducing a mother's ability to attend to her infant. This may explain some of the poor outcomes witnessed in infants of depressed mothers.

5. Postnatal Depression and Infant Temperament

Recognising some of the key mechanisms driving and underlying PND, such as rumination and maternal attributions, are important in understanding the relationship between PND and poor outcomes in infants and mothers. However it may not just be maternal factors driving or influencing these poor outcomes and impacting on the mother-infant relationship. It is also important to consider infant factors and how these may interact with maternal presentations. It is suggested that

infants of mothers with depression already show non-optimal behaviours at birth, which may then further contribute to interaction disturbances. This suggests that it is not just a mother who contributes to the mother-infant interactions, but the infant's behaviour as well (Abrams, Field, Scafidi & Prodromidi, 1995). Temperament, defined as "Individual difference in emotional, motor and attentional reactivity measured by latency, intensity and recovery of response, and self regulation processes such as effortful control that moderate reactivity " (Rothbart, 2007, p207) has been shown to be one infant factor which may interact with PND and its underlying mechanisms. Temperament is thought to exhibit a degree of stability over time, but it is recognised that it can be affected by experience, genetic heritage and maturation, therefore parental functioning and home environment have the potential to influence temperament (Hannington, Ramchandani & Stein, 2010). Marked individual differences can be observed between infants, from even the first months of life. Studies have suggested that a difficult child temperament may be associated with maternal depression (Cutrona & Troutman, 1986), as well as negative mother-infant interactions, including parental ability to deal with and solve child rearing difficulties (Gauvain & Fagot, 1995; Martorell & Bugental, 2006). Infants of parents with depression exhibit more difficult temperaments (Hannington et al., 2010) and difficult child temperament also seems to be a strong predictor of parental warmth (Kendler, Sham & MacLean, 1997) and later childhood depression (Hannington et al., 2010). Interestingly, parents who provided low levels of warmth also scored highly for depressive symptoms, which as previously noted can disrupt parenting (Kendler et al., 1997).

Research has also looked at the effect a child's temperament can have on bonding or the quality of bonding between the mother and infant. Certainly there is

evidence to suggest that a child's temperament is associated with the way mothers and their infants interact. A difficult child temperament has been associated with more controlling behaviours by parents (Gauvain *et al.*, 2002) as well as low levels of parental warmth, caring and lovingness (Kendler *et al.*, 1997).

In a study by Cutrona & Troutman (1986) a relationship was found between child temperament and maternal depression. This study found that 'infant difficulty' could account for 30% of the variance found in the maternal depression scores. However this study was limited by its small sample size and the modelling techniques used meant that directional relationships were hard to assess. This relationship between infant temperament and maternal depression has also been shown in a more recent study, where the relationships between maternal symptoms of depression and anxiety, child temperament and child behaviour were explored. This study found that even mild levels of depression and anxiety were related to disruptive temperaments and problem behaviours in children (West & Newman, 2003). The causality between these relationships are again difficult to ascertain, and could be uni or bi directional. This study also found that mothers who were depressed, were more likely to report problems with their children's behaviour than non-depressed mothers. This study used both parental and observer ratings of child behaviour, and found no differences between these two measures, suggesting that the reporting of the difficult behaviour was not unduly influenced by parental depressed mood. The study suggests that there may be a feedback system between parental mood and child temperament, particularly if a parent with depression finds it more difficult to cope effectively. A recent study by (Saisto, Salmela-Aro, Nurmi & Halmesma, 2008), looked to discover predictors of long term parental stress. They found that child temperament as well as parents' personality traits, parental

depression and lack of social support predicted parental stress 2-3 years later. A study (Gauvain & Fagot, 1995) which looked at the mother-child interaction surrounding a problem solving task, found that children rated as having more difficult temperaments, performed more poorly on a parent-child collaborative problem solving task. When a child was rated as being more difficult, mothers made more effort to regulate their children's behaviours, gave more disapproving comments and gave their children fewer opportunities to discover problem solving strategies by themselves.

Within the postnatal period, an infant's temperament appears to present as an additional variable, which may interact with parental dysfunctional cognitions, particularly attributional biases, to impact further upon infant and maternal outcomes. However a link between infant temperament and depression, which is mediated by rumination has not yet been fully investigated.

6. Conclusion

It is clear that postnatal depression poses significant risks to the child and the mother. Identifying any underlying mechanisms in this process could be helpful in developing effective interventions. Rumination and its links with particular negative attributional biases, within the context of certain infant factors such as a difficult child temperament, could be a key mechanism mediating the relationships between these variables and their affects on outcomes, such as maternal problem solving ability, confidence in maternal problem solving ability and bonding between the mother and her infant. There is however a lack of evidence that the current findings from general depression literature can be applied directly to a postnatal population. For example, although rumination has been shown to be related to depression and problem

solving, there is no literature supporting the same relationship within a postnatal population. Furthermore although the relationship between depression and impaired bonding has been demonstrated, it is unclear if this mediated by rumination.

Additionally the relationships between infant temperament and depression and infant temperament and maternal attributions have been shown. However, it remains unclear if these relationships impact upon maternal problem solving or the mother infant bond, and whether rumination mediates these relationships.

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Abstract

Background: The present study considers some of the underlying mechanisms that may be acting in postnatal depression (PND). It has been suggested that rumination predicts problem solving ability and that child temperament and maternal attributions predict mother-infant bonding. This study aims to investigate the role that brooding and reflective rumination may play in predicting and mediating these relationships in postnatal women.

Methods: Postnatal women were recruited to complete an online survey. 190 women responded and completed the Edinburgh Postnatal Depression Scale (EPDS), Maternal Attribution Scale (MAS), Postpartum Bonding Questionnaire (PBQ), Parental Problem Solving Task (PPST), Rumination Response Scale (RRS), Infant Behaviour Questionnaire (IBQ) and a confidence in problem solving using a Visual Analogue Scale (VAS).

Results: Analyses showed that reflective rumination mediated the relationship between low infant soothability and high negative attributions, on maternal problem solving. Reflective and Brooding Rumination also predicted confidence in problem solving and mother-infant bonding. Analyses showed that infant temperament (soothability and distress) and maternal attributions (positive and negative) predicted confidence in problem solving and mother-infant bonding.

Limitations: This study employed a correlational design and therefore all inferences regarding possible causal pathways are tentative. Limitations include the use of self report measures to assess mother-infant bonding and infant temperament.

Additionally the PPST is a new measure which needs further validation.

Conclusions: Reflective rumination may act as an adaptive strategy for women in the postnatal period when faced with difficult child temperaments, and for those employing negative attributions, when faced with parent specific problem solving tasks. In addition, Brooding and Reflective Rumination may be important in predicting difficulties in mother-infant bonding. Difficult Infant temperaments and less positive or more negative maternal attributions, may affect problem solving, confidence in problem solving and mother-infant bonding in the postnatal period. Future research should look to replicate these findings and explicate possible causal relationships within a postnatal population.

1. Introduction

Childbirth represents a significant life event for all mothers and their families. It is a crucial time for both the mother and their infant and can be disrupted by many internal and external factors. Depression, at any time in a person's life can be debilitating, so depression in the postnatal period can have serious implications for both mother and her infant. Rates of postnatal depression (PND) have been reported to be between 10 and 15% (Hall & Papageorgiou, 2005), with up to 30% of postnatal women exhibiting emotional distress (Hipwell, Reynolds & Crick, 2004). Depression during the perinatal period has been associated with certain difficulties for the mother and the developing infant, as well as the mother-infant relationship.

1.1. Postnatal Depression

Depression in the postnatal period has been linked with poor outcomes for children, such as cognitive delay and a range of emotional and behavioural difficulties (Bonari et al., 2004; Field, 2011; Nulman et al., 2002). In particular, chronic PND has been linked with lower infant cognitive and psychomotor development (Cornish et al., 2005). It has also been suggested that the effect of PND on the child can include developmental disturbances, behavioural, emotional, attentional and interpersonal disturbances and that these changes outlast the maternal depressive episode and continue throughout childhood (Moehler, Brunner, Wiebel, Reck & Resch, 2006). Long-term effects have also been noticed in children of postnatally depressed mothers, including cognitive delay and chronic illness in adulthood (Field, 2011).

1.2. Postnatal Depression and the Mother-Infant Relationship

There is also a quantity of research which indicates that depression during the perinatal period can have a detrimental impact upon the mother-infant relationship. Bonding and attachment, the tie between the parent and the infant, is vitally important for infants, in order to ensure healthy growth and development. Attachment is described as the innate behaviours furnished to infants to ensure their survival (Bowlby, 1988). Impairment or interference in this process may be associated with some of the poor infant outcomes mentioned previously. PND has been consistently shown to have a negative impact on the mother-infant relationship (Edhborg, Mattiesen, Lundh & Widstrom, 2005; Loh, & Vostanis, 2004) and on the development of attachment strategies (Benvenuti, 2001). Higher levels of PND have been associated with lower infant security and maternal dissatisfaction with the mother-infant interaction (Coyl, Roggman & Newland, 2002). Hornstein et al., (2006) found that mothers who are depressed perceived bonding with their baby more negatively. PND has also been related with undesirable parenting practices, such as unresponsiveness, inattentiveness, intrusiveness, inept discipline and negative parental perceptions of their children (Gelfund & Teti, 1990). Care giving activities also seem to be compromised by PND, such as feeding practices (particularly breast feeding), sleep routines, vaccinations and safety practices (Field, 2010). Furthermore, PND has been linked to less responsive maternal behaviours and difficult interaction styles, such as being withdrawn or intrusive (Field, Miguel & Hernandez-Rief, 2009). There is evidence that depressed mothers, spend less time looking at their infants, touching them, talking to them and show more negative emotions on their faces (Field, 1995). Depressed mothers have reportedly diminished emotional involvement with their infants, impaired communication,

disaffection, increased hostility and resentment towards their child (Lovejoy, Grayczyk, O'Hare & Neuman, 2000). Murray, Kemptom, Woolgar and Hooper (1993) have suggested that it is the quality of maternal communication which may mediate the association between maternal depression and infant cognitive development at 18mths. Depressed mothers have also been shown to express more negative affect, be less focused on the infant experience and show less acknowledgement of infant agency (Murray et al, 1993).

Infants of mothers exhibiting such behaviours have demonstrated less attentiveness, show familiarity with sad faces (Field, 2009; Hernandez-Reif, Field, Deigo, Vera, & Pickens, 2006), have been shown to protest more, vocalise less, be less active, look away more frequently and show fewer positive faces. These infant reactions have been shown to generalise to non-depressed adults, indicating that these infant interaction disturbances may become generalised to all infant-adult interactions not just the infant-mother dyad (Field, 1995). These disturbances in the interaction of depressed mothers and their infants also appear to be universal across cultures and occur despite socio-economic status (Field, 2010).

1.3. Mechanisms Underlying Postnatal Depression

The literature is clear that PND has implications for the mother and the infant and the mother-infant relationship, however there is less clarity around the mechanisms driving the relationship between depression, poor maternal and infant outcomes and poor mother-infant bonding. In looking at depression literature, it may be possible to identify key processes which may also be acting in postnatal depression.

1.3.1 Depression and rumination. Depression research has shown that

prevalence rates for depression indicate women are twice as likely to show depressed mood and one and half times more likely to be diagnosed with a major depressive episode compared to men (Butler & Nolen-Hoeksema, 1994). Women appear to have more episodes of depression, which are longer in duration and are more likely to respond to their depressed mood by focusing their attention on their affective state. It has been suggested that women experience more chronic strain, have reported lower levels of mastery and may ruminate more. These factors have been suggested to mediate this gender difference in depression (Nolen-Hoeksema, Larson & Grayson, 1999). Butler and Nolen-Hoeksema (1994) found that females chose to engage in emotion-related tasks significantly more than males and that they were more likely than males to have an emotion-related ruminative coping style, in response to their depressed mood. Rumination has been described in many different ways but is understood to involve “repetitively focusing on the fact that one is depressed; on one’s symptoms of depression; and on the causes, meanings and consequences of depressive symptoms” (Nolen-Hoeksema et al., 1999, p. 569). Rumination appears to be a predictor of depression scores, maintaining and exacerbating mood when depressed. The response styles theory, suggests that women are more likely to respond to dysphoric mood with a ruminative cognitive style (Nolen-Hoeksema, 1991). As rumination has been linked with dysphoria and depression, this may help to explain these gender differences in rates of depression.

Nolen-Hoeksema (1991) suggests, in the response styles theory (Nolen-Hoeksema, Wisco & Lyubomirsky, 2008), that rumination exacerbates depression through its interaction with negative mood. In further studies rumination has been shown to predict chronicity of depressive disorders (Nolen-Hoeksema, 2000), increase depressed mood, impair performance, concentration and increase the

retrieval of negative autobiographical memories (Brinker & Dozois, 2009; Lyubomirsky, Caldwell & Nolen-Hoeksema, 1998; Lyubomirsky, Kasri & Zehm, 2003). It appears that rumination may interact with mood to interfere or affect particular processes or mechanisms, such as problem solving ability (Donaldson & Lam, 2004; Kao, Dritschel & Astell, 2006; Lyubomirsky & Nolen-Hoeksema, 1993; Lyubomirsky & Nolen-Hoeksema, 1995; Lyubomirsky, Tucker, Caldwell & Berg, 1999; Singer & Dobson, 2007; Watkins & Baracaia, 2002), cognitive flexibility (Davis & Nolen-Hoeksema, 2000), negative cognitive styles (Ciesla & Roberts, 2007), decision making (Radenborg, Jong-Meyer & Huffmeier, 2009) and confidence in problem solving ability (McMurrich & Johnson, 2008; Papageorgiou & Wells, 1999). If women are more likely to ruminate, then this may be a central mechanism underlying PND.

Other theories have suggested that rumination might be constructive and functional. Lyubomirsky & Nolen-Hoeksema (1993) found that people reported that ruminating about themselves and their problems makes dyphorics feel they understand themselves better. It has been argued that rumination is instrumental and helps people to attain their goals through more effective problem solving (Martin & Tesser, 1996). In a study looking at different types of rumination, two rumination factors were suggested, brooding and reflection (Treynor, Gonzalez & Nolen-Hoeksema, 2003). Treynor et al, (2003) suggests that reflective rumination may be adaptive in reducing negative affect because it leads to more effective problem solving. Reflective rumination, was found to be associated with more depression concurrently but with less depression overtime. Whereas brooding rumination was associated with more depression concurrently and longitudinally, suggesting it is a maladaptive form of rumination (Treynor et al., 2003). As the postnatal period is a

time when women have new and unique demands, particularly around problem solving, it may be that rumination under certain circumstances could have an adaptive function, whilst other types of rumination continue to have a pathological impact.

For mothers with depression, the first year following birth is a complex time, with many different demands, requiring a mother to be an effective problem solver with a good ability to think flexibly and functionally. If during the postnatal period a woman who is depressed is vulnerable to ruminate more, we may see these problem solving abilities and cognitive functions impaired. In addition a mother, who is ruminating more, may struggle to attend to her infant completely, affecting the bonding and attachment process. This could account for some of the effects that PND appears to have on the mother-infant relationship and poor infant outcomes.

1.3.2 Postnatal depression and maternal attributions. Another mechanism which may underlie PND and has been researched in general depression literature is dysfunctional cognitions. The transition into motherhood presents many new experiences and stressors, providing a unique set of cognitive tasks, at a time of increasing demands, opening up mothers to both the potential for the development of maternal specific dysfunctional cognitions (Church, Brechman-Toussaint & Hine, 2005) and the activation of previous negative cognitive styles (Milgrom & Beatrice, 2003). One particular type of dysfunctional cognition, that may be maternal specific, is the way in which a mother understands her infant's behaviour. Child abuse literature suggests that parental attributions about the causes of a child's behaviour, mediate the link between child behaviour and abusive parental behaviour. Studies have demonstrated that parental attributions of child behaviour can have a negative impact upon the parent-child interaction (Martorell & Bugental, 2006), leading to

more controlling and harsher parenting practices (Guavain, Fagot, Leve & Kavanagh, 2002). It is suggested that negative child behaviour, which is attributed to internal stable child characteristics (e.g. their bad or naughty), elicits more negative parental affect (Dadds, Mullins, McAllister & Atkinson, 2003). Research also suggests that mothers with depression have more attributional biases concerning their children's problematic behaviour, compared to non-depressed mothers, (White & Barrowclough, 1998). Mothers with depression were also found to be more likely to attribute problematic child behaviour to causes perceived to be controllable by the child (White & Barrowclough, 1998). Castro, Ayala and Mayes (2010) suggest that the attribution of infant behaviour is related to how a mother interprets the intentionality of her baby's cues. This ability to accurately interpret the intentionality of a baby's cue is vitally important in the formation of a secure infant attachment through the development of the mother-infant bond. Dysfunctional cognitions, such as attributional errors, or other underlying factors, such as rumination, may interfere with this process, through increasing preoccupation with thoughts and reducing a mother's ability to attend to her infant. This may explain some of the poor outcomes witnessed in infants of mothers. A preoccupation with negatively biased attributions may impact directly upon a mother's ability to problem solve, as her cognitive resources are diverted and distracted. Specifically, negative maternal attributions may be particularly problematic if a mother ruminates, as this may maintain or increase these attributions.

