Moderators and Mediators of Outcome in an Internet-Based Behavioural Activation Trial for Postnatal Depression (Netmums).

Submitted by Amanda Swales to the University of Exeter as a thesis for the degree of Doctor of Clinical Psychology, January 2015

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I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

Signature: ..............................................................
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Author’s Declaration for Joint Working

The empirical paper within this thesis forms one part of a larger body of research. This author, in collaboration with another Trainee Clinical Psychologist, was responsible for collecting the 6 and 12-month follow-up data. The design of the trial and original recruitment, intervention, and data collection (at baseline and post-treatment) had been conducted prior to this author’s involvement in the study. The specific research questions and hypotheses related to the relationship between baseline measures and follow up data were this author’s own. All data analysis was conducted by this author.
A systematic review of the longer-term patterns of the mother-child relationship within the context of maternal postnatal depression

SUPERVISOR: Heather O’Mahen

TARGET JOURNAL: Behaviour Research and Therapy

WORD COUNT: 3,991 (excluding abstract)
Abstract

Background: The review aims to examine any prospective or longitudinal literature that provides follow up outcomes relating to mother-child relationship or attachment within the context of postnatal depression (PND). Method: A systematic search of key electronic databases identified studies that examined follow up outcomes specifically focusing on the mother-child relationship or attachment within the context of PND. Results: It was found that PND has long-term consequences for the mother-child relationship. The studies included suggest insecure mother-child attachments remain in the months and years following the postnatal period. Some studies suggest this is due to severity and chronicity of maternal depression, other studies suggest early symptoms of mood predict later attachment as opposed to current maternal mood. The implications for this are discussed. Conclusions: The review concludes that the majority of literature in this area agrees that there are long-term negative consequences for the mother-child relationship. It suggests that more research is required to design and implement interventions that target the mother-child relationship as well as the maternal mood. Limitations: A large majority of papers in this study are based on the same prospective samples.

Keywords: postnatal depression, attachment, prospective/longitudinal, mother-child relations
Introduction

Background

Meta-analyses suggest prevalence rates of Postnatal Depression (PND) are approximately 10-15% in new mothers (O’Hara & Swain, 1996). The postnatal period is usually defined as the period beginning immediately after birth and extending for six weeks following the birth (World Health Organisation; WHO, 2013). The diagnostic criteria for PND within the literature varies considerably; some define onset within four weeks, some reports suggest 50% of cases start within three months and 75% within seven months of birth (Cooper, Campbell & Day, 1988). According to Bowlby’s (1958) attachment theory there is a critical period between birth and two and half years old where it is important that good relationships are developed. The theory suggests that if parents are not in tune with their child’s needs this can lead to insecure attachment styles.

A number of studies using systematic assessment of early child attachment in women with PND have consistently linked the presence of PND and insecure attachment styles (Teti, Gelfand, Messinger, & Isabella, 1995; Tronick et al., 1986). The impact of PND on both the mother and child has a number of adverse consequences for the mother, the mother-child relationship, and subsequent child development (Tronick, Field, Lyons-Ruth, Zoll, Connell, & Grunebaum, 1986; Halligan, Herbert, Goodyer, & Murray, 2004; Milgrom, Westley, & Gemmill, 2004).

Perhaps what is less understood is the trajectory of the mother-child relationship and whether PND has a lasting impact on attachment. The current research evaluating PND interventions suggests improvement in maternal mood is not associated with an improvement in the mother-child relationship (Milgrom,
Ericksen, McCarthy, & Gemmill, 2006; Forman et al., 2006). It is unclear whether depressive symptoms during the postnatal period permanently and adversely impact on the future development of the mother-child relationship or attachment. There are some studies that suggest attachment is stable over time (Waters et al., 2000; Hamilton, 2000), however, there is also evidence to suggest the contrary, particularly if there are significant changes to family circumstances (Lewis et al., 2000).

The research in this area is complicated by several studies suggesting that there is a high rate of subsequent maternal depressive episodes throughout the child’s life in addition to depression in the postnatal period (Murray et al., 2011; Halligan, Murray, Martins, & Cooper, 2007). Within the broader literature there is evidence that severity and chronicity of maternal depression is strongly associated with adverse child outcomes than the specific timing of the onset of depression (Hammen and Brennan, 2003; Brennan, Hammen, Anderson, Bor, Najman & Williams, 2000). These studies do not report mother-child relationship outcomes, however, they report that single episodes of depression were less associated with poor child outcomes. Given that it is hypothesised that the quality of the mother-child relationship and child outcomes are associated (Murray et al., 2011), it is important to consider that subsequent episodes of depression may be more detrimental to the mother-child relationship than a brief episode of PND.

It remains unclear whether an improvement in the mother-child relationship will necessarily improve outcomes for the child, interventions in this area are few and in their infancy (Poobalan, Aucott, Ross, Smith, Helms & Williams, 2007). A systematic review exploring the trajectory of the mother-child relationship within the context of PND is clearly indicated given the important
role that close and supportive relationships have in protecting against mental health problems such as depression (Cohen & Wills, 1985). The mother-child relationship is an essential component for the wellbeing of the mother and their child. Understanding the trajectory and whether it is related to depressive symptoms has a number of important clinical implications and is critical to understanding the timing and type of interventions offered to mothers with PND.

Objectives

The current review examined current literature on the trajectory of the mother-child relationship in mothers with a history of PND in the months and/or years following the postnatal period. The main aim was to examine follow up outcomes with regard to the mother-child relationship, in the form of attachment classifications, mother-child interactions, and/or maternal behaviour towards her child. The findings have important implications in terms of providing a better understanding of the link between PND and the developing mother-child relationship. It is also critical to understanding the timing and type of interventions that would be most helpful to women with PND and their child.

The structure and design of the review has been based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyse (PRISMA) guidelines (Mohr, Liberati, Tetzlaff & Altman, 2009).

Methods

Eligibility Criteria

The specific inclusion criteria was as follows: Population inclusion criteria included all studies with women who presented with clinically significant symptoms of low mood as measured by a validated tool or diagnostic interview during the postnatal period (ii) Outcome inclusion criteria
included studies that specifically reported mother-child outcomes in relation to PND. The studies included had to provide follow up outcome data on attachment, mother-child interactions or mothers’ behaviour toward the child in the form of questionnaires, observations or self-reports. All follow up periods that occurred during or after the postnatal period (first 6 weeks from birth) were included. This time frame was used to capture the prospective, patterns of the mother-child relationship during and beyond the postnatal period (iii) only naturalistic, prospective, longitudinal studies were included in line with the research question. Articles published between January 1999 and December 2014 were included to ensure the most recent literature was reviewed. Only studies published in peer-reviewed journals and written in English were included.