1.4. Postnatal Depression and Infant Temperament

Recognising some of the key mechanisms driving and underlying postnatal depression, such as rumination and attributions, are important in understanding the relationship between PND and poor outcomes in infants and mothers. However it

may not just be maternal factors driving or influencing these poor outcomes and impacting on the mother-infant relationship. It is also important to consider infant factors and how these may interact with maternal presentations. It is suggested that infants of mothers with depression already show non-optimal behaviours at birth, which may then further contribute to interaction disturbances. This suggests that it is not just a mother who contributes to the mother-infant interactions, but the infant's behaviour as well (Abrams, Field, Scafidi & Prodromidis, 1995). Temperament, defined as "Individual difference in emotional, motor and attentional reactivity measured by latency, intensity and recovery of response, and self regulation processes such as effortful control that moderate reactivity " (Rothbart, 2007, p207) has been shown to be one infant factor which may interact with PND and its underlying mechanisms. Temperament is thought to exhibit a degree of stability over time, but it is recognised that it can be affected by experience, genetic heritage and maturation, therefore parental functioning and home environment have the potential to influence temperament (Hannington, Ramchandani & Stein, 2010). Marked individual differences can be observed between infants, from even the first few early months of life. Studies have suggested that a difficult child temperament may be associated with maternal depression (Cutrona & Troutman, 1986), as well as negative mother-infant interactions, including parental ability to deal with and solve child rearing difficulties (Gauvain & Fagot, 1995; Martorell & Bugental, 2006). This suggests that infant temperament may influence how well a mother problem solves around parenting issues. Infants of depressed parents exhibit more difficult temperaments (Hannington et al., 2010) and difficult child temperament also seems to be a strong predictor of parental warmth (Kendler, Sham & MacLean, 1997) and later childhood depression (Hannington et al., 2010). Within the postnatal period, an

infant's temperament appears to present as an additional variable, which may interact with parental dysfunctional cognitions, particularly attributional biases, but also rates of rumination, to impact further upon infant and maternal outcomes.

Research into the mother-infant bonding process suggests that factors such as maternal depression (mood), negative parental attributions and child temperament may have a negative effect on the quality of the mother infant relationship (Moehler et al., 2006). These factors may be more problematic if a mother also ruminates, as this may maintain or increase these effects.

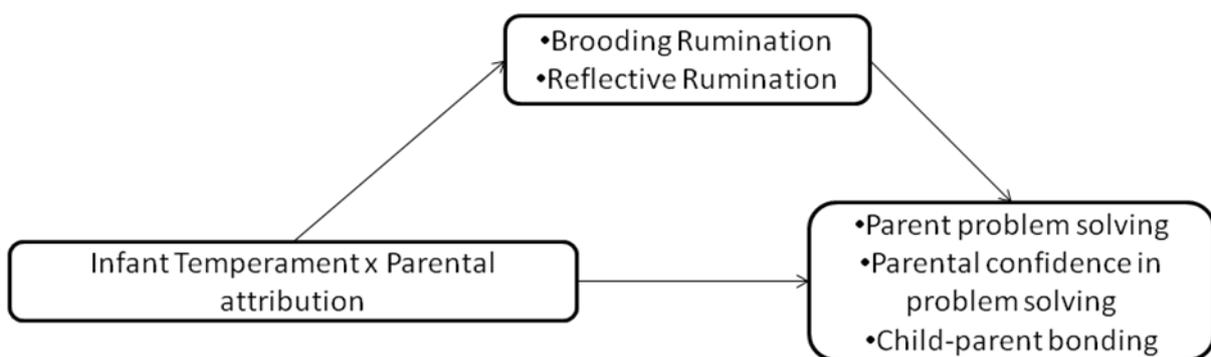
1.5. Present Study

The present research looks to consider some of the underlying mechanisms that may be acting in PND. Mechanisms underlying depression, such as brooding rumination and dysfunctional cognitions have been investigated within general and clinical populations. However there is a need for more research investigating these relationships within a postnatal population, as it poses specific risks and demands, unique to the postnatal population. It is suggested that brooding and reflective rumination may explain specific phenomena in the mother-infant relationship. As such this study proposes to control for mood in all analyses, in order to specifically examine these relationships, despite depression status. This present study proposes to investigate the relationships between maternal factors such as, brooding and reflective rumination and maternal attributions, and infant factors such as child temperament, on parental problem solving ability, parental confidence in problem solving ability and the mother-infant relationship (bonding). The following relationships are hypothesised:

1. Brooding and Reflective Rumination will predict parental problem solving ability, confidence in parental problem solving ability and mother-infant bonding, whilst controlling for mood.
2. The interaction of infant temperament and parental attributions will predict parental problem solving ability, confidence in parental problem solving ability and mother-infant bonding, whilst controlling for mood.
3. The interaction of infant temperament and parental attributions will predict Brooding and Reflective Rumination, whilst controlling for mood.
4. Brooding and Reflective Rumination will mediate the relationship between infant temperament and parental attributions, on parental problem solving ability, confidence in parental problem solving and mother- infant bonding, whilst controlling for mood.

The following mediational model is therefore hypothesised (see Figure 1).

Figure 1: Mediational Model



2. Method

2.1 Participants

The sample comprised 190 adult women, who had given birth to an infant within the last 12 months. Participants were recruited, over a three month period, via parent and infant information websites and parenting social networking groups, local children's centres, local baby groups and via email contacts.

Mothers were excluded if they were suffering or had previously suffered from psychosis; this meant that 14 participants were excluded from the study. The age of participants ranged from 21 to 43 years, with a mean age of 30.73 years (SD = 4.65). The respondents' infants ranged in age from 1 week to 12 months, with a mean age of 6.2 months (SD = 3.08). Demographic characteristics of the sample are shown in Table 1.

Table 1
Demographic characteristics of the sample (N = 190)

Demographic Variable		%	N
Maternal age (mean 30.73 years; SD 4.65 years; range 21-43 years)	21-26 years	18.8	35
	27-32 years	48.3	90
	33-38 years	25.3	47
	39-43 years	7.6	14
Relationship Status	Married	73.2	139
	In a committed relationship living together	23.2	44
	In a committed relationship not living together	1.6	3
	Single	1.6	3
	Other	0.5	1
Ethnicity	White British	73.7	140
	White	14.7	28
	Irish	2.1	4
	Other White	4.7	9
	Mixed heritage	0.5	1
	White and Black	0.5	1
	Other Black	0.5	1
	Asian or Asian British	0.5	1
	Indian	0.5	1

	Chinese	1.6	3
	Other Ethnic Group	0.5	1
Household Income			
	<9999	3.7	7
	10,000-14,999	5.3	10
	15,000-19,999	8.9	17
	20,000-29,000	14.2	27
	30,000-39,000	14.7	28
	40,000-49,000	16.3	31
	50,000-59,000	10.0	19
	60,000-69,000	10.5	20
	70,000-99,000	11.1	21
	>100,000	5.3	10
Highest Level of education achieved			
	Secondary School	5.8	11
	College or sixth form	13.7	26
	Further Education (not university)	17.9	34
	University Graduate	36.8	70
	Masters	15.3	29
	Post graduate Qualification	10	19
	Other	0.5	1
Occupational Status			
	Working Full time	9.0	20
	Working Part time	15.3	34
	On disability or extended medical leave	0.9	2
	Student	2.7	6
	Maternity Leave	45.0	100
	Stay at home mum	24.3	54
	Other	2.7	6
Infant age (Mean 6.2 months; SD 3.08 months; Range 0.01-12months)			
	0-3 months	23.1	44
	4-6 months	31	59
	7-9 months	28.5	54
	10-12 months	17.4	33
Number of children			
	1	54.7	104
	2	33.7	64
	3	7.9	15
	4	3.2	6
	5	0.5	1

2.2 Ethical considerations

This study was approved by The University of Exeter Ethical Committee Board (Appendix A.1, p.83). Prior to women completing the study they were given written information on the purpose of the study and asked to indicate their consent to participate. In the debrief material participants were provided with information about ways to get help and support, as well as the information regarding some postnatal depression help lines. Women were asked to provide GP contact details at the outset, with the understanding that if they indicated either risk to themselves or risk to their infant their GP would be informed.

2.3 Procedure and measures

Participants were given a link to a website (generated using SurveyGizmo), where they were provided with information about the study and exclusion criteria and consent questions (Appendix A.2, p.84). Participants who met inclusion criteria were then directed to complete a series of measures (Appendix A.3, p.90). Following the completion of measures, participants were asked to provide demographic information (Appendix A.4, p.116) and were presented with debrief information (Appendix A.5, p.119). Participants were given the option to complete the measures by mail or telephone (No participant chose either of these methods).

2.3.1 Edinburgh Postnatal Depression Scale (Cox, Holden & Sagovsky, 1987) (Appendix A.3.1, p.90). The EPDS is a ten item self report scale enquiring about mood in the last 7 days. High scores on the EPDS indicate lower mood. Although originally designed as a screening measure, the EPDS has been widely used as an outcome measure as well (Morrell et al., 2009). The EPDS has shown

good internal consistency in previous research (Cronbach's $\alpha = .87$) and good construct validity (Cox et al., 1987). Cronbach's α for the current sample was .89.

2.3.2 Postpartum Bonding Questionnaire (Brockington et al., 2001)

(Appendix A.3.2, p.93). The Postpartum Bonding Questionnaire (PBQ) measures the mother-infant relationship. It is a 25-item self report questionnaire designed to detect difficulties in the mother-infant relationship. The PBQ calculates four factors associated with bonding difficulties; Impaired bonding (IB), Rejection and Pathological Anger (RA), Infant Focused Anxiety (I-F A) and Incipient Abuse (IA). IB is typified by delay or loss of emotional response. A mother may express disappointment, have no feeling or feel distant from her infant (Klier & Muzik, 2000). RA is typified by negative feelings about the infant; dislike, hatred, anger and regret at the birth. A mother may express anger and feelings of being trapped. There is an absence of affectionate behaviour (Klier & Muzik, 2000). I-F A is typified by feeling anxious, particularly when alone with the infant and may lead to reduced contact with the infant (Klier & Muzik, 2000). High scores on all scales indicate more impairment in that bonding factor. For the purpose of this study the items constituting IA were collected, particularly as they provided information pertaining to the risk of child abuse; however this scale was not used in the analysis. Similar to previous studies (Edhborg et al., 2005; Hornstein et al., 2006), the IA scale has been excluded as 'risk of abuse' is not associated with any form of bonding disorder and is often not scored by most participants. This measure has been validated in both a clinical and non-clinical population. A validation of the PBQ showed positive predictive value to be 0.76 (Brockington, Aucamp & Fraser, 2006). Cronbach's α for this sample, for each factor was as follows; Impaired bonding .84, Rejection and Pathological Anger .83, Infant Focused Anxiety .67 and Incipient Abuse .76.

2.3.3 Maternal Attributions Scale (Castro et al., 2010) (Appendix A.3.3, p.97). The Maternal Attributions Scale is a 35-Item scale covering positive and negative maternal attributions about infant behaviour, wishes, intentions, thoughts and emotions. The scale has two subscales, positive attribution (PA) and negative attributions (NA). High PA scores signify an interpretation of an infant's cues as positive e.g. I feel that my baby smiles at me just to make me happy. Positive attributions are typified by interpreting the infant's behaviour as wanting to please and wanting to communicate. High NA scores signify an interpretation of an infant's behaviour as negative e.g. I feel that my baby cries, just to upset me. Negative attributions are typified by interpretations of the infant's behaviour as wishing to upset or cause distress. Previous analysis has shown good internal consistency for PA (Cronbach's $\alpha = .70$) and NA (Cronbach's $\alpha = .83$). Cronbach's α for this sample were .85 for PA and .84 for NA.

2.3.4 Parental Problem Solving Task (Appendix A.3.4, p.102). This was assessed using a Parental Problem Solving Task (PPST) which was adapted from the Means End Problem Solving Scale (MEPS) (Platt & Spivack, 1975). The MEPS assesses interpersonal problem solving ability. The current measure was modified to assess parental problem solving ability. In order to generate typical parental problem scenarios, five mothers were consulted and asked to develop problem scenarios associated with parenting a child 12 months or under. The principal investigator and a co-researcher then used this information to develop four unique parental problem scenarios, which were then reviewed by the initial five mothers. Following this review and consultation period, the final four parental problem solving tasks were piloted on four different mothers, with babies 12 months or under. Using these responses two researchers developed a scoring framework, taking into account the postnatal

literature, a modified scoring system used by Lyubomirsky and Nolen-Hoeksema (1995) and the scoring method used in the MEPS (Platt & Spivack, 1975). In addition, three psychologists, who were also mothers, were asked to provide feedback on the areas considered and the scoring system. Early into the study a selection of five participants' PPST responses were used to further develop the scoring procedure. Three researchers independently scored these PPST and these responses were used to further refine and develop the scoring procedure. In particular the researchers' scoring was looked at for areas of difference and similarity. Following this the scoring guidelines were further refined (see Appendix A.6, p.121 for the PPST manual). The scoring system coded for, solutions, obstacles, attending to the emotional state of the baby and/or self, positive attributions about the baby, self and/or others and overall solution effectiveness. The original MEPS has some similar scoring procedures, specifically scoring for 'means' or steps in solving the problem, enumeration of the means (elaboration of a step involved in solving the problem) and obstacles. Lyubomirsky and Nolen-Hoeksema (1995) modified the MEPS to produce an overall effective scale, which is very similar to the one used in this new measure.

The PPST presented participants with the beginning and the end of four different parental problem solving scenarios. Participants were asked to provide the middle section of these problem solving scenarios, completing the story. Scenarios were written in the first person and were programmed (using SurveyGizmo) to be randomly presented to participants. All PPST were scored (blind of mood scores) by the principal investigator and an independent scorer was used to score (blind of mood scores) a randomly selected 10% of the participants to assess inter-rater reliability. High scores on the PPST indicate more effective problem solving. An inter-

rater reliability analysis using the Kappa statistic was performed to determine consistency among raters. The inter-rater reliability for the raters scores for overall effectiveness of the PPST was found to be $Kappa = 0.77$ ($p < .001$).

2.3.5 Infant Behaviour Questionnaire (Rothbart, 1981) (Appendix A.3.5, p.104). This Infant Behaviour Questionnaire (IBQ) has been designed to measure temperament in infants. The IBQ assesses six dimensions of temperament, activity level, soothability, distress and latency to approach and sudden or novel stimuli, distress to limitations, duration of orientating. For the purpose of this study, distress to limitations and distress and latency to approach and sudden or novel stimuli, were collapsed into one factor (to aid analysis), which is referred to as Distress. In previous studies these two factors have been shown to load together into one factor which has been called Negative Affectivity (Garstein & Rothbart, 2003). The version of the IBQ used in this study omitted the Smiling and laughter and duration of orienting scales, leaving three temperament factors to use in the analysis of this sample. High scores on the distress scale indicate an infant who is showing distress to novel stimuli or whilst being fed, confined, dressed or prevented access to an object. High score on the soothability scale indicate a baby that is easily soothed through techniques such as rocking, holding or patting. High activity level scores indicate an infant who is more active, including moving their arms and legs and squirming. Previously, internal consistency for each subscale has been shown to be adequate (Cronbach's $\alpha = > 0.7$) (Parade & Leerkes, 2008). The current sample also showed good internal consistency for Distress (Cronbach's $\alpha = .77$), Soothability (Cronbach's $\alpha = .78$) and Activity Level (Cronbach's $\alpha = .70$).

2.3.6 Rumination Response Scale (Treyner et al., 2003) (Appendix A.3.6, p.112). This is a 22-item scale, examining trait levels of rumination, with responses on a 4 point likert scale, ranging from 1 (almost never) to 4 (almost always). The RSS has shown good internal consistency in previous studies (Cronbach's $\alpha = 0.9$) (Nolen-Hoeksema, Parker & Larson, 1994). For the purpose of this study, Treyner et al's., (2003) version of the RSS was used, enabling the calculation of the two sub factors Reflective Rumination (RR) and Brooding Rumination (BR). It is suggested that these factors differentially relate to depression in terms of their predictive ability. High RR scores indicate a propensity to contemplate, deal with and attempt to overcome problems. High BR scores indicate a tendency to think anxiously and gloomily. The two factors RR (Cronbach's $\alpha = .72$) and BR (Cronbach's $\alpha = .77$) have shown good internal consistency in previous studies. The Cronbach's α for this study was as follows; RR .78 and BR .84.

2.3.7 Confidence in parental problem solving (Appendix A.3.7, p.115). This was assessed using a 0-100 visual analogue scale (VAS), where 100 indicates high confidence, as used in other studies (Lyubomirsky et al., 1999). A VAS presented on a computer has been shown to give equivalent and valid information when compared to a pen and paper version and a likert rating scale (Tryon, Orr & Bleumenfield, 1996), particularly when based upon a single question (Turner, Van De Leemput, Draaisma, Oosterveld & Ten Cate, 2008)¹.

2.4 Analytic Strategy

It was estimated that to detect a moderate to large effect size using power of 0.80 and a significance level of 0.05, a total sample size of 150 would be required for

¹ Note: Confidence in parental problem solving will be referred to as 'confidence' for the rest of the study.

a multiple regression analysis. SPSS for Windows (version PASW 18) was used for all analyses. Assumptions necessary for statistical analyses were tested specifically skewness and kurtosis. Some variables (PBQ [scales IB, RA and IF-A], MAS ([NA]) were found not to meet assumptions of normality and so a logarithmic transformation was therefore carried out. Following this these variables met assumptions of normality. One variable (confidence in problem solving), which did not meet assumptions of normality, met these assumptions once three extreme outliers were removed (See Appendix A.7, p.135 for data screening).

The analyses were conducted in several stages. Initially, basic correlations between variables were investigated. In the second stage, to reduce coliniarity, all variables were centred. To centre a variable, the mean of that variable was subtracted from each individual variable. Then to test for moderation, within a multiple regression framework, controlled variables were entered in the first step, main effects were entered in the second step and the interaction effect was entered in the third step. In order to explicate the interaction Aitken and West's (1991) procedure was followed. Three steps are necessary to probe the interaction. First, a new variable must be created (e.g. SoothabilityLow). This term represented the individual score on a given measure plus one standard deviation from the score. In the second step, the crossproduct of the new variable (SoothabilityLow) with the predictor score (e.g. NA) was created. In the last step, the criterion (e.g. PPS) was regressed on the predictor (e.g. NegAtt), the new variable (SoothabilityLow) and the cross-product of these variables (SoothabilityLow x NA). The parameter estimate (β) of the predictor (e.g. NA) when significant, indicates that the relationship between that variable and the criterion variable (e.g. PPS) is significant at low levels of infant soothability. A similar process was performed to examine whether the relationship

between the predictor variable and the criterion variable was significant at high levels of the moderating variable.

To test for mediation several criteria must be met in order for complete mediation to be shown. First, the predictor variables must be shown to significantly predict the criterion variable. Second the mediating variable must be shown to also significantly predict the criterion variable. Thirdly, when the mediating variable is entered into the equation with the predictor variables, the significance of the predictor variables must reduce to complete non-significance, in the case of full mediation (Baron & Kenny, 1986).

3. Results

3.1. Descriptives and Preliminary Correlational Analysis

Means, standard deviations and correlations for the main variables are presented in Table 2. Positive correlations were found between EPDS and the rumination subscales (BR, $r(188) = .63, p < .01$, RR, $r(188) = .26, p < .01$), the bonding variables (IB, $r(187) = .54, p < .01$, RA, $r(187) = .45, p < .01$, I-F A, $r(187) = .47, p < .01$), Distress, $r(188) = .29, p < .01$, and NA, $r(188) = .37, p < .01$. Negative correlations were found between EPDS and PA, $r(188) = -0.23, p < .01$, PPS, $r(188) = -.24, p < .01$, and Confidence, $r(188) = -.45, p < .01$.

BR scores positively correlated with NA, $r(188) = .37$, Distress, $r(188) = .19$, IB, $r(187) = .48$, RA, $r(187) = .45$ and I-F A, $r(187) = .41$ (all $ps < .01$). RR also displayed the same pattern of positive correlations with NA, $r(188) = .3$, IB, $r(187) = .31$, RA, $r(187) = .34$, and I-F A, $r(187) = .29$ (all $ps < .01$), but was additionally shown to be positively correlated with PPS, $r(188) = .18, p < .05$. This suggests an association between higher levels of RR and better PPS.

Table 2

Mean, Standard Deviations and Correlations

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. EPDS	7.39	5.34													
2. BR	8.94	3.29	.63**												
3. RR	7.83	2.94	.26**	.52**											
4. PA	55.67	8.63	-.23**	-.16*	-.13										
5. NA	24.55	5.79	.37**	.37**	.30**	-.11									
6. Distress	3.30	0.75	.29**	.19**	.02	-.15*	.33**								
7. Soothability	5.14	0.98	.05	.01	-.12	.03	-.06	-.18							
8. Activity	3.86	0.97	.14	.02	-.03	-.04	.27**	.27**	.07						
9. PPS	31.34	10.29	-.24**	-.13	.18*	.09	-.07	-.19**	.08	-.05					
10. Confidence	82.75	14.26	-.45**	-.45**	-.29**	.18*	-.24**	-.32**	.00	-.04	.10				
11. IB	6.35	5.67	.54**	.48**	.31**	-.38**	.55**	.48**	-.15*	.29**	-.07	-.49**			
12. RA	3.27	3.45	.45**	.45**	.34**	-.41**	.50**	.38**	-.18*	.19**	.001	-.49**	.83**		
13. I-F A	2.73	2.49	.47**	.41**	.29**	-.39**	.43**	.48**	-.140	.22**	-.07	-.61**	.69**	.69**	

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed). N=190. EPDS = Edinburgh Postnatal Depression Scale, BR = Brooding Rumination, RR = Reflective Rumination, PA = Positive Attributions, NA = Negative attributions, PPS= Parental Problem Solving, IB = Impaired Bonding, RA = Rejection and Pathological Anger, I-F A = Infant Focused Anxiety

BR scores were found to be negatively correlated, with PA, $r(188) = -.16$, $p < .05$, and Confidence, $r(188) = -.45$, $p < .01$. RR was also found to be negatively correlated with Confidence, $r(188) = -.29$, $p < .01$, but not with PA.

PA negatively correlated with Distress, $r(188) = -.15$, $p < .05$, and all the bonding scales, IB, $r(187) = -.38$, RA, $r(187) = -.41$ and I-F A, $r(187) = .43$ (all $ps < .01$). Whereas NA positively correlated with Distress, $r(188) = .33$, Activity Level, $r(188) = .27$, and all the bonding scales, IB, $r(187) = .55$, RA, $r(187) = .5$ and I-F A, $r(187) = .43$ (all $ps < .01$). PA positively correlated with Confidence, $r(188) = .18$, $p < .05$, whereas NA negatively correlated with confidence, $r(188) = -.24$, $p < .01$.

As expected, Distress was negatively correlated with PPS, $r(188) = -0.19$, $p < .01$, and Confidence, $r(188) = -0.32$, $p < .01$.

Lower rates of confidence were also associated with poorer bonding, as results indicate a negative correlation between confidence and the three bonding scales (IB, $r(187) = -.49$, RA, $r(187) = -.49$, I-F A, $r(187) = -.61$ (all $ps < .01$)).

Soothability was negatively correlated with two of the bonding scales, IB, $r(187) = -.15$ and RA, $r(187) = -.18$ (all $ps < .05$). Conversely, an infant's Activity Level was found to be positively correlated with the bonding scales (IB, $r(187) = .28$, RA, $r(187) = .19$ and I-F A, $r(187) = .22$, (all $ps < .01$), indicating that higher infant activity levels are associated with poorer bonding.

PPS was found to be negatively correlated with Distress, $r(188) = -.19$, $p < .01$, and positively correlated with RR, $r(188) = .18$, $p < .05$.

3.2. Linear Regression Analyses - Mood

Linear regression analyses were conducted to examine the relationships between mood and predictor variables. Analyses showed that mood significantly predicted PPS, $\beta = -.245$, $t(188) = -3.467$, $p = .001$, Confidence, $\beta = -.376$, $t(184) = -5.488$, $p < .001$, and all three bonding scales (IB, $\beta = .518$, $t(187) = 8.287$, $p < .001$, RA, $\beta = .429$, $t(187) = 6.486$, $p < .001$ and I-F A, $\beta = .469$, $t(187) = 7.259$, $p < .001$). Mood also significantly predicted both rumination subscales, RR, $\beta = .264$, $t(188) = 3.757$, $p < .001$ and BR, $\beta = .632$, $t(188) = 11.168$, $p < .001$.

3.3. Multiple Regression Analyses

Hierarchical multiple regression analyses were conducted to examine the relationships between variables, whilst controlling for mood. A series of hierarchical multiple regressions were conducted to identify the contribution of selected predictor variables on parental problem solving ability, confidence in problem solving and bonding.

3.3.1. Hypothesis 1. Brooding and Reflective Rumination will predict parental problem solving ability, confidence in parental problem solving ability and mother-infant bonding, whilst controlling for mood.

3.3.1.1. Brooding and Reflective Rumination on Parental Problem Solving. A Hierarchical multiple regression analysis showed that RR ($\beta = .268$, $p < .001$) significantly predicted PPS (see Table 3). There was no significant effect found for BR.

Table 3

Hierarchical Multiple Regression: Criterion variable Parental Problem Solving

		B	SE B	β
1	(Constant)	34.830	1.241	
	EPDS	-.472	.136	-.245**
2	(Constant)	28.483	2.062	
	EPDS	-.608	.136	-.316***
	RR	.940	.248	.268***

Note $R^2 = .06$, $p = .001$ for Step 1; $\Delta R^2 = .067$, $p < .001$ for Step 2.
* $p < .05$, ** $p < .01$, *** $p < .001$

When RR and BR were entered into the regression together, RR still predicted PPS ($\beta = .331$, $p < .001$) and BR was non-significant.

3.3.1.2 Brooding and Reflective Rumination on Confidence in

Parental Problem Solving. Hierarchical multiple regression analyses also showed that the subscales of BR ($\beta = -.155$, $p < .01$) and RR ($\beta = -.227$, $p < .01$) both significantly predicted Confidence (see Tables 4 and 5 respectively).

Table 4

Hierarchical Multiple Regression: Criterion variable Confidence

		B	SE B	β
1	(Constant)	89.669	1.223	
	EPDS	-.771	.141	-.375***
2	(Constant)	94.225	2.065	
	EPDS	-.492	.172	-.239**
	BR	-.743	.274	-.227**

Note $R^2 = .141$, $p < .001$ for Step 1; $\Delta R^2 = .033$, $p = .007$ for Step 2. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 5

Hierarchical Multiple Regression: Criterion variable confidence

		B	SE B	β
1	(Constant)	89.669	1.223	
	EPDS	-.771	.141	-.375***
2	(Constant)	93.515	2.098	
	EPDS	-.70	.42	-.342***
	RR	-.558	.249	-.155**

Note $R^2 = .141$, $p < .001$ for Step 1; $\Delta R^2 = .023$, $p = .026$ for Step 2. * $p < .05$, ** $p < .01$, *** $p < .001$

When RR and BR were entered into a regression together, neither scales significantly predicted Confidence.

3.3.1.3. Brooding and Reflective Rumination on Bonding -

Impaired Bonding. Hierarchical multiple regression analyses also showed that the subscales of RR ($\beta = .226, p < .01$) and BR ($\beta = .184, p < .01$) both significantly predicted IB (see Tables 6 and 7 respectively).

Table 6

Hierarchical Multiple Regression: Criterion variable Impaired Bonding

		B	SE B	β
1	(Constant)	.501	.038	
	EPDS	.035	.004	.521***
2	(Constant)	.350	.065	
	EPDS	.026	.005	.378***
	BR	.025	.009	.226**

Note $R^2 = .271, p < .001$ for Step 1; $\Delta R^2 = .031, p = .005$ for Step 2. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 7

Hierarchical Multiple Regression: Criterion variable Impaired Bonding

		B	SE B	β
1	(Constant)	.501	.038	
	EPDS	.035	.004	.521***
2	(Constant)	.348	.065	
	EPDS	.032	.004	.472***
	RR	.023	.008	.184**

Note $R^2 = .271, p < .001$ for Step 1; $\Delta R^2 = .032, p = .004$ for Step 2. * $p < .05$, ** $p < .01$, *** $p < .001$

When RR and BR were entered into the regression together, neither scale significantly predicted IB.

3.3.1.4. Brooding and Reflective Rumination on Bonding –

Rejection and Pathological Anger. Hierarchical multiple regression analyses showed that the subscales of reflective ($\beta = .303, p < .01$) and brooding rumination ($\beta = .254, p < .01$) both significantly predicted rejection and pathological anger (see tables 8 and 9 respectively).

Table 8

Hierarchical Multiple Regression: Criterion variable Rejection and Pathological Anger

		B	SE B	β
1	(Constant)	.321	.032	
	EPDS	.022	.004	.410***
2	(Constant)	.162	.054	
	EPDS	.012	.004	.218**
	BR	.026	.007	.303***

Note $R^2 = .168$, $p < .001$ for Step 1; $\Delta R^2 = .055$, $p < .001$ for Step 2. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 9

Hierarchical Multiple Regression: Criterion variable Rejection and Pathological Anger

		B	SE B	β
1	(Constant)	.321	.032	
	EPDS	.022	.004	.410***
2	(Constant)	.156	.054	
	EPDS	.018	.004	.343***
	RR	.025	.006	.254***

Note $R^2 = .168$, $p < .001$ for Step 1; $\Delta R^2 = .062$, $p < .001$ for Step 2. * $p < .05$, ** $p < .01$, *** $p < .001$

When RR and BR were entered into the regression together, both RR ($\beta = .215$, $p = .004$) and BR ($\beta = .191$, $p = .039$) significantly predicted RA.

3.3.1.5. Brooding and Reflective Rumination on Bonding - Infant

Focused Anxiety. Hierarchical multiple regression analyses showed that the subscales of RR ($\beta = .232$, $p < .01$) and BR ($\beta = .194$, $p < .01$) both significantly predicted I-F A and (see tables 10 and 11 respectively).

Table 10

Hierarchical Multiple Regression: Criterion variable Infant focused anxiety

		B	SE B	β
1	(Constant)	.314	.030	
	EPDS	.024	.003	.469***
2	(Constant)	.197	.050	
	EPDS	.016	.004	.322***
	BroR	.019	.007	.232**

Note $R^2 = .22$, $p < .001$ for Step 1; $\Delta R^2 = .032$, $p = .005$ for Step 2. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 11
Hierarchical Multiple Regression: Criterion variable infant focused anxiety

		B	SE B	β
1	(Constant)	.314	.030	
	EPDS	.024	.003	.469***
2	(Constant)	.193	.050	
	EPDS	.021	.003	.418***
	RefR	.018	.006	.194**

Note $R^2 = .22$, $p < .001$ for Step 1; $\Delta R^2 = .035$, $p = .004$ for Step 2. * $p < .05$, ** $p < .01$, *** $p < .001$

When RR and BR were entered into the regression together, neither scale significantly predicted I-F A.

3.3.2. Hypothesis 2. The interaction of infant temperament and parental attributions will predict parental problem solving ability, confidence in parental problem solving ability and mother-infant bonding, whilst controlling for mood.

3.3.2.1. Infant Temperament and Maternal Attributions on Parental Problem Solving (PPS). Analyses show that the interaction of soothability and PA explained a significant proportion of variance in PPS ($R^2 = .089$, $F(185) = 3.84$, $p = .05$) and a significant increase of variance in PPS ($\Delta R^2 = 0.19$, $F(185) = 3.84$, $p = .05$) (see Table 12). Explication analysis of the significant interaction term, show that when PA is high (see Appendix B.1, p.144), there is a positive relationship between infant Soothability and PPS ($\beta = .246$, $p < .05$).

Table 12
Hierarchical Multiple Regression: Criterion variable Parental Problem Solving

		B	SE B	β
Step 1	(Constant)	34.830	1.241	
	EPDS	-.472	.136	-.245**
Step 2	(Constant)	34.809	1.265	
	EPDS	-.470	.140	-.244**
	Soothability	1.017	.746	.097
	PA	.031	.087	.026
Step 3	(Constant)	34.670	1.257	
	EPDS	-.458	.139	-.238**
	Soothability	1.014	.740	.096
	PA	.027	.086	.022
	SoothabilityXPA	.182	.093	.138*

Note $R^2 = .06$, $p = .001$ for Step 1; $\Delta R^2 = .01$, $p = .362$ for Step 2;

$\Delta R^2 = .019, p = .05$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

Regression analyses also revealed that Soothability and NA explained a significant proportion of variance in PPS ($R^2 = .071, F(185) = 3.868, p = .05$) and a significant increase of variance in PPS ($\Delta R^2 = .019, F(185) = 3.868, p = .05$) (see Table 13). Explication analysis show that when NA is low (see Appendix B.2, p.144), there is a positive relationship between infant Soothability and PPS ability ($\beta = .212, p < .05$). A main effect was also found, showing that infant Distress, $\beta = -.166, t(194) = -2.173, p = .031$, significantly predicted PPS. There were no other main effects found.

Table 13
Hierarchical Multiple Regression: Criterion variable PPS

		B	Std. Error	β
Step 1	(Constant)	34.830	1.241	
	EPDS	-.472	.136	-.245**
Step 2	(Constant)	35.142	1.305	
	EPDS	-.515	.147	-.268**
	Soothability	1.071	.748	.102
	NA	5.669	9.335	.046
Step 3	(Constant)	35.200	1.295	
	EPDS	-.532	.146	-.276***
	Soothability	1.238	.747	.118
	NA	4.663	9.278	.038
	SoothabilityXNA	-12.452	6.331	-.140*

Note $R^2 = .06, p = .001$ for Step 1; $\Delta R^2 = .011, p = .322$ for Step 2; $\Delta R^2 = .019, p = .05$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

3.3.2.2. Infant Temperament and Maternal Attributions on

Confidence in Parental Problem Solving. Analyses showed that, the interaction of Soothability and PA explained a significant proportion of variance in Confidence ($R^2 = .179, F(181) = 6.073, p = .015$) and a significant increase of variance in Confidence ($\Delta R^2 = .018, F(181) = 6.073, p = .015$) (see Table 14). Explication analysis showed that when PA is low (see

Appendix B.3, p.144), there is a positive relationship between infant Soothability and Confidence ($\beta = .252, p < .05$).