The exclusion criteria were: (i) any studies where there were stated co-morbid diagnoses were identified, with the exception of anxiety which has high co-morbidity and shared variability with depression, further, given that other disorders, when measured, were frequently severe and enduring (i.e., personality disorder, substance dependence), it would be difficult to parse out the role of acute PND in the context of these difficulties (ii) studies examining episodes of maternal depression which did not include measures of depression within the postnatal period, for example maternal depression within the antenatal period only were excluded (iii) studies focusing on the mother-child relationship in relation to previous infant child loss or preterm babies were excluded (iv) women with the ‘maternity blues’ were excluded from the review (v) Reviews, book chapters and discussion papers were excluded from the review.
Search Strategy

A number of key search terms from the review’s objective were selected and combined, please see table 1. Databases searched included PsychINFO, PsychARTICLES and Pubmed. Medical Subject Headings (MeSH) terms were combined for the Pubmed search to ensure all possible articles were retrieved. Additionally, surrounding literature was revised for backward and forward citations from the selected papers to ensure all relevant papers were attained.

Table 1.

<table>
<thead>
<tr>
<th>Search 1</th>
<th>Search 2</th>
<th>Search 3</th>
<th>Search 4</th>
<th>MeSH terms</th>
</tr>
</thead>
<tbody>
<tr>
<td>postnatal depress* OR postpartum depress* OR maternal depress* OR post natal depress* OR post partum depress*</td>
<td>longitudinal OR long-term OR prospective</td>
<td>mother-infant relations* OR mother-child relations* OR mother-baby relations* OR parent-child relations* OR parent-infant relations* OR parent-baby relations*</td>
<td>attachment OR bonding OR parenting</td>
<td>depression, postpartum OR depression, postnatal AND parent-child relations OR mother-child relations</td>
</tr>
</tbody>
</table>

Note. MeSH, Medical Subject Headings

Study Selection

From the initial search 404 articles were identified. The removal of 135 duplicates resulted in 269 articles. The abstracts of these articles were screened for relevance against the inclusion criteria. This resulted in 262 articles being excluded and the retrieval of 30 full-text articles. Upon reading the 30 full text articles 17 articles met the inclusion criteria and were retained for analysis. Two papers were added following citation searches of the 17 articles. The study selection process is illustrated in Figure 1.
Data extraction

Details providing an overview of the study, information relating to the sample and recruitment as well as methods of data collection were extracted for all 19 studies. This is outlined in Table 2.
Identification

Records identified through database searching \((n=404)\)

Screening

Records after duplicated removed \((n=269)\)

Eligibility

Abstracts screened \((n=269)\)

Records excluded \((n=239)\)

Eligibility

Full text articles assessed for eligibility \((n=30)\)

Full text articles excluded \((n=13)\)

Included Studies

Studies included in review \((n=19)\)

Citations from surrounding literature \((n=2)\)

Reasons for exclusion:
- Book chapter \((n=3)\)
- Animal studies \((n=4)\)
- Multiple diagnoses \((n=32)\)
- PND interventions \((n=15)\)
- PND in relation to other topics e.g. breastfeeding, colic, premature births \((n=58)\)
- Only child outcomes reported \((n=44)\)
- Risk factors/predictors of PND \((n=39)\)
- Postnatal period not included \((n=16)\)
- High-risk groups \((n=12)\)
- No depression measure used \((n=2)\)
- Paternal depression \((n=6)\)
- Maternal sensitivity related to daycare \((n=3)\)
- Review \((n=5)\)

Reasons for exclusion:
- Studies were specifically looking at PND pharmacology effects \((n=4)\)
- Redundant paper- main mother-child results for follow up period reported in an earlier paper included in review \((n=5)\)
- Parent-child relationship just discussed but in relation to child outcomes \((n=3)\)
- Depression measure not validated \((n=1)\)

Figure 1. Flow diagram of study inclusion and exclusion
### Table 2.