Table 14
Hierarchical Multiple Regression: Criterion variable Confidence

	B	SE B	β
Step 1 (Constant)	89.669	1.223	
EPDS	-.771	.141	-.375
Step 2 (Constant)	89.464	1.241	
EPDS	-.744	.143	-.362***
Soothability	.752	.718	.072
PA	.093	.084	.077
Step 3 (Constant)	89.629	1.226	
EPDS	-.758	.141	-.369***
Soothability	.758	.708	.072
PA	.098	.083	.081
SoothabilityXPA	-.218	.089	-.166*

Note $R^2 = .141, p < .001$ for Step 1; $\Delta R^2 = .011, p = .301$ for Step 2; $\Delta R^2 = .018, p = .015$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

Further explication analysis showed that when Soothability is low (see Appendix B.4, p.145), there is a positive relationship between PA and Confidence ($\beta = .258, p < .05$).

Analyses also revealed that the interaction of infant Distress and PA explained a significant proportion of variance in Confidence ($R^2 = .203, F(181) = 4.53, p = .035$) and a significant increase in the variance in Confidence ($\Delta R^2 = .02, F(181) = 4.53, p = .035$) (see Table 15). Hierarchical multiple regression analyses also showed a main effect, indicating that NA, $\beta = -.174, t(194) = -2.107, p = .037$, significantly predicted Confidence.

Table 15
Hierarchical multiple regression: Criterion variable Confidence

	B	Std. Error	β
Step 1 (Constant)	89.669	1.223	
EPDS	-.771	.141	-.375***
Step 2 (Constant)	88.652	1.247	
EPDS	-.638	.145	-.310***
Distress	-2.760	.974	-.198**
PA	.072	.083	.059
Step 3 (Constant)	89.075	1.251	
EPDS	-.667	.144	-.325***

Distress	-2.497	.972	-.179**
PA	.046	.083	.038
DistressXPA	.209	.098	.144*

Note $R^2 = .14, p < .001$ for Step 1; $\Delta R^2 = .042, p = .01$ for Step 2; $\Delta R^2 = .02, p = .035$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

Explication analysis show that when PA is low (see Appendix B.5, p.145), there is a negative relationship between infant Distress and Confidence ($\beta = -.309, p < .001$). Further, when infant Distress is high (see Appendix B.6, p.145) there is a positive relationship between PA and Confidence ($\beta = .168, p < .05$).

3.3.2.3. Infant Temperament and Maternal Attributions on Bonding

- **Impaired Bonding (IB).** Analyses showed that the interaction of infant Distress and NA explained a significant proportion of variance in IB ($R^2 = .461, F(184) = 6.681, p = .011$) and a significant increase of variance in impaired bonding scores ($\Delta R^2 = .02, F(184) = 6.681, p = .011$) (see Table 16).

Table 16
Hierarchical Multiple Regression: Criterion variable Impaired Bonding

		B	SE B	β
Step 1	(Constant)	.488	.038	
	EPDS	.034	.004	.518***
Step 2	(Constant)	.578	.035	
	EPDS	.022	.004	.332***
	Distress	.131	.028	.280***
	NA	1.176	.255	.282***
Step 3	(Constant)	.590	.035	
	EPDS	.022	.004	.334***
	Distress	.142	.027	.304***
	NA	1.516	.283	.363***
	DistressXNA	-.653	.253	-.168**

Note $R^2 = .27, p < .001$ for Step 1; $\Delta R^2 = .17, p < .001$ for Step 2; $\Delta R^2 = .02, p = .011$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

Explication analysis show that when NA is low ($\beta = .416, p < .001$) or high ($\beta = .193, p < .01$), there is a positive relationship between infant Distress and IB (see Appendix B.7, p.146 and B.8, p.146 respectively). Explication analyses

further show that when infant Distress is low ($\beta = .481, p < .001$) or high ($\beta = .246, p < .001$), there is a positive relationship between NA and IB (see Appendix B.9, p. 147 and B.10, p.147 respectively).

Analyses further show that the interaction of infant Soothability and PA explained a significant proportion of the variance in IB ($R^2 = .369, F(184) = 11.724, p = .001$) and a significant increase in the variance in IB scores ($\Delta R^2 = .04, F(184) = 11.724, p = .001$) (see Table17). There was also a main effect, indicating that infant activity levels, $\beta = .234, t(194) = 3.911, p < .001$ significantly predicted impaired bonding scores.

Table 17

Hierarchical Multiple Regression: Criterion variable Impaired Bonding

		<i>B</i>	<i>SE B</i>	β
Step 1	(Constant)	.488	.038	
	EPDS	.034	.004	.518***
Step 2	(Constant)	.506	.037	
	EPDS	.032	.004	.484***
	Soothability	-.057	.022	-.159**
	PA	-.008	.003	-.185**
Step 3	(Constant)	.499	.036	
	EPDS	.032	.004	.492***
	Soothability	-.057	.021	-.159**
	PA	-.008	.002	-.190**
	SoothabilityXPA	.009	.003	.201**

Note $R^2 = .269, p < .001$ for Step 1; $\Delta R^2 = .06, p = < .001$ for Step 2; $\Delta R^2 = .04, p = .001$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

Explication analysis showed that when Soothability is low (see Appendix B.11, p.147), there is a negative relationship between PA and IB ($\beta = -.408, p < .001$). Furthermore when positive MA is low (see Appendix B.12, p.148), there is a negative relationship between Soothability and IB ($\beta = -.377, p < .001$).

3.3.2.4. Infant Temperament and Maternal Attributions on Bonding

- **Rejection and Pathological Anger (RA).** Analyses showed that the

interaction of infant Soothability and PA explained a significant proportion of the variance in RA ($R^2 = .299$, $F(184) = 5.892$, $p = .016$) and a significant increase in the variance in RA ($\Delta R^2 = .022$, $F(184) = 5.892$, $p = .016$) (see Table 18). Hierarchical multiple regression analyses also showed some main effects, indicating that negative maternal attributions, $\beta = .422$, $t(194) = 5.654$, $p < .001$ and Infant distress, $\beta = .208$, $t(194) = 3.171$, $p = .002$ both significantly predicted rejection and pathological anger scores.

Table 18
Hierarchical Multiple Regression: Criterion variable Rejection and Pathological Anger

		B	Std. Error	β
Step 1	(Constant)	.344	.034	
	EPDS	.024	.004	.429***
Step 2	(Constant)	.361	.033	
	EPDS	.022	.004	.388***
	Soothability	-.063	.019	-.205**
	PA	-.008	.002	-.222**
Step 3	(Constant)	.357	.032	
	EPDS	.022	.004	.394***
	Soothability	-.063	.019	-.205**
	PA	-.008	.002	-.226***
	SoothabilityXPA	.006	.002	.150*

Note $R^2 = .184$, $p < .001$ for Step 1; $\Delta R^2 = .093$, $p < .001$ for Step 2; $\Delta R^2 = .022$, $p = .016$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

Explication analysis indicated that when Soothability is low, there is a negative relationship between PA and RA ($\beta = -.389$, $p < .001$) (see Appendix B.13, p.148). In addition when PA is low, there is a negative relationship between infant Soothability and RA ($\beta = -.368$, $p < .001$) (see Appendix B.14, p.148).

3.3.2.5. Infant Temperament and Maternal Attributions on Bonding

- Infant Focused Anxiety (I-F A). Hierarchical multiple regression analyses showed some main effects, indicating that PA, $\beta = -.248$, $t(194) = -4.169$, $p = .002$, NA, $\beta = .259$, $t(194) = 3.894$, $p < .001$, infant Activity Levels, $\beta = .145$, $t(194) = 2.347$, $p = .02$, infant Distress, $\beta = -.344$, $t(194) = 5.697$, $p < .001$,

and infant Soothability, $\beta = -.155$, $t(194) = -2.504$, $p = .013$, all significantly predicted I-F A scores. No significant interactions were found.

3.3.3. Hypothesis 3. The interaction of infant temperament and parental attributions will predict Brooding and Reflective Rumination, whilst controlling for mood.

3.3.3.1. Infant Temperament and Maternal Attributions on Brooding and Reflective Rumination. Analyses showed that the interaction of infant Soothability and NA explained a significant proportion of the variance of RR scores ($R^2 = .16$, $F(185) = 4.045$, $p = .046$) and a significant increase in the variance in RR scores ($\Delta R^2 = .018$, $F(185) = 4.045$, $p = .046$) (see Table 19). There was no significant effect found for BR.

Table 19
Hierarchical Multiple Regression: Criterion variable Reflective Rumination

		B	SE B	β
1	(Constant)	6.754	.352	
	EPDS	.145	.039	.264***
2	(Constant)	7.105	.358	
	EPDS	.097	.040	.176*
	Soothability	-.343	.205	-.114
	NA	8.735	2.560	.251**
3	(Constant)	7.122	.355	
	EPDS	.092	.040	.167*
	Soothability	-.296	.205	-.099
	NA	8.453	2.544	.243**
	SoothabilityXNA	-3.491	1.736	-.137*

Note $R^2 = .07$, $p < .001$ for Step 1; $\Delta R^2 = .72$, $p = .001$ for Step 2; $\Delta R^2 = .016$, $p < .05$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

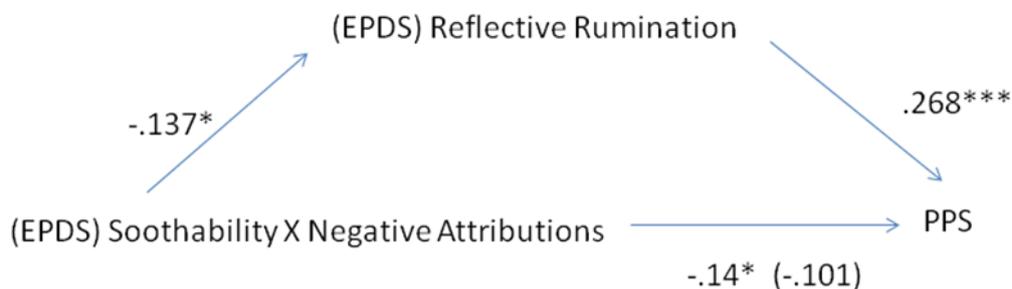
Explication analysis shows that when infant Soothability is low, there is a negative relationship between NA and RR ($\beta = .341$, $p < .001$) (see Appendix B.15, p.149). In addition, when NA are high, there is a negative relationship

between infant Soothability and RR ($\beta = -.192, p < .05$) (see Appendix B.16, p.149).

3.3.4. Hypothesis 4. Brooding and Reflective Rumination will mediate the relationship between infant temperament and parental attributions, on parental problem solving ability, confidence in parental problem solving and mother- infant bonding, whilst controlling for mood.

3.3.4.1. Mediation analyses. The relationship between Soothability and NA on PPS was mediated by RR (see Appendix B.17, p.150). As Figure 2 illustrates the standardised regression coefficient between the interaction term (soothability x negative attributions) and parental problem solving decreased significantly when reflective rumination was added to the regression model. The other conditions of mediation were met: The interaction term (soothability x negative attribution) was a significant predictor of parental problem solving and reflective rumination, and reflective rumination was a significant predictor of parental problem solving.

Figure 2. Standardized regression coefficients for the relationship between the interaction term (soothability x negative attributions) and parental problem solving as mediated by reflective rumination



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

4. Discussion

This study examined maternal factors (reflective and brooding rumination, maternal attributions) and infant factors (temperament) and considered their relationship to parental problem solving (PPS), confidence in PPS and mother-infant bonding.

4.1. Reflective and Brooding Rumination on Outcome Measures: PPS, Confidence in PPS and Bonding.

4.1.1. PPS. Results showed that reflective rumination, but not brooding rumination, predicted PPS. Specifically, high rates of reflective rumination predicted more effective problem solving. It was expected that high levels of brooding rumination might predict less effective problem solving, but this relationship was not shown. It was also expected that reflective rumination would negatively impact upon problem solving, however it seems to have had an adaptive function, producing a positive relationship between reflective rumination and problem PPS. There are no previous studies that have specifically looked at the relationship between brooding and reflective rumination on maternal problem solving.

4.1.2. Confidence in PPS. This study also found that reflective and brooding rumination predicted confidence in PPS. Specifically, low confidence in PPS was predicted by high rates of both reflective and brooding rumination. So mothers who employed a ruminative style of coping (brooding or reflective) were less confident in their problem solving abilities. Previous studies support these findings; in particular it has been found that rumination fosters less confidence in problem solving ability (McMurrich & Johnson, 2008; Papageorgiou & Wells, 1999). This also highlights that

being able to effectively problem solve does not always mean a woman will be confident in her problem solving abilities.

4.1.3. Bonding. As expected rumination, both brooding and reflective rumination, were found to predict all three bonding scales. This suggests that women who employ a more ruminative style of coping (either reflective or brooding) may experience interference in the mother-infant bonding process. Perhaps this is because rumination preoccupies the mother cognitively and prevents her from sensitively attending to her infant. There are no other studies which have investigated the role of rumination in bonding. The clinical implications of these findings are therefore interesting, particularly in terms of the application that ruminative focused interventions may have within a postnatal population.

4.2. Infant Temperament and Maternal Attributions on Outcome Measures: PPS, Confidence in PPS and Bonding.

4.2.1. PPS. This study found that infant soothability, and either low negative attributions or high positive attributions, predicted PPS. This suggests that mothers who have an infant who is soothable and who draw on a more positive attributional style, are able to problem solve more effectively.

4.2.2. Confidence in PPS. This study also found that, as hypothesised, the interaction of infant temperament and maternal attributions predicted confidence in PPS. Specifically, low confidence in PPS was predicted by infants who were less soothable and more distressed, and by mothers employing a less positive attributional style. This suggests that mothers who cope with an infant who is either less soothable or more distressed, as well as employing a less positive attributional style, are less confident in their problem solving abilities.

4.2.3. Bonding. The current study's findings are, that as hypothesised, the interaction of infant temperament and maternal attributions, predict bonding scores. Impaired bonding was found to be predicted by low infant soothability and low positive maternal attributions. Low infant distress levels and low negative attributions, predicted better bonding. This suggests that mothers who are coping with an infant, who is less soothable and more distressed, coupled with a less positive maternal attributional style, may experience disruption to the bonding process. These results are supported by other studies, where parental attributions of child behaviour were seen to have a negative impact upon the parent-child interaction (Martorell & Bugental, 2006). In addition, previous research has also suggested that a difficult child temperament may be associated with maternal depression (Cutrona & Troutman, 1986), as well as negative mother-infant interactions, including parental ability to deal with and solve child rearing difficulties (Gauvain & Fagot, 1995; Martorell & Bugental, 2006).

4.3. Infant Temperament and Maternal Attributions on Reflective and Brooding Rumination

This study found that infant soothability and negative maternal attributions predicted reflective rumination. In particular it was found that high levels of negative maternal attributions and low infant soothability was associated with higher levels of reflective rumination. So a mother who has a less soothable infant and employs a more negative attributional style is more likely to ruminate reflectively. No significant associations were found between infant temperament and maternal attribution on brooding rumination.

4.4. Mediation Analyses

It was further hypothesised that reflective and brooding rumination would mediate the relationship between infant temperament and parental attributions, on parental problem solving ability, whilst controlling for mood. Whilst this relationship did exist, unexpectedly a mediation analysis showed that when a mother is coping with a child who is less soothable, and they employ a more negative attributional style, if they are able to utilise reflective rumination, they can then problem solve more effectively. This suggests that there may be two routes, direct and indirect, to effective problem solving for postnatal women. One route directly leads to women problem solving effectively, whereas the other route, requires women to first reflect, before being able to problem solve effectively. It may be that women are particularly goal driven when it comes to looking after their babies, perhaps because of the huge pressures to be a good parent. Ordinarily you might expect this type of repetitive reflective rumination not to be helpful, but in the presence of an important goal such as effectively problem solving around a baby, reflective rumination serves to drive women to problem solve effectively. Other studies have suggested that rumination may be an adaptive strategy, helping people to attain their goals through more effective problem solving (Martin & Tesser, 1996). Treynor et al., (2003) also suggests that reflective rumination may be adaptive in reducing negative affect because it leads to more effective problem solving. Reflective rumination has also been associated with less depression over time, whereas brooding has been significantly related to depression (Treynor et al., 2003; Ciesla & Roberts, 2007).

4.5. Mood

Independently, mood was found to significantly predict PPS and confidence in PPS, indicating that low mood is related to poorer problem solving abilities and lower confidence in problem solving abilities. Mood was also found to predict bonding and

rumination scores. Indicating that low mood is related to impaired bonding and higher rates of rumination. These findings are supported by other research which has also demonstrated that low mood is related to higher rates of rumination (Lyubomirsky & Nolen-Hoeksema, 1995; Nolen-Hoeksema, 2000; Nolen-Hoeksema, 1991; Nolen-Hoeksema *et al.*, 2008; Watkins & Baracaia, 2002). Additionally, previous studies have also found that maternal mood can affect the sensitive bonding period between infants and mothers (Edhborg *et al.*, 2005; Moehler *et al.*, 2006).

4.6. Limitations

Before moving on to a more detailed discussion of these findings, it is important to mention the limitations of this study. Firstly the correlational design meant that while this study can suggest that there is a relationship between two variables, it cannot prove that one variable causes a change in another variable. In other words, correlation does not equal causation. Other variables might play a role, particularly within this population, such as birth trauma, previous history of depression, sleep deprivation, and hormonal changes. The survey design of this study also has its limitations, as such methods can be affected by an unrepresentative sample. In particular the use of an online survey meant that data was only collected from individuals who had access to a computer, the internet and who were computer literate. Although participants were given the option to complete paper copies or via the telephone, no-one chose to use these methods. Despite this, the demographic data does suggest that the sample captured a normally distributed population. In addition to demographic difficulties survey methods can also be open to participants trying to please the researcher, lie to make themselves look better, or have mistaken memories. It was also apparent that this survey contained a large

number of questionnaires and on average took participants about 45 minutes to complete. It was evident that there was a large dropout rate as the survey progressed, which could have been limited if the survey had been shorter in duration.

Further limitations may be associated with the measures used.

Specifically all the measures were self report, which leaves them open to biases and false reporting. The infant temperament questionnaire is also a maternal rating of infant temperament and may not accurately describe infant's actual temperament. Additionally, the PPST was a new measure specifically developed for the purpose of this study and although early indications are that it has good inter-rater reliability, it still needs to be fully investigated and tested further.

4.7. Clinical Implications

Taken together these results have a number of important clinical implications, with regard to the development of intervention and prevention programmes for women in the perinatal period. This study's findings suggest that reflective rumination in the postnatal period may act as an adaptive strategy in problem solving. However it also, seems that rumination, including reflective rumination, may interfere with the bonding process. This suggests that although reflective rumination may enable a mother to problem solve more effectively (which maybe driven by a mother's goal orientation) it is at a cost to the quality of the bond she has with her baby. Possibly, resources used to effectively problem solve, under difficult circumstances, such as an infant with a difficult temperament and a negative attributional style, leave a mother distracted and unable to attend effectively to her infant. It is important to note that these findings are despite whether a mother is

depressed or not. This might suggest that interventions which directly target either more effective problem solving or which tackle ruminative coping styles may be beneficial in the postnatal period. Additionally maternal attributions appear to play a role in increasing the effect that factors such as infant temperament can have upon maternal and infant outcomes. It may be possible that interventions could specifically target these maternal attributions. Other studies have also supported the idea that targeting specific maternal cognitions may be beneficial for women in the perinatal period (Phillips et al, 2010), including women with postnatal depression. The results of this study also suggest that perhaps it cannot be assumed that previous depression research findings can be directly applied to this population, as the postnatal period presents unique challenges and motivations for women.

4.8. Future Research

Future research should seek to replicate the findings in relation to reflective rumination and problem solving in postnatal population using prospective designs as well as looking to explain causal relationships between variables. Future research could also look to evaluate the effectiveness of cognitively based prevention/intervention programmes which look to target specific maternal dysfunctional cognitions.

4.8. Conclusions

The main findings of this study were that higher levels of trait reflective rumination were shown to predict more effective problem solving. Reflective rumination was also found to mediate the relationship between low infant soothability, moderated by high negative parental attributions, and PPS ability. Low confidence in PPS was predicted by reflective and brooding rumination, infants who

were less soothable and more distressed, and in mothers employing a less positive attributional style. High levels of brooding and reflective rumination were also found to be related to impairments in the mother-infant bonding process. Bonding may also be disrupted where mothers are coping with an infant, who is less soothable and more distressed, coupled with a less positive maternal attributional style.

In summary the main findings of this study were that, reflective rumination mediates the relationship between low infant soothability (moderated by high negative attributions) and parental problem solving. That rumination (both brooding and reflective) predicts impaired bonding. That difficult infant temperaments and less positive attributional styles predict impaired bonding and that low confidence in PPS ability is predicted by more temperamentally difficult infants, higher rates of rumination (reflective and brooding) and in mothers employing a less positive attributional style. Mood was also found to predict impaired bonding, lower confidence in PPS and PPS ability.

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A.1. Ethics Approval



Psychology Research Ethics
Committee

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To: Caroline Gashe
From: Cris Burgess
CC: Heather O'Mahen
Re: Application 2010/062 Ethics Committee
Date: November 23, 2010

The School of Psychology Ethics Committee has now discussed your application, *2010/062 – Child temperament, maternal attributions, postnatal mood and rumination, in predicting parental problem-solving and mother-infant bonding*. The project has been approved in principle for the duration of your study.

The agreement of the Committee is subject to your compliance with the British Psychological Society Code of Conduct and the University of Exeter procedures for data protection (<http://www.ex.ac.uk/admin/academic/datapro/>). In any correspondence with the Ethics Committee about this application, please quote the reference number above.

I wish you every success with your research.

A handwritten signature in black ink, appearing to read "Cris Burgess", written over a horizontal line.

Cris Burgess
Chair of Psychology Research Ethics Committee

A.2. Participant Information, screening questions and consent form

My name is Caroline Gashe and I am a Trainee Clinical and Community Psychologist. I am doing research looking at how we can help women who have given birth within the preceding year, within the United Kingdom.

This research is looking for women **with** or **without** symptoms of postnatal depression.

I would like to invite you to take part in this study. However, before you make a decision whether or not you would like to take part, please read the following information carefully. If you have any questions after reading this, please feel free to contact me directly (contact details are given below). Thank you for taking the time to read this.

Summary of the study

This study will look at both mothers and their babies. It will look at the relationship between mothers and their babies, as well as how mothers of babies solve problems. This study will also assess mood and how thinking affects how mothers solve problems. The study will involve completing 7 questionnaires. This will take between 30 minutes and 1 hour. The study has been reviewed and passed by the University of Exeter research ethics board.

Aim of the study

We know that the first year after birth is a busy time for women and is a time when you are building a relationship with your baby, as well as having to solve problems about the care of your new baby. We know that for some women this can be a stressful time and we want to understand if there are ways in which we can help women to cope and manage better, during this period.

Do I have to take part?

It is up to you whether or not to take part. If you do decide to take part please complete the consent form (which states that you agree to take part) and the questionnaires which are on the following pages. If you decide to take part you are still free to stop at any time without giving a reason. Taking part in the study will have no effect on any treatment you currently receive.

What will happen to me if I take part? What do I have to do?

Taking part in this study involves answering 7 questionnaires, including a questionnaire asking about you and your family (e.g., age, racial background). These questionnaires will follow on from this information sheet, but if you prefer they could be completed in a pen and paper format, by e-mail, or in consultation with a researcher over the phone. Please contact me to arrange alternative methods of completing the questionnaires if you prefer to do so.

To thank you for your time taking part in this study you will be entered into a prize

draw. Eight prizes, each of £25 in vouchers are available. Each winner will be able to choose whether they would like the prize to be in the form of a voucher for Mothercare, Argos or for a local health and beauty spa. You will have, approximately, a one in twenty chance of winning a prize.

What are the possible disadvantages and risks of taking part?

Being part of this research will involve you giving up your time to complete the questionnaires. Some of the questions are personal and sometimes people can find it upsetting to disclose these issues. You don't have to discuss anything you don't want to, and the process has been designed to be sensitive to your feelings and concerns. If you did become upset you could either call me to talk about this, or the following helplines may also be useful.

- The 'Meet a Mum Association' postnatal helpline (0845 120 3746), is available Monday to Friday between 7pm and 10pm.
- 'The Association for Postnatal Illness' postnatal helpline (020 7386 0868) is available Monday to Friday between 10am and 2pm.

What are the possible benefits of taking part?

The information we get from this study should help us to better understand how to support new Mums and could support psychological treatments for women with postnatal depression. Also, if the questionnaires indicate that you are struggling with

your mood and mental health we will contact you and can liaise with your local GP/Health visitor to help ensure you have access to help if needed or desired.

What would happen if we were concerned about the safety of you or your baby?

We are aware that being a mother of a young baby can be a stressful period of time. If from talking with you we became concerned that either you or your child was at risk of harm we would take steps to make sure you and your child were safe. These steps may include contacting you and asking to speak to your GP, Health Visitor or Social Services.

What will happen to the results of the study?

I aim to publish the work in an academic journal. Upon request, I will provide you with an information sheet about the results of the research. Your identity will not be revealed in any report or publication. Our research is often reported on the Mood Disorders Centre website at: <http://www.centres.ex.ac.uk/mood>

Contact for further information

If you would like any advice about participating in research you can contact the following organisations for information and advice on research.

- The National Research Ethics Services: <http://www.nres.npsa.nhs.uk>
- INVOLVE : Supporting public involvement in NHS, public health and social care research: <http://www.invo.org.uk/>

If you have any further questions please feel free to talk to me, Caroline Gashe, the study's Principal Investigator.

Caroline Gashe

Mood Disorders Centre

School of Psychology

University of Exeter

Exeter EX4 4QG

Telephone Number - 01392 725753

E-mail address – cg267@exeter.ac.uk

Screening Questions:

To take part in the study you need to have had a baby in the past 12 months.

Unfortunately you cannot take part if you have ever had any experiences of psychosis. If you are unsure how to answer these questions, or whether you are able to take part in the study please contact me using the details on the previous page.

1.) I have had a baby within the past twelve months.

Yes

No

2.) Have you had any experiences of psychosis? (This could have included hearing things that other people could not hear, like noises or voices, or seeing things that other people could not see).

Yes

No

Consent Form

Thank you for being willing to take part in the study. Prior to completing the questionnaires, please complete this consent form.

I have read the participant information and want to take part in the study.

Yes

No

I would like to be sent information about the results of the research when they are available.

Yes

No

A.3 Measures

A.3.1 EPDS

Hi [question("option value"), id="325", option="10543"] Please select the answer that comes closest to how you have felt in the past seven days.

) I have been able to laugh and see the funny side of things:

- As much as I always could
- Not quite so much now
- Definitely not quite so much now
- Not at all

) I have looked forward with enjoyment to things:

- As much as I ever did
- Rather less than I used to
- Definitely less than I used to
- Hardly at all

) I have blamed myself unnecessarily when things went wrong:

- Yes, most of the time
- Yes, some of the time
- Not very often
- No, never

) I have been anxious or worried for no good reason:

- No, not at all
- Hardly ever
- Yes, sometimes
- Yes, often

) I have felt scared or panicky for no very good reason:

- Yes, quite a lot
- Yes, sometimes
- No, not much
- No, not at all

) Things have been getting on top of me:

- Yes, most of the time I haven't been able to cope at all
- Yes, sometimes I haven't been coping as well as usual
- No, most of the time I have coped quite well
- No, I have been coping as well as ever

) I have been so unhappy that I have had difficulty sleeping:

- Yes, most of the time
- Yes, sometimes
- Not very often
- No, not at all

) I have felt sad or miserable:

- Yes, most of the time
- Yes, quite often
- Not very often
- No, not at all

) I have been so unhappy that I have been crying:

- Yes, most of the time
- Yes, quite often
- Only occasionally
- No, not at all

) The thought of harming myself has occurred to me:

Yes, quite often

Sometimes

Hardly ever

Never

A.3.2. PBQ

) Hi [question("option value"), id="325", option="10543"] Please indicate how often the following are true for you. There are no 'right' or 'wrong' answers. Select the answer which seems right in your recent experience:

	Always	Very often	Quite often	Sometimes	Rarely	Never
I feel close to my baby	()	()	()	()	()	()
I wish the old days when I had no baby would come back	()	()	()	()	()	()
I feel distant from my baby	()	()	()	()	()	()
I love to cuddle my baby	()	()	()	()	()	()
I regret having this baby	()	()	()	()	()	()
The baby doesn't seem to be mine	()	()	()	()	()	()
My baby	()	()	()	()	()	()

winds me up						
I love my baby to bits	()	()	()	()	()	()
I feel happy when my baby smiles or laughs	()	()	()	()	()	()
My baby irritates me	()	()	()	()	()	()
I enjoy playing with my baby	()	()	()	()	()	()
My baby cries too much	()	()	()	()	()	()
I feel trapped as a mother	()	()	()	()	()	()
I feel angry with my baby	()	()	()	()	()	()
I resent my baby	()	()	()	()	()	()

) There are no 'right' or 'wrong' answers. Select the answer which seems right in your recent experience:

	Always	Very often	Quite often	Sometimes	Rarely	Never
My baby is the most beautiful baby in the world	()	()	()	()	()	()
I wish my baby would somehow go away	()	()	()	()	()	()
I have done harmful things to my baby	()	()	()	()	()	()
My baby makes me feel anxious	()	()	()	()	()	()
I am afraid of my baby	()	()	()	()	()	()
My baby annoys me	()	()	()	()	()	()
I feel confident when caring for my baby	()	()	()	()	()	()
I feel the only solution is for someone else to	()	()	()	()	()	()

look after my baby						
I feel like hurting my baby	()	()	()	()	()	()
My baby is easily comforted	()	()	()	()	()	()

A.3.3. MAS

Hi [question("option value"), id="325", option="10543"] the following questions ask you to select the answer which best describes your feelings about your baby.

If you do not find an answer which exactly states your feelings, please fill in the answer which comes closest to describing how you feel.

	Never	Almost never	Not Sure	Sometimes	Often
I feel that my baby does things that bother me just to be mean	()	()	()	()	()
I feel that my baby really likes to be close to me	()	()	()	()	()
I feel that my baby refuses to sleep just to be mean	()	()	()	()	()
I feel that my baby truly appreciates what I do for him/her	()	()	()	()	()
I feel that my baby cries just to upset me	()	()	()	()	()
I feel that my baby understands what I am feeling	()	()	()	()	()
I feel that my baby	()	()	()	()	()

misbehaves just to be mean					
I feel that my baby tries to reward me	()	()	()	()	()
I feel that my baby throws things on the floor just to upset me	()	()	()	()	()
I feel that my baby is trying to threaten me	()	()	()	()	()
I feel that my baby thinks good things about me	()	()	()	()	()
I feel that my baby is rebelling against me	()	()	()	()	()
I feel that my baby disobeys me just to be nasty	()	()	()	()	()
I feel that my baby does things that please me just to be nice	()	()	()	()	()
I feel that my baby is looking at me in a particular	()	()	()	()	()

way just to make me feel bad					
I feel that my baby tries to punish me or to "get even"	()	()	()	()	()
I feel that my baby does not like me	()	()	()	()	()
I feel that my baby loves me	()	()	()	()	()

If you do not find an answer which exactly states your feelings, please fill in the answer which comes closest to describing how you feel.

	Never	Almost never	Not Sure	Sometimes	Often
I feel that my baby doesn't make any effort to please me	()	()	()	()	()
I feel that my baby does not want to be close to me	()	()	()	()	()
I feel that my baby can communicate with me	()	()	()	()	()
I feel that my baby smiles at me just to make me	()	()	()	()	()

happy					
I feel that my baby thinks bad things about me	()	()	()	()	()
I feel that my baby tries to control me	()	()	()	()	()
I feel that I love my baby	()	()	()	()	()
I feel that my baby is defying me on purpose	()	()	()	()	()
I feel that my baby is looking at me in a particular way just to please me	()	()	()	()	()
I feel that my baby soils a fresh nappy just to be mean	()	()	()	()	()
I feel that my baby makes an effort to please me	()	()	()	()	()
I feel that my baby does things on purpose just to be annoying	()	()	()	()	()
I feel that my baby knows when I am pleased with	()	()	()	()	()

him/her					
I feel that my baby refuses to eat just to be nasty	()	()	()	()	()
I feel that my baby makes eye contact in order to encourage me to play	()	()	()	()	()
I feel that my baby ignores me on purpose just to upset me	()	()	()	()	()
I feel that my baby does not appreciate what I do for him/her	()	()	()	()	()

A.3.4. PPST

Hi [question("option value"), id="325", option="10543"]

On the following page are a number of problem situations. For each situation, you have been given the beginning of the story and how the story ends. Your task is to connect the beginning that is given to you with the end that is given to you. In other words, you are to provide a middle for each story.

Try to imagine yourself experiencing the particular situation and describe in writing what you would do in that situation. For each situation please describe your ideal strategy for solving the problem giving as much detail as possible. Please describe your strategy in specific and concrete terms so that an outsider could follow your plan of action

When you're ready, click on the 'next' button below, to take you to the next page

Thank you

) The story starts:

You have recently moved to a new town and have a 6 month old baby. You take a 30 minute bus ride to the town to do some shopping. After being in the town for 20 minutes your baby starts to cry and get distressed. On checking on them, you discover that they have a dirty nappy which has leaked all over them and the buggy. You then discover you only have your bus pass and have left your wallet and spare nappies at home. Your baby begins to become even more upset and lots of people start to look at you.