**Characteristics of Included Studies**

<table>
<thead>
<tr>
<th>Study</th>
<th>Participants</th>
<th>Methodology</th>
<th>Contact period</th>
<th>Depression measure(s)</th>
<th>Mother-child/attachment measure(s)</th>
<th>Main Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Campbell, Brownell, Hungerford, Spieker, Mohan &amp; Blessing (2004)</td>
<td>NICHD n = 1077</td>
<td>Longitudinal</td>
<td>6, 15, 24, and 36 months</td>
<td>CES-D</td>
<td>ASS</td>
<td>Mother-child semi-structured play (OBS)</td>
</tr>
<tr>
<td>Campbell, Matestic, von Stauffenberg, Mohan &amp; Kirchner (2007)</td>
<td>NICHD n = 1261</td>
<td>Longitudinal</td>
<td>6, 15, 24, and 36 months</td>
<td>CES-D</td>
<td>Mother-child semi-structured play (OBS)</td>
<td>Maternal sensitivity to child was generally higher and increased when depressive symptoms were low; sensitivity was lower and decreased when depressive symptoms were either high on increasing. Maternal sensitivity over time was linked to trajectories of maternal depressive symptoms</td>
</tr>
<tr>
<td>Carter, Garrity-Rokous, Chazan-Cohen, Little, &amp; Briggs-Gowan (2001)</td>
<td>n=69</td>
<td>Longitudinal</td>
<td>4, 14, months</td>
<td>CES-D</td>
<td>SCLI for DSM-IV ASS EAS</td>
<td>At 14 months 80% of mother-infant dyads in the comorbid group displayed insecure attachment. In contrast mother-infant dyads in the depression-only group did not differ in early play interactions or infant attachment security from dyads in the no-psychopathology group. Depression severity did not differ between the two groups (depressed and depressed and co-morbid psychopathology).</td>
</tr>
<tr>
<td>Edhborg, Lundh, Seimyr &amp; Widstrom (2001)</td>
<td>n=24 mother-child</td>
<td>Prospective</td>
<td>2, 15-18 months</td>
<td>EPDS</td>
<td>PCERA</td>
<td>Children from mothers in the PND group presented as either insecurely attached or demonstrated restricted levels of joy</td>
</tr>
<tr>
<td>Study</td>
<td>Design</td>
<td>Measures/Instruments</td>
<td>Results/Findings</td>
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<tr>
<td>Hatzinikolaou, and Murray (2010)</td>
<td>Prospective</td>
<td>EPDS Mother-child interactions (OBS)</td>
<td>When reunited with their mothers at 18 months, even in a secure attachment compared to the control group. Cluster analysis revealed nine dyads where mother-child interactions were impaired, seven of the dyads were from the PND group.</td>
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<tr>
<td>Huang, Lewin, Mitchell, Zhang (2012)</td>
<td>Longitudinal</td>
<td>CIDI CES-D TAS-45 Mother-child interactions (OBS)</td>
<td>There was no main effect of depressive symptoms on mother-child interaction at 8 or 18 weeks, but there was a significant depression and sex interaction. Whereby girls of mothers with PND showed particularly high rates of sensitivity, and boys of depressed mothers showed low rates of sensitivity during mother-infant interactions. Both girls and boys of controls showed similar, moderate rates of sensitivity. Chronic depression was a risk factor for insecure attachment. Chronic depressive symptoms were associated with less maternal sensitivity. They found unique patterns of the effects of maternal depression and attachment dependent on race/ethnicity. Symptoms of mood were more associated with insecure attachment in Hispanic but not Asian mothers.</td>
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<tr>
<td>Mason, Briggs &amp; Silver (2011)</td>
<td>Longitudinal</td>
<td>EPDS MPAS; PSI-SF ASQ: SE</td>
<td>Mediational analysis revealed that maternal PND predicted poorer maternal feelings of attachment to the child, and poor maternal feelings of attachment in turn relates to less positive child social emotional development outcomes. The direct path between maternal PND and the child outcomes is no longer significant when controlling for maternal feelings of attachment. They concluded that maternal feelings of attachment play a significant role in the reports of infant social-emotional development and on the mothers view of the interaction with her child, and also suggests that maternal feelings of attachment help to explain the relationship between maternal PND and child outcomes. Briefly depressed mothers were no more likely than never depressed mothers to have insecure attachment relationships with their infants at 12 months follow up. Only 26% of the chronically depressed mothers had securely attached children suggesting that the more chronic the...</td>
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<tr>
<td>Study Authors</td>
<td>Design</td>
<td>Time Points</td>
<td>Measures</td>
<td></td>
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<tr>
<td>Mills-Koonce, Gariepy, Sutton, Cox (2008)</td>
<td>NICHD, Longitudinal</td>
<td>6, 15, 24, and 36</td>
<td>CES-D, ASS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moehler, Brunner, Parzer, Wiebel, Reck, &amp; Resch (2006)</td>
<td>Prospective</td>
<td>2, 6 weeks, 4 &amp; 14 months</td>
<td>SC, EPDS, PBQ</td>
<td></td>
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<tr>
<td>Murray, Sinclair, Cooper, Ducournau, Turner &amp; Stein (1999)</td>
<td>Cambridge study, Longitudinal</td>
<td>2, 18 months &amp; 5 years</td>
<td>EPDS, SCLI for DSM-IV ASS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Murray, Arteche, Fearon, Halligan, Croudace &amp; Cooper (2010)</td>
<td>Cambridge study, Longitudinal</td>
<td>2, 18 months, 5, 8, 13, 16 years</td>
<td>EPDS, SADS, SCI for DSM-IV Mother-child interactions (OBS)</td>
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</table>

Symptoms the more adverse the relationship difficulties. They also reported that if mothers in the chronic depressed group had a secure state of mind despite being chronically depressed they were more likely to have a secure attachment at 12 months. Higher maternal depressive symptoms were associated with lower levels of sensitivity for all mothers, although this effect was significantly less severe for mothers of securely attached children. Higher maternal depressive symptoms were associated with decreases in sensitivity from 6 to 36 months for mothers of children who at 36 months showed disorganized attachments combined with underlying patterns of avoidant or resistant behaviour. More sensitive interactions buffered the effects of depressive symptoms. Depressive symptoms in the first 4 months of life were predictive of impaired bonding at 14 months and the most significant impact was found for depressive symptoms at six weeks. Depressive symptoms at 14 months itself did not have any influence on the concurrent mother-child relationship. The child’s relationship with the mother appeared to be mediated by the quality of attachment at 18 months. Insecure attachment in infancy was associated avoidant patterns with mother at age 5. Mother-child relationship difficulties at 5-8 years, specifically, the failure to provide good cognitive support, added to the risk of poor GCSE performance. This effect occurred independently of the adverse impact of poor interactions on child IQ itself. The interaction difficulties were significantly more common in mothers who previously had PND. Results demonstrated that boys were more vulnerable to the effects of maternal interaction difficulties than girls.
<table>
<thead>
<tr>
<th>Study</th>
<th>N</th>
<th>Design</th>
<th>Time Points</th>
<th>Measure</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>NICHD Early Child Care Research Network (1999)</td>
<td>1215</td>
<td>Longitudinal</td>
<td>6, 15, 24, 36, 54 &amp; 84 months</td>
<td>CES-D Mother-child interactions (OBS)</td>
<td>Women with chronic symptoms of depression were the least sensitive when observed playing with their children from infancy through 36 months. Women with chronic symptoms of depression in particular showed more decline in sensitivity during the child's second year and some recovery at 3 years. Women in the chronically depressed group were less interactive with their child during play sessions.</td>
</tr>
<tr>
<td>O'Higgins, Roberts, Glover &amp; Taylor (2013)</td>
<td>100</td>
<td>Prospective</td>
<td>9 weeks, 16 weeks and 1 year</td>
<td>EPDS, MIBS</td>
<td>There was a strong association between bonding in the early weeks (1-4) and all later time points. A significant association between the EPDS score at 4 weeks and bonding at 1-4 weeks, 9 weeks, and at 1 year postnatal. Early bonding rather than early depression was the major predictor of bonding at 1 year.</td>
</tr>
<tr>
<td>Righetti-Veltema, Bousquet &amp; Manzano (2003)</td>
<td>35</td>
<td>Prospective</td>
<td>3, 18 months</td>
<td>EPDS, ASS</td>
<td>At 3 months the findings with regards to the mother-child relationship, the 'depressed' dyads presented less vocal and visual communications, less corporal interactions and less smiling. The mother-child with PND dyads demonstrated less verbal interaction and less playing interaction. 18-month-old infants of PND mothers were more insecurely attached to their mothers. It is important to note that none of the results concerning the 'strange situation' were correlated significantly with the mothers' depressive symptoms observed at 18 months.</td>
</tr>
<tr>
<td>Thomason, Volling, Flynn, McDonough, Marcus, Lopez, &amp; Vazquez (2014)</td>
<td>105</td>
<td>Longitudinal</td>
<td>3, 7, 14 months</td>
<td>BDI, PSI (Parent-Child Dysfunctional Interaction Subscale)</td>
<td>No association between perceived mother-child interaction difficulties and depressive symptoms. Changes in depressive symptoms were not related to changes in mother-child interaction across the different time points.</td>
</tr>
<tr>
<td>Tomlinson, Cooper &amp; Murray (2005)</td>
<td>147</td>
<td>Longitudinal/Prospective</td>
<td>2 &amp; 18 months</td>
<td>SCI for DSM-IV Mother-child interactions</td>
<td>PND at 2 months was associated with insecure infant attachment at 18 months. Mother-child interactions at 2 months and maternal depression at 2 months predicted insecure infant attachment at 18 months. Only 4 women who...</td>
</tr>
</tbody>
</table>
Toth, Rogosch, Sturge-Apple, Cicchetti (2009)  