The story ends.....You are back at home and your baby is clean and happy.

Please now write in detail your strategy for completing this story. Write as much as you can and use as much detail as possible:

) The story starts:

You are a lone parent and have moved to a new area and want to make some new friends with other mums your age. You have a 3 month old baby and a two year old. You attend a parent and baby group with your children. Your 3 month old baby starts to cry uncontrollably and refuses to settle and your two year old bites another child, which upsets another parent

The story ends.....You make some friends

Please now write in detail your strategy for completing this story. Write as much as you can and use as much detail as possible:

) The story starts:

You have an 8 month old baby and are worried about your baby's hearing. You have been to see your GP, who has reassured you that there is nothing to worry about. You are still very concerned about your baby's hearing.

The story ends.....You feel you have done all you can

Please now write in detail your strategy for completing this story. Write as much as you can and use as much detail as possible:

) The story starts:

Your baby has a runny nose and cold. You have a headache and think you may be coming down with something too. As you start to feel worse your baby becomes irritable, clingy and won't settle. You then realise you used the last nappy an hour ago and are running short of food.

The story ends.....you and your baby are resting

Please now write in detail your strategy for completing this story. Write as much as you can and use as much detail as possible:

Offering food or liquid	()	()	()	()	()	()	()	()
Offering baby his/her dummy or security object	()	()	()	()	()	()	()	()
Changing your baby's position	()	()	()	()	()	()	()	()
Other	()	()	()	()	()	()	()	()

A.3.6. RRS

Hi [question("option value"), id="325", option="10543"]

People think and do many different things when they feel down, sad or depressed. Please read each of the items and indicate whether you never, sometimes, often, or always think or do each one when you feel down, sad or depressed.

) Please indicate what you generally do, not what you think you should do.

	Almost never	Sometimes	Often	Almost always
Think about how alone you feel	()	()	()	()
Think "I won't be able to do my job/work because I feel so bad"	()	()	()	()
Think about your feelings of fatigue and achiness	()	()	()	()
Think about how hard it is to concentrate	()	()	()	()
Think about how passive and unmotivated you feel	()	()	()	()
Analyse recent events to try and understand why you are	()	()	()	()

depressed.				
Think about how you don't seem to feel anything anymore	()	()	()	()
Think "Why can't I get going?"	()	()	()	()
Think " Why do I always react this way?"	()	()	()	()
Go away by yourself and think about why you feel this way	()	()	()	()
Write down what you are thinking about and analyse it	()	()	()	()
Think about a recent situation, wishing it would have gone better	()	()	()	()
Think "Why do I have problems other people don't have?"	()	()	()	()

) Please indicate what you generally do, not what you think you should do.

	Almost never	Sometimes	Often	Almost always
Think about how sad you feel	()	()	()	()
Think about all your shortcomings, failings, faults and mistakes	()	()	()	()
Think about how you don't feel up to doing anything	()	()	()	()
Analyse your personality to try and understand why you are depressed	()	()	()	()
Go some place alone to think about your feelings	()	()	()	()
Think about how angry you are with yourself	()	()	()	()
Listen to sad music	()	()	()	()
Isolate yourself and think about the reasons why you feel sad	()	()	()	()
Try to understand yourself by focusing on	()	()	()	()

your depressed mood				
Think "What am I doing to deserve this?"	()	()	()	()
Think "I won't be able to concentrate if I keep feeling this way?"	()	()	()	()
Think "Why can't I handle things better?"	()	()	()	()

A.3.7. Confidence VAS

) Hi [question("option value"), id="325", option="10543"]

Using the numbers 1 to 100, please write the number which best represents how confident you are in solving problems surrounding your baby.

Where 0 indicates that you have low confidence in problem solving with your child and 100 indicates high confidence.

0 _____ 100

A.4. Demographics

Hi [contact("first name")] Please complete these demographic information questions, thank you.

) What is your date of birth? (dd/mm/yyyy eg. 23/03/1980)

) How would you describe your ethnicity?

- White
- White British
- Irish
- Other white background
- Mixed
- White and Black Caribbean
- White and Black African
- White and Asian
- Other mixed background
- Asian or Asian British
- Indian
- Pakistani
- Bangladeshi
- Other Asian background
- Black or Black British
- Caribbean
- African
- Other Black background
- Chinese
- Chinese or Other Ethnic Groups
- Other ethnic group

) How would you describe your occupation? (you may select more than one answer)

- Working full time
- Working part time
- On disability or extended medical leave
- Student
- On maternity leave (approximate date of return to work)
- Stay at home mum
- Other

) What is your gender?

- Male
- Female

) How would you describe your relationship status?

- Single
- Married
- In a committed relationship and living together
- In a committed relationship but not living together
- Civil Partnership
- Separated
- Divorced
- Other

) How many children do you have?

) What is the date of birth of your youngest child? (dd/mm/yyyy eg. 23/03/1980)

) How many of your children currently live with you?

) What is your yearly household income before tax?

- Less than £9999
- £10,000-£14,999
- £15,000-£19,999
- £20,000-£29,999
- £30,000-£39,999
- £40,000-£49,999
- £50,000-£59,000
- £60,000-£69,999
- £70,000-£99,999
- £100,000 or more

) What is your highest level of education?

- Primary school or less
- Secondary School (years 7-11)
- College or sixth form, including apprenticeships and diplomas (years 12-13)
- Further education (not university)
- University Graduate
- Masters level graduate
- Post graduate (Ph.D, doctorate)
- Other

A.5. Debrief Information

Thank You!

[question("option value"), id="325", option="10543"]

Thank you very much for taking part in this research study!

Your response is very important to us.

This study was looking at the factors which can affect how a mother, who has a young baby, problem solves and how certain factors might affect the mother-infant relationship. We were particularly interested in a process called rumination.

Rumination is a style of thinking. People who ruminate get caught up in thinking about negative things over and over. In other research, this style of thinking has been shown to have a negative impact on people who are experiencing low mood, or who are depressed. It can keep the low mood going, and can interfere with people's ability to solve problems.

In this study we're interested to see if rumination affects people's ability to parent and bond with their children. This will help us to develop new psychological interventions which can target the factors which most contribute to post natal depression.

If you have found that you have become upset whilst participating in this study you could either call me to talk about this, contact your GP or health visitor or the following helplines may also be useful.

- The 'Meet a Mum Association' postnatal helpline (0845 120 3746), is available Monday to Friday between 7pm and 10pm.

- 'The Association for Postnatal Illness' postnatal helpline (020 7386 0868) is available Monday to Friday between 10am and 2pm.

If you have any questions about the study please contact Caroline Gashe (Principal Investigator) using the details below.

Contact number: 01392 725753

E-mail: cg267@exeter.ac.uk

If you have selected that you wish to find out the results of the study these will be sent to you by October 2011.

The prize draw will occur by July 2011 and the winners notified by telephone or email. Good luck!

A.6. PPST Manual

Parental Problem-Solving Task (PPST)– Scoring Manual

In order to score the answers to the parental problem-solving task please follow the steps and criteria outlined below.

Before scoring, please read the answer in full, this will allow the story and content to be evaluated for overall logic and consistency and if a solution is given. In order to ascertain an overall problem-solving score, please use the following guidelines to score each question independently. A total score of all questions is then reached by adding the four individual question scores together to ascertain an overall score per participant.

Solution

A solution is defined as any attempt to achieve the end outcome of the story e.g. I would get on the bus and go home. A solution needs to be a discreet step, not a general statement, e.g. 'I do all the things to calm my baby' is not a solution unless detail is added such as, rocking baby, checking nappy etc. An answer without a solution would be where no attempt has been made to either answer the question or achieve the end outcome e.g. I don't know what I'd do.

- Is a solution given?
- Yes = 1 point.
- No = 0 point – do not continue to score.

Obstacles

Does the participant note obstacles?

Do not score for any similar or repeated obstacles e.g. 'if my mum couldn't help I'd then...' followed by 'If my Mum still couldn't help then...'.
An obstacle would be identified as something that might get in the way of reaching a solution. An obstacle would usually lead to developing an alternative solution.

e.g. 'if x won't help me, I'd' or 'if I couldn't do x I'd'

- 1 point for each obstacle.

More than one solution

Is more than 1 solution given? Please score for each additional solution, however discreet. e.g. cuddle, feed, check nappy, would be scored as 3. However, if an additional solution is a repetition or elaboration of the same or similar solution in one sentence, e.g. I would telephone a friend, my husband, mother or neighbour this would only be scored as one solution, where a similar solution is preceded by an obstacle and is presented as a discrete step it would be considered an additional solution.

- Following 1 point for initial solution, 1 point per additional solution.

Attending to Emotional Needs

Does the participant attend to the emotional state of themselves and/or the baby. This may take the form of seeking reassurance from others people, relaxing, comforting.

Self e.g. 'I'd ask other mothers if they've experienced this before'

Baby e.g. 'I'd soothe or cuddle my baby'

- Yes = 1 point
- No = 0 point

Participants score only 1 point per answer, for each attendance to self and baby, (e.g. overall maximum score per answer is 2) no matter how many times they indicate attending to emotional needs.

Positive attributions

Are positive attributions made about:

Self

Others

Baby

Does the participant show a positive way of thinking about themselves, others and their baby in relation to these scenarios? This needs to be an explicit statement about themselves, their baby or others not just implied. e.g. 'other people are usually nice to me when my baby cries', 'I wouldn't worry about what others thought' and 'It's okay for babies to cry that's how babies behave'.

- Yes = 1 point
- No = 0 point

Participants score 1 point per answer, for self, others and baby, (e.g. overall maximum score per answer is 3) no matter how many times they indicate positive attributions.

Overall Effectiveness Rating

1. No solutions given; alternatively, steps given that would not be at all effective, easy to carry out or realistic, they may even be counter-productive.
2. Some indication of steps 'in the right direction', but not overly detailed, effective or easy to carry out in terms of reaching solution.
3. Outlining some steps in the right direction, but not with sufficient detail/purpose to suggest that steps would be successful or easy to carry out. No obstacles are noted.
4. Useful, potentially easy and successful steps at solving the problem listed, but without a sense of structure, elaboration about short/long term outcomes, sense of sequential unfolding of steps, or contingency. Some recognition of obstacles maybe present but not necessarily explicitly stated.
5. Moderately easy and successful solutions given, with a sense of structure and an indication of some recognition of obstacles and concepts of outcome/sequence/contingency.
6. Very good, relevant steps detailed, that are likely to result in the problem being solved. Overall, the response is well structured, presents some alternatives, an awareness of possible obstacles (this may include more than one being noted), suggests alternatives within the solution, reflects a sense of sequence and contingency and attempts to minimise negative consequences and maximises positive consequences.

7. Extremely effective solution provided, that would be easy to follow and certain to result in the problem being solved. The response is well structured, presents a range of alternatives, anticipates obstacles and suggests alternatives as to how to overcome them, reflects a sense of sequence and contingency and attempts to minimise negative consequences and maximises positive consequences.

Parental Problem-Solving Task (PPST) – Example Scoring

The PPST was designed to generate problem solutions which take in to account multiple areas of caring for an infant. Adequate answers require the participant to conceptualise an effective way of managing a solution and bringing about a certain ending. As detailed previously, answers are scored by a number of domains (solutions, obstacles, attention to baby's and mother's needs, positive attributions and overall effectiveness). Detailed below are two example answers, followed by a more detailed outline of how answers may be scored.

Example 1.

Q1.

The story starts:

I have recently moved to a new town and have a 6 month old baby. I take a 30 minute bus ride to the town to do some shopping. After being in the town for 20 minutes my baby starts to cry and get distressed. On checking them, I discover that they have a dirty nappy which has leaked all over them and the buggy. I then discover I only have my bus pass and have left my wallet and spare nappies at home. My baby begins to become even more upset and lots of people start to look at me.

First of all I would phone my husband, a friend or anyone local that I know and ask them to come and rescue me! Ideally my husband or someone who might also have access to nappies, wipes and a change of clothes for the baby. Failing that, someone who could bring money (to buy nappies & wipes and even baby clothes from town). Or at the very least, someone to collect both me and the baby in their car and take us home...and I might ask them to bring a big towel so I could undress baby and wrap him up in that. I wouldn't worry about the car seat issue...this is an emergency!

If I could not get in touch with ANYONE, I would go into a Boots, Superdrug or Mothercare and appeal with them to give me the necessary provisions on credit – they can keep my wedding ring or iPhone as insurance! – to clean and re-dress baby. If this didn't work I would get a taxi (if they could put the poo-covered buggy in the boot) home and pay the driver once I had retrieved my wallet from inside.

The story ends:

I am back at home and my baby is clean and happy.

Q2.

The story starts:

I am a lone parent and have moved to a new area and want to make some new friends with other mums my age. I have a 3 month old baby and a two year old. I attend a parent and baby group with my children. My 3 month old baby starts to cry uncontrollably and refuses to settle and my two year old bites another child, which upsets another parent

I think that dealing with the biting toddler should take priority as I'd feel very embarrassed and guilty and would be aware of the other mums watching me / my reaction. I might ask one of the other mums to hold my screaming baby for 2 minutes while I dealt with the 2 yr

old attacker, the victim and (more importantly!) the victim's mother. I'd make a show out of telling off my 2 yr old – probably more that I would if we were at home and he had just bitten a sibling or me! – so the other mums would respect me. The screaming baby would not bother me as much as a) babies scream – that's what they do and b) there's no more accepting / understanding an environment as a mother & baby group! This incident would be the perfect ice-breaker...I'd be able to start talking to the mum who held the baby and the mother of the bite victim and hopefully invite them to my house for coffee to "make up for it"! With regard to the screaming baby I'd do all the usual things to try to calm it and if nothing worked I'd probably start to get worried as (SOMETHING usually works eventually). Also I would not be able to supervise my 2 yr old properly or talk to the other mums over the noise, so I'd leave..but I'd go back the next week

The story ends:

I make some friends

Q3.

The story starts:

I have an 8 month old baby and am worried about my baby's hearing. I have been to see my GP, who has reassured me that there is nothing to worry about. I am still very concerned about my baby's hearing.

I'd Google it 'til the cows come home! If I was still worried I'd talk to my HV about it. I know my HV well and in the past she has always referred my children on, if there's any suggestion of a problem with ears / eyes etc even without me asking her to. So I know that if I DID ask, she'd refer us to the Audiology straight away.

The story ends:

I feel I have done all I can.

Q4.

The story starts:

My baby has a runny nose and cold. I have a headache and think I may be coming down with something too. As I start to feel worse my baby becomes irritable, clingy and won't settle. Then I realise I used the last nappy an hour ago and am running short of food.

I would phone my husband and ask him to pick up some nappies and provisions on the way home from work. If for some reason (eg he was working late doing a private function) and I felt too ill to go out myself, I would phone one of my brilliant local friends and call in a favour. In the meantime I would give baby a good dose of Calpol and keep offering him milk, and hold him until he fell asleep. I'd take some painkillers. If I literally had NO nappies and the baby has dirtied himself, I'd just make one out of a small hand towel!

The story ends:

My baby and I are resting

An example of how answers are to be scored:

Q1.

First of all I would phone my husband, a friend, or anyone local (SOLUTION) that I know and ask them to come and rescue me! Ideally my husband or someone who might also have access to nappies, wipes and a change of clothes for the baby. Failing that (OBSTACLE), someone who could bring money (to buy nappies & wipes and even baby clothes from town)

(SOLUTION). Or at the very least, (OBSTACLE) someone to collect both me and the baby in their car and take us home (SOLUTION)...and I might ask them to bring a big towel so I could undress baby and wrap him up in that (SOLUTION). I wouldn't worry about the car seat issue...this is an emergency!

If I could not get in touch with ANYONE,(OBSTACLE) I would go into a Boots, Superdrug or Mothercare (SOLUTION)_and appeal with them (ATTRIBUTION-OTHER) to give me the necessary provisions on credit – they can keep my wedding ring or iPhone as insurance! (SOLUTION)_ – to clean and re-dress baby. If this didn't work (OBSTACLE) I would get a taxi (SOLUTION) (if they could put the poo-covered buggy in the boot) home and pay the driver once I had retrieved my wallet from inside.

OVERALL EFFECTIVENESS = 6

Q2.

I think that dealing with the biting toddler should take priority as I'd feel very embarrassed and guilty and would be aware of the other mums watching me / my reaction. I might ask one of the other mums to hold my screaming baby for 2 minutes (SOLUTION) while I dealt with the 2 yr old attacker, the victim and (more importantly!) the victim's mother. I'd make a show out of telling off my 2 yr old (SOLUTION) – probably more that I would if we were at home and he had just bitten a sibling or me! – so the other mums would respect me (ATTRIBUTION-OTHER). The screaming baby would not bother me as much as a) babies scream – that's what they do (ATTRIBUTION-BABY) and b) there's no more accepting / understanding an environment as a mother & baby group! (ATTRIBUTION OTHER) This incident would be the perfect ice-breaker ...I'd be able to start talking to the mum who held the baby and the mother of the bite victim (SOLUTION) and hopefully invite them to my house for coffee (SOLUTION) to "make up for it"! With regard to the screaming baby I'd do all the usual things to try to calm it (EMOTIONAL NEEDS OF BABY) and if nothing worked

(OBSTACLE) I'd probably start to get worried as (SOMETHING usually works eventually). Also I would not be able to supervise my 2 yr old properly or talk to the other mums over the noise (OBSTACLE), so I'd leave..but I'd go back the next week (SOLUTION)

OVERALL EFFECTIVENESS = 7

Q3.