\[ n=63 \]  

<table>
<thead>
<tr>
<th>Prospective</th>
<th>DIS-III-R</th>
<th>BDI</th>
<th>ASS</th>
</tr>
</thead>
<tbody>
<tr>
<td>20, 36 months</td>
<td>n=63 mother-child PND pairs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>controls</td>
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</table>

At 20 months attachment classification differed significantly between PND and controls, with high rates of disorganised insecure attachment in the PND group. At 36 months there were also significant differences between the two groups.

Severity of early maternal depressive symptoms was related to the concurrent degree of attachment insecurity in toddlers at age 20 months as well as to later attachment insecurity at age 3, controlling for initial levels of attachment insecurity.

Trapolini, Ungerer, McMahon (2008)  

\[ n=89 \]  

<table>
<thead>
<tr>
<th>Prospective</th>
<th>CIDI</th>
<th>CES-D</th>
<th>PDI</th>
<th>EAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4, 12, 15 months &amp; 4 years</td>
<td>n=89 mother-child pairs</td>
<td></td>
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At 15 months of age, children of chronically depressed mothers (depressive symptoms lasting throughout the first postnatal year and beyond) were significantly less likely to be classified as secure; only 26% of chronically depressed mothers had infants with secure attachments, compared to 63% of never depressed mothers. The experience of chronic depression was significantly related to impaired maternal sensitivity. They found that the effect of chronic depression on maternal sensitivity is attributable to an impaired capacity of chronically depressed mothers to take their child’s perspective.

**Note.** NICHD, National Institute of Child Health and Human Development; CES-D, Center for Epidemiological Studies Depression Scale; ASS, Ainsworth strange situation; ASQ-SE, The Ages and Stages Questionnaires: Social-Emotional; PCERA, Parent and Child Early Relational Assessment Scale; CIDI, Composite International Diagnostic Interview; ECLS-B, Early childhood longitudinal study- birth cohort; TAS, Toddler Attachment Sort-45; AAI, Adult Attachment Interview; PBQ, Postpartum Bonding Questionnaire; SC, Symptom Checklist; MFQ, Mood & Feelings Questionnaire; SAD-SL, Affective Disorders and Schizophrenia, Lifetime Version; SCL, Structured Clinical Interview; DSM-IV, Diagnostic and Statistical Manual of Mental Disorders, 4th. Edition; MIBS, Mother-Infant Bonding Scale; ASCT, Attachment Story Completion Task; PDI, Parent Development Interview; EAS, Emotional Availability Scales; OBS, Observations; PND, Postnatal Depression; DIS-III-R, Diagnostic Interview Schedule 3rd Edition; BDI, Beck Depression Inventory.
Results

Preliminary synthesis of findings

There were 19 studies included in the review. The studies included comprised of eleven studies that reported findings specifically focused on women who presented with symptoms of PND (Edborg et al., 2001; Hatzinikolaou & Murray, 2010; Mason et al., 2011; Moehler et al., 2006; Murray et al., 1999; Murray et al., 2010; O’Higgins et al., 2013; Righetti-Veltema et al., 2003; Thomason et al., 2014; Tomlinson et al., 2005; Toth et al., 2009). Nine of the studies reported findings examining severity and chronicity of maternal depression including depressive symptoms during the postnatal period but not exclusively to this period (Campbell et al., 2004; Campbell et al., 2007; Carter et al., 2001; Huang et al., 2012; McMahon et al., 2006; Mills-Koonce et al., 2008; NICHD 1999; Trapolini et al., 2008).

Eleven studies reported attachment outcomes. Ten reported that ‘insecure’ mother-child attachments remained in mothers with a history of PND during the follow-up periods. The follow-up periods varied and included 5 years (Murray et al., 1999) 36 months (Campbell et al., 2004; Mills-Koonce et al., 2008; Toth et al., 2009) 24 months (Huang et al., 2012) 20 months (Toth et al., 2009) 18 months (Edborg et al., 2001; Righetti-Veltema et al., 2003; Tomlinson et al., 2005) 15 months (Trapolini et al., 2008) and 12 months (McMahon et al., 2006). Of these 10 studies, five linked later attachment difficulties to chronic symptoms of maternal depression following the postnatal period (Campbell et al., 2004; Mills-Koonce et al., 2008; McMahon et al., 2006; Huang et al., 2012; Trapolini et al., 2008). Four studies concluded that later
attachment was better predicted by earlier attachment difficulties as opposed to current maternal mood (Righetti-Veltema et al., 2003; Tomlinson et al., 2005; Murray et al., 1999; Edborg et al., 2001). However, Toth et al. (2009) reported that early maternal depressive symptoms had a stronger impact on later attachment than concurrent depressive symptoms. Edhborg et al. (2001) also concluded that the difficult mother-child attachment relationship remained difficult beyond the period of the mothers’ depressed mood. However, this study did not report a follow-up mood outcome at the same time as the attachment outcomes at 18 months. No data was available on whether the women in this study were still presenting with symptoms of low mood at 18-month follow up. In an exception, Carter et al. (2001) reported no differences between the PND group and controls in terms of attachment difficulties. However, they included a third group of women presenting with depressive symptoms with a comorbid psychopathology, within this group 80% of the dyads presented at insecure at both time points.