I'd Google it 'til the cows come home! (SOLUTION) If I was still worried (OBSTACLE) I'd talk to my HV about it. (SOLUTION) I know my HV well and in the past she has always referred my children on, (ATTRIBUTION-OTHER) if there's any suggestion of a problem with ears / eyes etc even without me asking her to. So I know that if I DID ask, she'd refer us to the Audiology straight away.

OVERALL EFFECTIVENESS = 6

Q4.

I would phone my husband (SOLUTION) and ask him to pick up some nappies and provisions on the way home from work. If for some reason (eg he was working late doing a private function) (OBSTACLE) and I felt too ill to go out myself (OBSTACLE), I would phone one of my brilliant local friends (SOLUTION) and call in a favour (ATTRIBUTION-OTHER). In the meantime I would give baby a good dose of Calpol (SOLUTION) and keep offering him milk (SOLUTION) , and hold him until he fell asleep (SOLUTION / EMOTIONAL NEEDS OF BABY). I'd take some painkillers (SOLUTION). If I literally had NO nappies and the baby has dirtied himself , (OBSTACLE) I'd just make one out of a small hand towel! (SOLUTION)

OVERALL EFFECTIVENESS = 6

Example 2

Q1.

The story starts:

I have recently moved to a new town and have a 6 month old baby. I take a 30 minute bus ride to the town to do some shopping. After being in the town for 20 minutes my baby starts to cry and get distressed. On checking them, I discover that they have a dirty nappy which has leaked all over them and the buggy. I then discover I only have my bus pass and have left my wallet and spare nappies at home. My baby begins to become even more upset and lots of people start to look at me.

I go to Mothercare where I find other Mums in the baby change room and ask if anyone has a spare nappy. A very kind lady offers me a nappy and wipes to clean her with. In the baby change room there are some paper towels which I use to clean the buggy.

The story ends:

I am back at home and my baby is clean and happy.

Q2.

The story starts:

I am a lone parent and have moved to a new area and want to make some new friends with other mums my age. I have a 3 month old baby and a two year old. I attend a parent and baby group with my children. My 3 month old baby starts to cry

uncontrollably and refuses to settle and my two year old bites another child, which upsets another parent

I go to the parent and enquire after the other child and apologise to the parent who can see that I am struggling to settle my baby. The parent accepts the apology and starts to converse with me as she can see my distress. She introduces me to a couple of other parents one of which is also a single mum and we share experiences.

The story ends:

I make some friends

Q3.

The story starts:

I have an 8 month old baby and am worried about my baby's hearing. I have been to see my GP, who has reassured me that there is nothing to worry about. I am still very concerned about my baby's hearing.

I do some research on the Internet and take video clips of my baby referring to the behaviour that is causing concern and making me think there may be a hearing problem ie baby not responding to some sounds. I go to another GP to get a second opinion. I ask if I can see a specialist if it warrants further concern.

The story ends:

I feel I have done all I can.

Q4.

The story starts:

My baby has a runny nose and cold. I have a headache and think I may be coming down with something too. As I start to feel worse my baby becomes irritable, clingy and won't settle. Then I realise I used the last nappy an hour ago and am running short of food.

I take paracetamol and wrap myself and baby up warm and walk to the shops up the road to get more nappies and some food that is quick, nutritious and easy to prepare. The walk settles the baby and the baby falls asleep. We return home.

The story ends:

My baby and I are resting

An example of how answers are to be scored:

Q1.

I go to Mothercare (SOLUTION) where I find other Mums in the baby change room and ask if anyone has a spare nappy (SOLUTION). A very kind lady offers me a nappy and wipes(ATTRIBUTION-OTHER) to clean her with (SOLUTION). In the baby change room there are some paper towels which I use to clean the buggy (SOLUTION).

OVERALL EFFECTIVNESS = 3

Q2.

I go to the parent and enquire after the other child and apologise (SOLUTION) to the parent who can see that I am struggling to settle my baby. The parent accepts the apology and starts to converse with me as she can see my distress (ATTRIBUTION-OTHER). She

introduces me (SOLUTION) to a couple of other parents one of which is also a single mum and we share experiences (SOLUTION).

OVERALL EFFECTIVENESS = 3

Q3.

I do some research on the Internet (SOLUTION) and take video clips (SOLUTION) of my baby referring to the behaviour that is causing concern and making me think there may be a hearing problem i.e. baby not responding to some sounds. I go to another GP to get a second opinion (SOLUTION). I ask if I can see a specialist if it warrants further concern (SOLUTION).

OVERALL EFFECTIVENESS = 3

Q4.

I take paracetamol (SOLUTION) and wrap myself and baby up warm (SOLUTION) and walk to the shops up the road to get more nappies and some food (SOLUTION) that is quick, nutritious and easy to prepare. The walk settles the baby and the baby falls asleep (SOLUTION). We return home.

OVERALL EFFECTIVENESS = 3

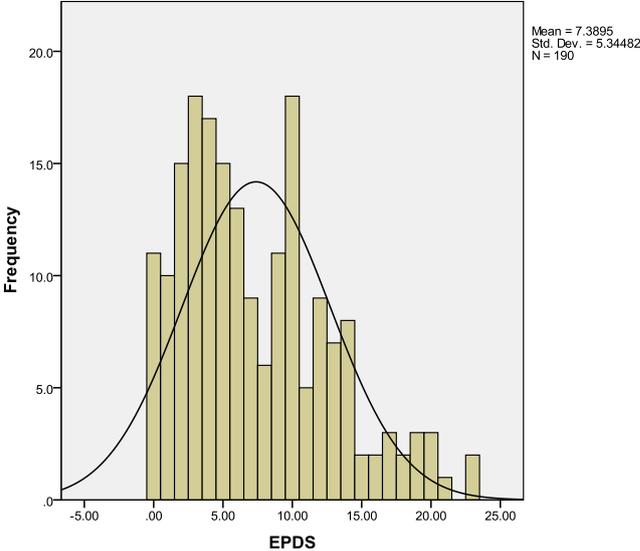
A.7 Data Screening

A.7.1. Kurtosis and Skewness

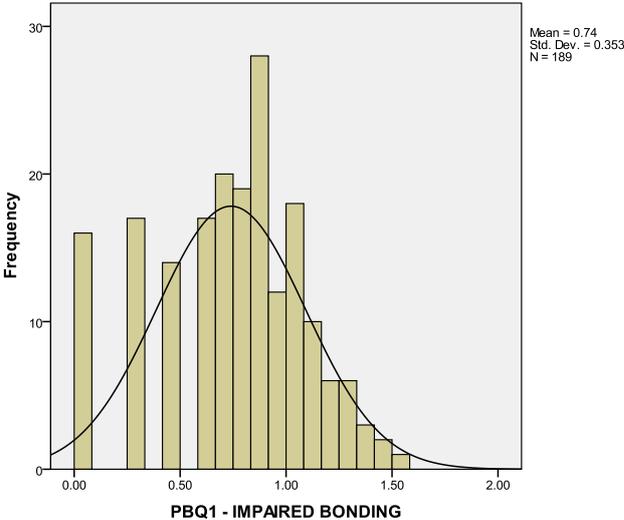
A.7.1. Skewness and Kurtosis

	EPDS	Brooding	Reflection	Positive Attributions	PPST	Activity	Soothability	Distress	Infant Focused Anxiety	Negative Attributions	Confidence	Impaired Bonding	Rejection & Pathological Anger
N Valid	190	190	190	190	190	190	190	190	189	190	186	189	189
Missing	0	0	0	0	0	0	0	0	1	0	4	1	1
Mean	7.3895	8.9421	7.8263	55.6684	31.3421	3.8568	5.1426	3.2968	.4894	1.3809	84.1828	.7401	.5221
Skewness	.745	.996	1.120	-.863	.372	.232	-.323	.570	-.091	1.885	-.776	-.423	.248
Std. Error of Skewness	.176	.176	.176	.176	.176	.176	.176	.176	.177	.176	.178	.177	.177
Kurtosis	-.025	.451	.721	.505	1.217	-.182	.249	.531	-.252	3.482	.508	-.169	-.263
Std. Error of Kurtosis	.351	.351	.351	.351	.351	.351	.351	.351	.352	.351	.355	.352	.352

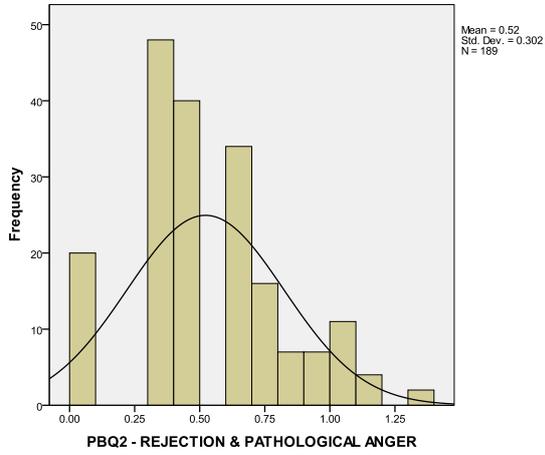
A.7.2. EPDS



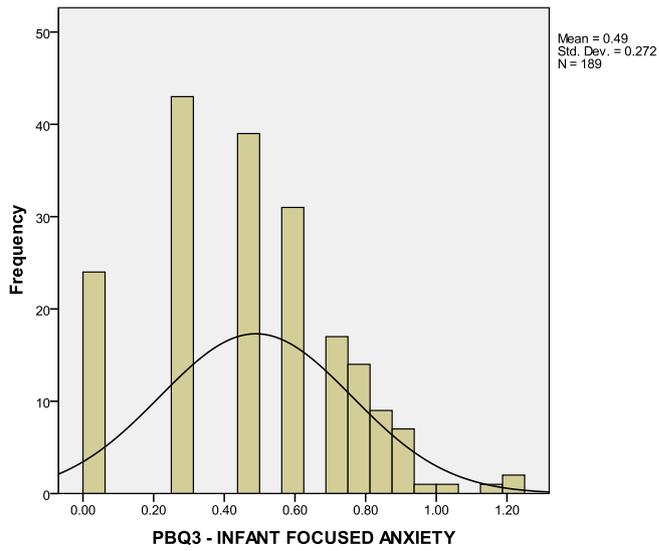
A.7.3. Impaired Bonding



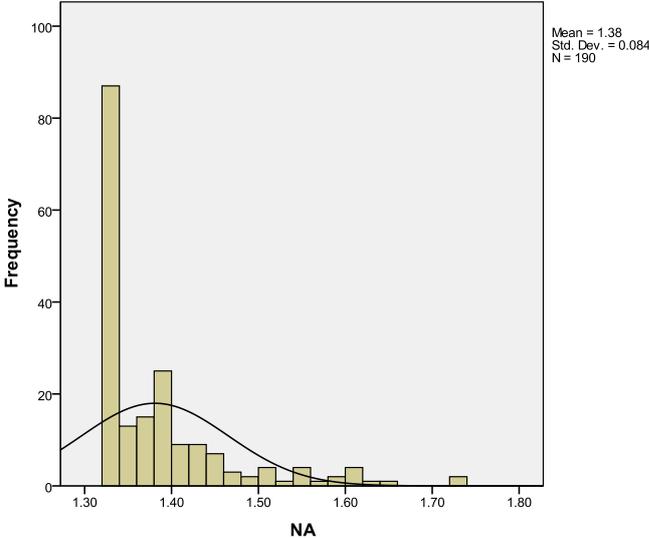
A.7.4.Rejection and Pathological Anger



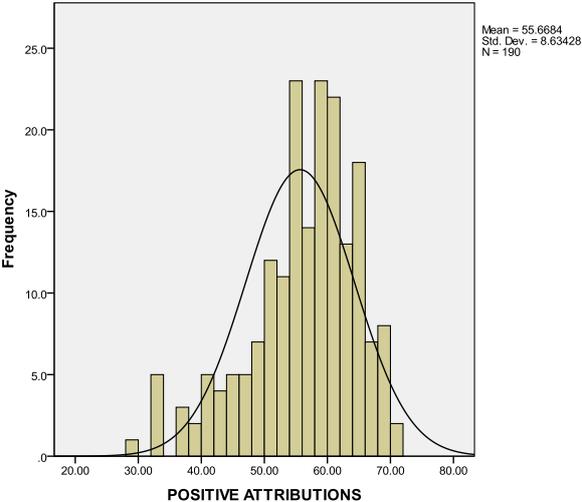
A.7.5. Infant-Focused Anxiety



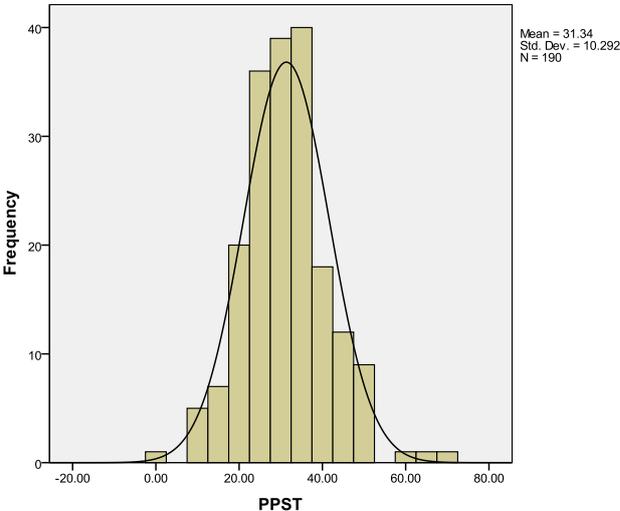
A.7.6. Negative Attributions



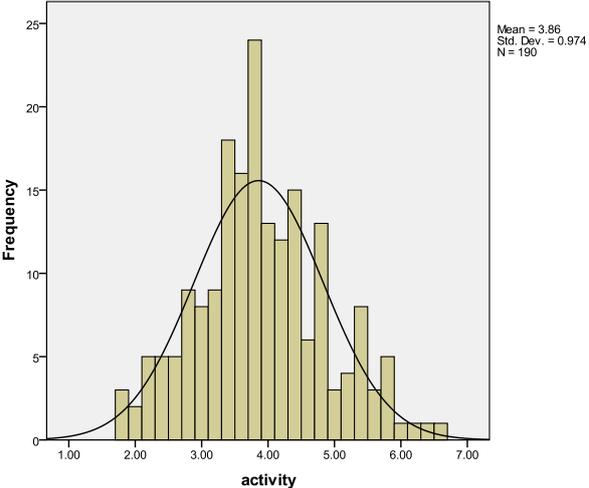
A.7.7. Positive Attributions



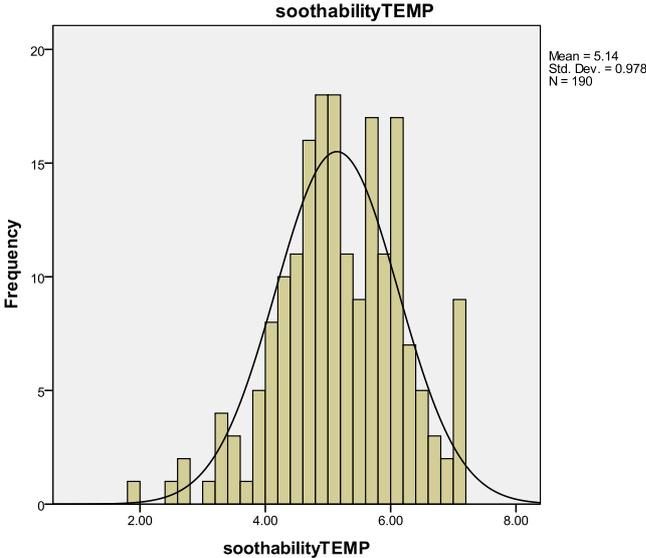
A.7.8. Parental Problem Solving



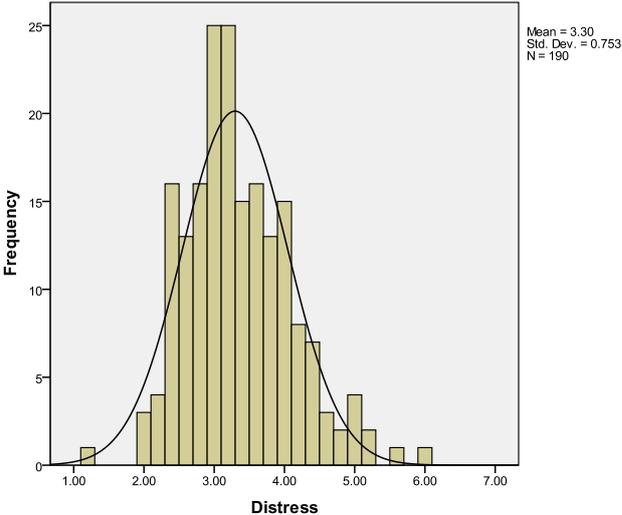
A.7.9. Activity Level



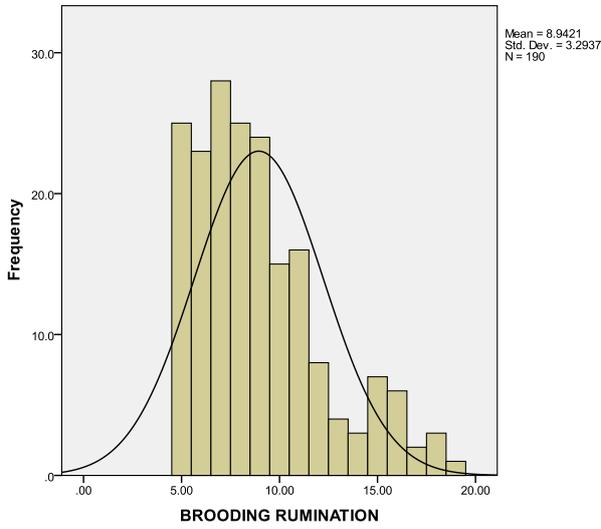
A.7.10. Soothability



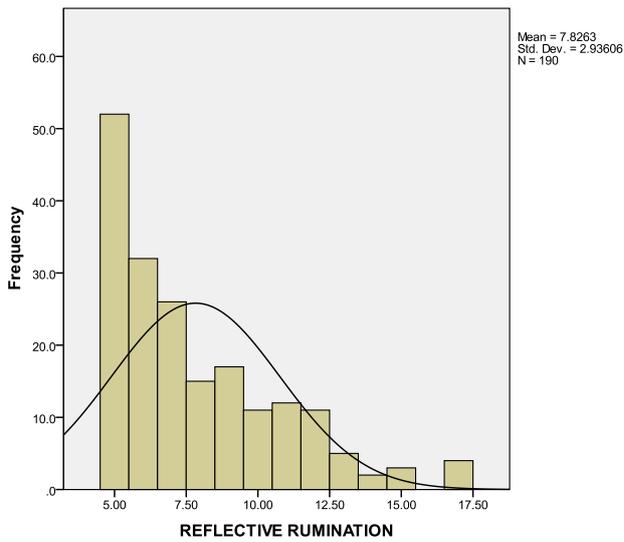
A.7.11. Distress



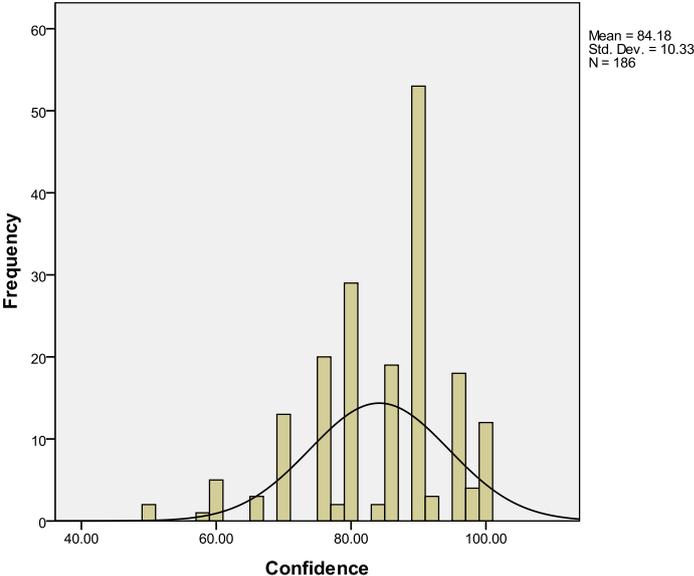
A.7.12. Brooding Rumination



A.7.13. Reflective Rumination



A.7.14. Confidence



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B. Explication Analyses

B.1.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable Parental Problem Solving

		<i>B</i>	<i>SE B</i>	β
Step 1	(Constant)	34.830	1.241	
	EPDS	-.472	.136	-.245**
Step 2	(Constant)	35.079	1.341	
	EPDS	-.470	.140	-.244**
	Soothability	1.017	.746	.097
	PA High	.031	.087	.026
Step 3	(Constant)	34.901	1.334	
	EPDS	-.458	.139	-.238**
	Soothability	2.588	1.090	.246*
	PA High	.027	.086	.022
	SoothabilityXPA High	.182	.093	.203*

Note $R^2 = .06$, $p = .001$ for Step 1; $\Delta R^2 = .01$, $p = .362$ for Step 2; $\Delta R^2 = .019$, $p < .05$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.2.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable PPS

		<i>B</i>	<i>SE B</i>	β
Step 1	(Constant)	34.830	1.241	
	EPDS	-.472	.136	-.245**
Step 2	(Constant)	34.688	1.287	
	EPDS	-.515	.147	-.268**
	Soothability	1.071	.748	.102
	NA Low	5.669	9.335	.046
Step 3	(Constant)	34.827	1.279	
	EPDS	-.532	.146	-.276***
	Soothability	2.235	.949	.212*
	NA Low	4.663	9.278	.038
	SoothabilityXNA Low	-12.452	6.331	-.177*

Note $R^2 = .06$, $p = .001$ for Step 1; $\Delta R^2 = .011$, $p = .322$ for Step 2; $\Delta R^2 = .019$, $p < .05$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.3.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable Confidence

		<i>B</i>	<i>SE B</i>	β
Step 1	(Constant)	89.669	1.223	
	EPDS	-.771	.141	-.375***
Step 2	(Constant)	88.663	1.544	
	EPDS	-.744	.143	-.362***
	Soothability	.752	.718	.072
	PA Low	.093	.084	.077
Step 3	(Constant)	88.782	1.524	
	EPDS	-.758	.141	-.369***
	Soothability	2.643	1.044	.252*
	PA Low	.098	.083	.081
	SoothabilityXPA Low	-.218	.089	-.245*

Note $R^2 = .141$, $p < .001$ for Step 1; $\Delta R^2 = .011$, $p = .301$ for Step 2; $\Delta R^2 = .028$, $p = .015$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.4.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable Confidence

		B	SE B	β
Step 1	(Constant)	89.669	1.223	
	EPDS	-.771	.141	-.375***
Step 2	(Constant)	88.727	1.406	
	EPDS	-.744	.143	-.362***
	Soothability Low	.752	.718	.072
	PA	.093	.084	.077
Step 3	(Constant)	88.887	1.388	
	EPDS	-.758	.141	-.369***
	Soothability Low	.758	.708	.072
	PA	.312	.122	.258*
	Soothability LowXPA	-.218	.089	-.247*

Note $R^2 = .141, p < .001$ for Step 1; $\Delta R^2 = .011, p = .301$ for Step 2; $\Delta R^2 = .028, p = .015$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.5.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable Confidence

		B	SE B	β
Step 1	(Constant)	89.669	1.223	
	EPDS	-.771	.141	-.375***
Step 2	(Constant)	88.034	1.527	
	EPDS	-.638	.145	-.310***
	Distress	-2.760	.974	-.198**
	PA Low	.072	.083	.059
Step 3	(Constant)	88.674	1.542	
	EPDS	-.667	.144	-.325***
	Distress	-4.304	1.207	-.309***
	PA Low	.046	.083	.038
	Distress X PA Low	.209	.098	.181*

Note $R^2 = .136, p < .001$ for Step 1; $\Delta R^2 = .042, p = .01$ for Step 2; $\Delta R^2 = .02, p = .035$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.6.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable Confidence

		B	SE B	β
Step 1	(Constant)	89.669	1.223	
	EPDS	-.771	.141	-.375***
Step 2	(Constant)	86.582	1.577	
	EPDS	-.638	.145	-.310***
	Distress High	-2.760	.974	-.198**
	PA	.072	.083	.059
Step 3	(Constant)	87.202	1.589	
	EPDS	-.667	.144	-.325***
	Distress High	-2.497	.972	-.179**
	PA	.203	.103	.168*
	Distress HighX PA	.209	.098	.180*

Note $R^2 = .141, p < .001$ for Step 1; $\Delta R^2 = .042, p < .01$ for Step 2; $\Delta R^2 = .02, p = .035$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.7.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable Impaired Bonding

	<i>B</i>	<i>SE B</i>	β
Step 1 (Constant)	.488	.038	
EPDS	.034	.004	.518***
Step 2 (Constant)	.484	.036	
EPDS	.022	.004	.332***
Distress	.131	.028	.280***
NA Low	1.176	.255	.282***
Step 3 (Constant)	.468	.036	
EPDS	.022	.004	.334***
Distress	.195	.037	.416***
NA Low	1.516	.283	.363***
Distress X NA Low	-.653	.253	-.228*

Note $R^2 = .269$, $p < .001$ for Step 1; $\Delta R^2 = .173$, $p < .001$ for Step 2; $\Delta R^2 = .02$, $p = .011$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.8.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable Impaired Bonding

	<i>B</i>	<i>SE B</i>	β
Step 1 (Constant)	.488	.038	
EPDS	.034	.004	.518***
Step 2 (Constant)	.672	.045	
EPDS	.022	.004	.332***
Distress	.131	.028	.280***
NA High	1.176	.255	.282***
Step 3 (Constant)	.711	.047	
EPDS	.022	.004	.334***
Distress	.090	.031	.193**
NAHigh	1.516	.283	.363***
Distress X NA High	-.653	.253	-.172*

Note $R^2 = .269$, $p < .001$ for Step 1; $\Delta R^2 = .173$, $p < .001$ for Step 2; $\Delta R^2 = .02$, $p < .011$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.9.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable Impaired Bonding

		B	SE B	β
Step 1	(Constant)	.488	.038	
	EPDS	.034	.004	.518***
Step 2	(Constant)	.480	.038	
	EPDS	.022	.004	.332***
	Distress Low	.131	.028	.280***
	NA	1.176	.255	.282***
Step 3	(Constant)	.483	.037	
	EPDS	.022	.004	.334***
	Distress Low	.142	.027	.304***
	NA	2.006	.407	.481***
	Distress LowX NA	-.653	.253	-.251*

Note $R^2 = .269$, $p < .001$ for Step 1; $\Delta R^2 = .173$, $p < .001$ for Step 2;
 $\Delta R^2 = .02$, $p = .011$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.10.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable Impaired Bonding

		B	SE B	β
Step 1	(Constant)	.488	.038	
	EPDS	.034	.004	.518***
Step 2	(Constant)	.676	.044	
	EPDS	.022	.004	.332***
	Distress High	.131	.028	.280***
	NA	1.176	.255	.282***
Step 3	(Constant)	.696	.044	
	EPDS	.022	.004	.334***
	Distress High	.142	.027	.304***
	NA	1.027	.257	.246***
	Distress HighX NA	-.653	.253	-.144*

Note $R^2 = .265$, $p < .001$ for Step 1; $\Delta R^2 = .173$, $p < .001$ for Step 2;
 $\Delta R^2 = .02$, $p = .011$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.11.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable Impaired Bonding

		B	SE B	B
Step 1	(Constant)	.488	.038	
	EPDS	.034	.004	.518***
Step 2	(Constant)	.562	.042	
	EPDS	.032	.004	.484***
	Soothability Low	-.057	.022	-.159**
	PA	-.008	.003	-.185**
Step 3	(Constant)	.555	.041	
	EPDS	.032	.004	.492***
	Soothability Low	-.057	.021	-.159**
	PA	-.017	.004	-.408***
	Soothability LowXPA	.009	.003	.302**

Note $R^2 = .269$, $p < .001$ for Step 1; $\Delta R^2 = .06$, $p < .001$ for Step 2;
 $\Delta R^2 = .04$, $p = .001$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.12.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable Impaired Bonding

		<i>B</i>	<i>SE B</i>	β
Step 1	(Constant)	.488	.038	
	EPDS	.034	.004	.518***
Step 2	(Constant)	.571	.046	
	EPDS	.032	.004	.484***
	Soothability	-.057	.022	-.159**
	PA Low	-.008	.003	-.185**
Step 3	(Constant)	.566	.045	
	EPDS	.032	.004	.492***
	Soothability	-.136	.031	-.377***
	PA Low	-.008	.002	-.190**
	Soothability XPA Low	.009	.003	.296**

Note $R^2 = .269$, $p < .001$ for Step 1; $\Delta R^2 = .06$, $p < .001$ for Step 2; $\Delta R^2 = .369$, $p = .001$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.13.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable Rejection and Pathological Anger

		<i>B</i>	<i>SE B</i>	β
Step 1	(Constant)	.344	.034	
	EPDS	.024	.004	.429***
Step 2	(Constant)	.423	.037	
	EPDS	.022	.004	.388***
	Soothability Low	-.063	.019	-.205**
	PA	-.008	.002	-.222**
Step 3	(Constant)	.419	.037	
	EPDS	.022	.004	.394***
	Soothability Low	-.063	.019	-.205**
	PA	-.014	.003	-.389***
	Soothability LowX PA	.006	.002	.226*

Note $R^2 = .184$, $p < .001$ for Step 1; $\Delta R^2 = .093$, $p < .001$ for Step 2; $\Delta R^2 = .022$, $p = .016$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.14.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable Rejection and Pathological Anger

		<i>B</i>	<i>SE B</i>	<i>B</i>
Step 1	(Constant)	.344	.034	
	EPDS	.024	.004	.429***
Step 2	(Constant)	.428	.041	
	EPDS	.022	.004	.388***
	Soothability	-.063	.019	-.205**
	PA Low	-.008	.002	-.222**
Step 3	(Constant)	.425	.041	
	EPDS	.022	.004	.394***
	Soothability	-.113	.028	-.368***
	PA Low	-.008	.002	-.226***
	Soothability X PA Low	.006	.002	.221*

Note $R^2 = .184$, $p < .001$ for Step 1; $\Delta R^2 = .093$, $p < .001$ for Step 2; $\Delta R^2 = .022$, $p = .016$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.15.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable Reflective Rumination

	<i>B</i>	<i>SE B</i>	β
Step 1 (Constant)	6.754	.352	
EPDS	.145	.039	.264***
Step 2 (Constant)	7.441	.399	
EPDS	.097	.040	.176*
Soothability Low	-.343	.205	-.114
NA	8.735	2.560	.251**
Step 3 (Constant)	7.412	.396	
EPDS	.092	.040	.167*
Soothability Low	-.296	.205	-.099
NA	11.874	2.981	.341***
Soothability LowX NA	-3.491	1.736	-.161*

Note $R^2 = .07$, $p < .001$ for Step 1; $\Delta R^2 = .072$, $p = .001$ for Step 2; $\Delta R^2 = .018$, $p < .05$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.16.

Explication Analysis, Hierarchical Multiple Regression: Criterion variable Reflective Rumination

	<i>B</i>	<i>SE B</i>	β
Step 1 (Constant)	6.754	.352	
EPDS	.145	.039	.264***
Step 2 (Constant)	7.804	.464	
EPDS	.097	.040	.176*
Soothability	-.343	.205	-.114
NA High	8.735	2.560	.251**
Step 3 (Constant)	7.798	.460	
EPDS	.092	.040	.167*
Soothability	-.575	.234	-.192*
NA High	8.453	2.544	.243**
Soothability X NA High	-3.491	1.736	-.157*

Note $R^2 = .07$, $p < .001$ for Step 1; $\Delta R^2 = .72$, $p = .001$ for Step 2; $\Delta R^2 = .018$, $p < .05$ for Step 3. * $p < .05$, ** $p < .01$, *** $p < .001$

B.17.

Hierarchical Multiple Regression: Criterion variable Parental Problem Solving

		<i>B</i>	<i>SE</i>	β
Step 1	(Constant)	34.830	1.241	
	EPDS	-.472	.136	-.245**
Step 2	(Constant)	35.142	1.305	
	EPDS	-.515	.147	-.268**
	Soothability	1.071	.748	.102
	NA	5.669	9.335	.046
Step 3	(Constant)	35.200	1.295	
	EPDS	-.532	.146	-.276***
	Soothability	1.238	.747	.118
	NA	4.663	9.278	.038
	SoothabilityXNA	-12.452	6.331	-.140*
Step 4	(Constant)	28.247	2.229	
	EPDS	-.622	.143	-.323***
	Soothability	1.527	.726	.145*
	NA	-3.590	9.228	-.029
	SoothabilityXNA	-9.044	6.183	-.101
	Reflective Rumination	.976	.259	.279***

Note $R^2 = .06$, $p = .001$ for Step 1; $\Delta R^2 = .011$, $p = .322$ for Step 2;
 $\Delta R^2 = .019$, $p < .051$ for Step 3; $\Delta R^2 = .065$, $p < .001$. * $p < .05$, ** $p < .01$, *** $p < .001$

Appendix C. Dissemination Statement

- The findings of this study will be submitted for publication to the Journal of Affective Disorders.
- A brief summary of the findings will be disseminated, by email, to all participants that requested to receive them.
- Additionally the parenting website Netmums has requested to publish a summary of the study's findings on their website.
- Research findings will be presented to the Exeter University Clinical Psychology Doctoral training programme trainees and staff, staff in NHS Devon CAMHS and to the Rumination think-tank at The Mood Disorders Centre, Exeter University.

Appendix D. Instructions to Authors

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