Two studies reported outcomes in terms of bonding. O’Higgins et al. (2013) concluded that early bonding (1-4 weeks) and attachment at 9 weeks were major predictors of mother-child attachment at age one, early depressive symptoms were not associated with later attachment. Moehler et al. (2006) concluded that depressive symptoms in the first 4 months of life were predictive of impaired bonding at 14 months and the most significant impact was found for depressive symptoms at six weeks. In that study, depressive symptoms at 14 months did not influence the concurrent mother-child relationship.
Across the studies that used classifications of bonding and attachment, seven studies reported mother-child interactions in terms of maternal sensitivity toward the child during observed play (Campbell et al., 2004; Campbell et al., 2007; Huang et al., 2012; Mills-Koonce et al., 2008; NICHD, 1999; Trapolini et al., 2008; Tomlinson et al., 2005). Six of these studies reported that chronic depressive symptoms were related to decreased maternal sensitivity towards their child, and this extended beyond the postnatal period and was present at 15 months (Mills-Koonce et al., 2008; Trapolini et al., 2008) 18 months (Tomlinson et al., 2005) 24 months (Huang et al., 2012) and 36 months (Campbell et al., 2004; Campbell et al., 2007; NICHD, 1999). Tomlinson et al. (2005) reported that maternal mood at two months was associated with insecure infant attachment at 18 months. However there was no association between maternal mood at 18 months and attachment at 18 months. Maternal sensitivity remained predictive of attachment at 18 months when depressive symptoms no longer did. One study reported sensitivity based on the child’s interactions with their mother. Hatzinikolaou and Murray (2010) found no main effect of depressive symptoms on mother-child interactions at 8 or 18 weeks. They did find a significant interaction between depressive symptoms and sex in mothers with PND.

The studies that specifically focused on examining the impact of chronicity and severity of maternal depressive symptoms suggest that chronic, persistent depressive symptoms are more strongly associated with persistent insecure mother-child attachment (McMahon et al., 2006; Campbell et al., 2004; Huang et al., 2012) than PND alone. However, Thomason et al. (2014) found no association between maternal perceived mother-child interaction
difficulties and depressive symptoms at 3, 7 and 14 months. They concluded that changes in mood were not associated with changes in perceived mother-child interactions.

In summary although findings were at times mixed, some patterns emerged across the studies, inclusive of attachment and bonding. A large majority of the studies \( (n=17) \) suggest the mother-child relationship remains impaired following the postnatal period. The reasons for why the difficulties remain were mixed and varied across the studies. Several studies \( (n=7) \) suggest persistent chronic symptoms of depression are more associated with impaired mother-child relationship. Other studies \( (n=10) \) suggest that early chronic symptoms specifically during the postnatal period are more associated with later mother-child relationship difficulties. Two studies found no relationship with depressive symptoms during the postnatal period and impaired mother-child bonding.

**Participants**

All of the studies recruited participants through community settings. Four of the studies included used the same prospective sample from NICHD Study of Early Child Care (Campbell et al., 2004; Campbell et al., 2007; Mills-Koonce et al., 2008; NICHD, 1999). Two of the studies used the same prospective sample from the Cambridge Study (Murray et al., 1999; Murray et al., 2010). Sample sizes varied considerably from \( n=8300 \) in a large ECLS-B study (Huang et al., 2012) and \( n=1261 \) in the NICHD study sample to a small sample of \( n=45 \) (Edhborg et al., 2001).

There was considerable variability in the classification of maternal depressive symptoms. Seven of the studies included conducted a diagnostic
interview to categorize women as depressed in addition to using a questionnaire (Carter et al., 2001; Huang et al., 2012; Murray et al., 1999; Murray et al., 2010; Tomlinson et al., 2005; Toth et al., 2009; Trapolini et al., 2008). Nine of the studies used the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987) to measure depressive symptoms, the majority using a cut off of >12 (Edhborg et al., 2001; Hatzinikolaou & Murray, 2010; Murray et al., 1999; Murray et al., 2010; O’Higgins et al., 2013; Righetti-Veltema et al., 2003; Tomlinson et al., 2005). Mason et al. (2011) used a cut off >10 and Moehler et al. (2006) used a cut off of >9. Eight studies used the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) Six of the studies used a cut off of >16 (Campbell et al., 2004; Campbell et al., 2007; McMahon et al., 2006; Mills-Koonce et al., 2008; Trapolini et al., 2008; NICHD, 1999) Huang et al. (2012) used a 12-item short form and did not specify the cut off used. Carter et al. (2001) did not specify the cut off used. Two studies used the Becks Depression Inventory (BDI-II; Beck, Steer & Brown, 1996) to assess severity of depressive symptoms (Toth et al., 2009; Thomason et al., 2014).

Studies using the NICHD sample categorized women as either chronically depressed (elevated symptoms at three out of five assessment points), intermittently depressed (symptoms reported at least twice with a period of lower scores in between) or never depressed (CES-D <16 at each assessment point). They also categorized women as early depressed (one, six, and/or 15-month assessment, but not thereafter) or late depressed (women who did not report depressive symptoms until the 24 and/or 36-month) for some of their analyses. These studies included women depressed within
the postnatal period and those who developed depression 24 and/or 36 months later. Trapolini et al. (2008) categorized women as either never depressed (CES-D<16 at each time point) sometimes depressed (scored CES-D >16 on one or two time points) or chronically depressed (three or more time points). Huang et al. (2012) categorized women as chronically depressed (symptoms at both time points) remittent depression (symptoms at 9 months but not 2 years) or late onset (symptoms at 2 years but not 9 months).

**Risk of Bias Across Studies**

One of the main limitations of the current literature concerning the long-term parent-child relationship consequences of PND is that many of the published studies are based on the same samples. Two of the studies used the Cambridge sample, the sample was primarily White British and middle-upper class. As a consequence, the results may be biased. Similarly, four of the studies included in this review reported results from the NICHD sample, the studies provided valuable evidence on the trajectory of maternal depressive symptoms and its relation to mother-child outcomes however all the studies are based on the same sample which in itself could produce bias.

**Risk of Bias Within Studies**

The longitudinal design of the majority of the studies means has a degree of attrition, this varied from 59% (O’Higgins et al., 2013) to over 90% retention in the Cambridge sample. It is understood from research into predictors of baseline attrition that different factors often influence dropout rates (Fischer, Dornelas & Goethe, 2001). Murray et al. (2010) reported reasons for drop out included two dyads (both PND group) were lost to follow-up at 18 months: one family emigrated and one could not be traced; two
mothers (one PND group, one control) were unwilling to continue in the study at 5 years; at 13 years, one further mother was unwilling to continue, and one adolescent was lost to follow-up due to emigrating (both PND group). The studies that reported on the NICHD sample (Campbell et al., 2004; Campbell et al., 2007; Mills-Koonce et al., 2008; NICHD, 1999) reported that there were demographic differences between those families that dropped out of the study and those who did not across several measures. The women who remained in the sample were more educated, had a higher income and reported lower levels of depressive symptoms. The same pattern was found in another study (Thomason et al., 2014). Equally, other studies reported no demographic differences or differences in depressive symptoms (Trapolini et al., 2008; Tomlinson et al., 2008; Toth et al., 2009; Righetti-Veltema et al., 2003; O’Higgins et al., 2003; McMahon et al., 2006). Two studies did not report differences between the participants retained in the study and those who dropped out (Edhborg et al., 2001; Moehler et al., 2006). Two studies did not report attrition rates (Carter et al., 2001; Hatzinikolaou & Murray, 2010).

Discussion

Summary of Evidence

Overall, the reviewed literature demonstrated that mother-child attachment or relationships remained difficult and stable over time. However, newer studies that specifically explored maternal depression across the lifespan found that chronicity and severity of depressive symptoms were more strongly associated with enduring relationship and/or attachment difficulties. This is consistent with the literature associating severity and chronicity of maternal depression and adverse child outcomes (Hammen & Brennan, 2003;
Brennan et al., 2000). For example, McMahon et al. (2006) reported that briefly depressed mothers were no more likely than never depressed mothers to have insecure attachment relationships with their infants at 12 months follow up. If this is the case it implies that it is the consistent exposure to maternal depressive symptoms that have an adverse impact on the mother-child attachment as opposed to exposure to maternal depression during a sensitive period such as the postnatal period. In this case, it could be hypothesised that interventions that target the mother-child relationship could be beneficial beyond the postnatal period alongside targeting maternal mood. Additionally, there is growing evidence that the role of “pure” versus comorbid depression should be examined. Carter et al. (2001), for example, found that 80% of mothers who had comorbid depression also had developed an insecure attachment with their infant. In contrast, there were no differences in mother-infant attachment between mothers with only depression and non-depressed controls.

A number of studies found that early attachment (Edhborg et al., 2001) and early maternal mood (Moehler et al., 2006; Tomlinson et al., 2005) as opposed to concurrent maternal mood were better prospective predictors of the mother-child relationship. Although these studies had relatively small sample sizes, they suggest that mother-child difficulties can remain even when maternal mood has improved. Murray et al. (2001) suggested that it was possible that, even in remission, mothers who had been previously depressed previously may maintain a hostile style of interacting with the child. This is consistent with the findings from current interventions for PND that have
reported that improving maternal mood is not sufficient for improving the mother-child relationship (Forman et al., 2007; Murray et al., 2003).

A number of the studies also examined the role of maternal mood, sensitivity and subsequent attachment (Campbell et al., 2007; NICHD, 1999; Mills-Koonce et al., 2008; Tomlinson et al., 2005). As above, Campbell et al., (2007) reported chronic depressive symptoms were associated with lowered maternal sensitivity, which in turn predicted insecure attachment. This suggests that maternal sensitivity could act as a mediator between maternal mood and attachment. However, it is important to note that other variables such as genetics could be involved and act as a mediator of maternal mood and relationship outcomes (Kim-Cohen, Moffitt, Taylor, Pawlby, & Caspi, 2005). More extensive research is needed to understand the variables and mechanisms that are involved.

Limitations

A large proportion of studies included used the same samples of participants, many of these studies reported bias towards more resourceful, less symptomatic women. Subsequently, this review may not be representative of all mother-child relationships within the context of PND.

There were considerable differences across the studies in the depression measurements and cut off points used. Subsequently, women presenting with depression in one study would not have met the inclusion criteria for being considered depressed in another study.

The measures of mother-child relationship also varied between studies, some studies used observational methods others used attachment interviews or questionnaire tools. The focus of the observations varied, for example some
studies used them to classify attachment, others focused on maternal behaviour toward the child and measured maternal sensitivity or responsiveness. The review aimed to collect follow up outcomes based broadly on the mother-child relationship including attachment, however the review highlighted that the terminology used within the context of the mother-child relationship varied across studies. A number of studies included for example collected maternal sensitivity outcomes. Maternal sensitivity was not a search term used in the original search, however studies which focus on this could have been relevant but fell outside of the search strategy. Therefore it is possible that this review failed to retrieve all relevant studies.

There could methodological reasons for the difference in outcomes between the studies. Firstly, the majority of studies examining chronicity and severity had large sample sizes, many using the same NICHD sample. Secondly, these studies grouped women differently to the other studies, for example, intermittently depressed, chronically depressed or never depressed or early depressed or late depressed (Campbell et al., 2004). In contrast a number of other studies grouped women as either PND or control (Murray et al., 1999).

The studies also all varied in terms of the length of the follow-up period, this was helpful in terms of providing a holistic pattern of mother-child difficulties in relation to depressive symptoms however it made them difficult synthesize and compare. This review also only included prospective or longitudinal studies it is possible that a review including experimental data may add to the findings.
Conclusions

The review has highlighted that the mother-child relationship within the context of PND remains difficult in the months and years following the postnatal period. Although newer findings suggest chronicity may be a stronger predictor of difficulties in the relationship than PND alone, more research is needed to clarify this question. This review also highlights the possibility that maternal behaviour, specifically maternal sensitivity, could mediate the relationship between maternal mood and mother-child attachment. If a consequence of depression is that the mother-child relationship is insecure, then subsequent episodes seem to resurrect the insecure relationship, or to enhance it. Therefore a recommendation might be to work on improving the target of existing treatments, or to focus on ongoing relapse prevention in mothers.
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Moderators and Mediators of Outcome in an Internet-Based Behavioural Activation Trial for Postnatal Depression (Netmums).

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Abstract

Purpose: Postnatal depression (PND) has significant negative outcomes for both mother and baby. The literature indicates that cognitive behavioural interventions can be effective and efficacious treatments, less is known about what mechanisms underpin change in such interventions. The present study aimed to explore severity of depression as a moderator and Behavioural Activation (BA) as a possible mediator of treatment outcome in an online BA intervention for PND. Methods: Follow-up of postnatal women participating in a feasibility Randomised Controlled Trial (RCT) of Netmums, an online BA treatment with telephone support. Results: There was no evidence to support the hypothesis that severity of depression acted as a moderator for treatment outcome. No mediation effects for BA were found. Rumination and avoidance did predict treatment outcome, but this did not differ between the treatment and control group. Post Hoc sudden gains analysis revealed that 48.90% of the treatment group sample experienced a sudden gain. Those who experienced a sudden gain had better post intervention outcomes. Conclusions: The findings have important implications for both theory and the design of future interventions. Future research should consider collecting weekly measures from both treatment and control groups.

Keywords: postnatal depression, behavioural activation, mediation, moderation, sudden gains
Introduction

Background

Meta-analyses suggest prevalence rates of PND are approximately 10-15% in new mothers (Lee et al., 2004; O’Hara & Swain, 1996). There has been a considerable amount of research carried out examining the risk factors for developing PND (Leigh & Milgrom, 2008; Murphy et al., 2001). Generally, the current research examining interventions for PND has a primary focus on outcomes. The main aims are to investigate whether there is any change in the mother’s mood between the start and end of the intervention. There is considerably less known about what factors mediate or moderate these outcomes. This information is important because it: (i) may help to identify whether the treatment is working through the theoretical mechanism it is proposed to operate, and ii) whether individuals with specific characteristics are more likely to benefit from the treatment. Such information can be used to better refine the treatment, and to identify individuals who may need more focused or intensive intervention.

Current treatments for PND

The current recommended treatment for major depression is Cognitive Behavioural Therapy (CBT) (National Institute for Clinical Excellence; NICE, 2007; 2009). CBT aims to improve symptoms of low mood and anxiety through targeting thoughts, feelings and behaviour. At present a number of recent studies have examined the usefulness of psychological interventions at improving the symptoms of PND with some promising results (Cuijpers et al., 2008; Sockol et al., 2011). CBT in particular has been shown to be effective at reducing symptoms of both depression and anxiety in women suffering with
PND (Milgrom, Negri, Gemmill, McNeil & Martin, 2005). Despite the evidence base, women report a number of difficulties engaging in psychotherapy during the postnatal period (Dennis & Chung-Lee, 2006; Goodman, 2009; O’Mahen & Flynn, 2008). These difficulties include childcare arrangements, difficulties with transport to attend face-to-face psychotherapy as well as a perceived stigma that they will have their baby taken into care and beliefs that they are a bad mother (Dennis & Chung-Lee, 2006; Hall, 2006).

As a result an Internet based intervention with telephone support was employed to overcome some of the potential barriers that research has identified. In a broader meta-analysis, not specific to PND Andersson, Cuijpers, Carlbring, Riper & Hedman (2014) found that guided Internet-delivered CBT (ICBT) produced the same results as CBT delivered face to face. There is also evidence to suggest that therapeutic alliance, adherence and efficacy are not effected by not having face-to-face CBT (Kalapatapu, Cai, Vinogradov, Batki, & Mohr, 2014; Shields, Kwasny, Casi, & Mohr, 2014). In addition to the physical barriers Craig (2007) found that women also often report having difficulties carrying out multiple tasks simultaneously, limiting their attention and leaving them with a lack of time (Goodman, 2009). As a result the intervention employed an online Behavioural Activation (BA) approach. BA focuses on the behavioural element of CBT, it is grounded in learning theory and through using principles from operant conditioning it encourages individuals to learn to monitor their mood and daily activities, increasing the number of pleasant activities and interactions with their environment and in turn getting positive reinforcement back from their environment (Cuijpers, 2007). Meta Analyses have found BA to be an effective
treatment for depression, equally as effective if not more effective than traditional CBT (Cuijpers, 2007; Dimidjian et al., 2006) and possibly more effective than anti depressant medication (Ekers, Webster, Van Straten, Cuijpers, Richards & Gilbody, 2014).

**Moderators of Treatment**

A moderator of treatment is something that changes the relationship between the predictor and outcome variable (see Figure 1). A number of studies have looked what risk factors moderate the development of depression, however fewer studies have explored what moderators may be involved in treatment outcome. Some of the research that has looked at moderators of treatment outcome has so far failed to find any moderator effects (Button et al., 2014; Volker, Jacobi, Trockel, & Taylor, 2014).

The current literature suggests severity of depression can act as a moderator of treatment outcome, however research in this area yields mixed conclusions. In a recent paper by Bower et al. (2013) a meta-analysis was conducted examining the severity of depression as a moderator of outcome for low-intensity treatments. The results indicated that there was a significant interaction between baseline severity and treatment effect. They concluded that those identified as having moderate to severe depression demonstrated as much clinical benefit from low intensity treatments as those with less severe depression. In contrast other existing literature suggests the contrary concluding that those with more severe and chronic symptoms of depression are more likely to have poorer outcomes following an intervention (Curry et al., 2006; Field, 1992; Brennan et al., 2002). Identifying moderators can help identify which patients may be most responsive to treatment and for which
patients other treatments may be more appropriate (Kraemer, Wilson, Fairburn, & Agras, 2002).

There is very little research exploring what variables moderate treatment outcome specifically in PND. Furthermore, the literature suggests that the current interventions for depression are not sufficient in demonstrating longer-term gains. It is important to investigate whether treatments are having an impact on mechanisms hypothesized to be responsible for the change (Dennis & Hodnett, 2009). This research will provide a starting point for the evidence base through identifying women with PND.

![Diagram of moderation](image)

**Figure 2.** Example of moderation

**Mediators of Treatment**

Mediation can help to demonstrate whether a treatment is having its effect on depression through mechanisms hypothesized to be central to the treatment approach (see Figure 2). Unfortunately, identifying mediators of treatment outcomes for CBT based interventions with adults with depression has been unsuccessful (Hollon, DeRubeis, & Evans, 1987). The BADS is the measure of Behavioural Activation used in this study, it consists of four
subscales, activation, avoidance/rumination, work/school impairment, and social impairment. Based on the current literature this research will be primarily interested in examining any mediation effects of the activation and avoidance/rumination subscales on treatment outcome.

In theoretical terms BA would suggest that symptoms of depression occur as a result of a predisposing factor, life event or trauma. These symptoms can lead an individual to experience low levels of positive reinforcement from their environment. In addition, the behaviours that an individual uses to cope with their symptoms can have short-term gains but can be detrimental in long term in maintaining their symptoms through the process of negative reinforcement. Theoretically we would expect BA to mediate the relationship between treatment and outcome. As women increase their activity levels and begin to gain positive reinforcement from their environment their symptoms of depression get better. However, so far research has failed to identify BA as a mediator for depression symptom reduction (Kaufman et al., 2004; Allart-van Dam et al., 2003; Munoz et al., 1995).

In broader depression literature there is a wealth of research pointing towards a number of negative coping strategies associated with the maintenance of depression. Avoidance in particular has been implicated in a number of psychopathologies but has been shown to play a significant role in the maintenance of both anxiety and depression (Ottenbreit & Dobson, 2004). Moitra, Herbert, & Forman (2008) found that behavioural avoidance mediated the relationship between social anxiety and depressive symptoms in a group of socially anxious adults.
Rumination is another process that has recently received a lot of attention within depression literature. It has been identified as a core process for both the onset and maintenance of depression and anxiety. In one study McLaughlin and Nolen-Hoeksema (2011) reported that rumination fully mediated the relationship between symptoms of depression and anxiety in adolescents and partially mediated the relationship in adults. They concluded that rumination accounted for a significant proportion of overlap between depression and anxiety. Despite the fact that the BA intervention does not target rumination specifically as there is no cognitive component within the intervention, both avoidance and rumination would be considered coping behaviours, with rumination being considered a form of avoidance. The intervention encourages women to approach as opposed to ruminate/avoid. As a result based on the current literature it could be hypothesized a change in avoidance/rumination mediates the relationship between treatment and outcome.

As Kaufman et al. (2004) points out meditational analyses help elucidate which intervention components are the most important in effecting a reduction in depression. Ultimately, understanding the contribution of different moderators and mediators is crucial for the interpretation of study results, understanding and contribution to theory and the design of future interventions (Baron & Kenny, 1986; Emsley, Dunn, & White, 2009; Kraemer, Wilson, Fairburn, & Agras, 2002). The initial tests will help to identify any confounding variables, moderators and casual mediators for the larger trial.
**Sudden Gains/Rapid Response**

As previously mentioned there is a vast literature illustrating the effectiveness of CBT for depression, including PND (Milgrom et al., 2005) but less known about the mechanisms that cause change (Kraemer et al., 2002). In relation to this is the literature exploring sudden gains in therapy (Tang & DeRubeis, 1999). The phenomenon of sudden gains refers to a large or sudden gain made between two therapy sessions. Tang & DeRubeis (1999) found that 37% of depressed patients experienced sudden gains that accounted for 50% of their total symptom improvement over the course of therapy. Similar findings have been found in other studies (Busch, Kanter, Landes, & Kohlenberg, 2006; Tang, DeRubeis, Beberman, & Pham, 2005). Masterson et al. (2014) examined sudden gains in a BA intervention for depression. They found sudden gains occurred in 42.5% of their sample, the sudden gains occurred early (pre-gain session 2) and were related to outcome. In addition to this is a phenomenon called rapid responding. Research suggests that sudden gains often happen early on in an intervention, this is known as rapid early responding.
There is increasing evidence that a rapid early response or sudden gains during CBT occurs in a number of disorders (Wilson, 1999). A study by Ilardi and Craighead (1994) suggested that as much as 60% to 70% of total improvement in CBT for depression occurs in the first 4 weeks of therapy. This has important implications when researching mechanisms of change in interventions. Kraemer et al. (2002) makes the point that in RCTs researchers often assess possible mediators of treatment at mid-treatment with the view to explaining the effects. They conclude that such a rapid initial response suggests that considerable thought must be given to mediators that might operate very early and intensively. These would have to be measured early in the treatment, perhaps, on a session-by-session basis. Tang and DeRubeis, (1999) defined a sudden gain as an in between session improvement that met three criteria. Firstly, the gain has to be large, ≥ 4 for the EPDS (Matthey, 2004). Secondly, the improvement has to be large relative to symptom severity before the gain. Tang and DeRubeis (1999) suggest an improvement that was at least 25% of the score in the pre-gain session. Thirdly, that the improvement must be large relative to symptom fluctuation before and after the gain. Tang and DeRubeis (1999) suggest a t test comparing the mean of two-three sessions before the gain to the mean of the three sessions post gain. Post Hoc analyses will be conducted to explore any sudden gains/rapid responding within the treatment group using Tang and DeRubeis, (1999) three criteria.

**Aims and Hypotheses**

Given the need for more research exploring mechanisms of change during an intervention the main aims of this research were to examine severity of depression as a possible moderator of outcome and behavioural activation as
a mediator of treatment outcome. Based on the current existing literature it was hypothesised that

- Individuals with mild/moderate depression will demonstrate greater change than individuals with severe depression.

- Individuals in the treatment condition will have a greater improvement in BA scores (as measured by the activation subscale on the BADS) than individuals in TAU at week 5, BA will mediate mood outcome at 3 months.

- Individuals in the treatment condition will show a reduction in scores on the avoidance/rumination scale of the BADS compared with TAU at 5 weeks and this will mediate mood outcome at 3 months.

**Method**

**Design**

The Netmums project was a pilot Randomised Controlled Trial (RCT) designed to investigate the feasibility and effectiveness of an internet Behavioural Activation (iBA) intervention, supported over the telephone, in comparison to treatment-as-usual (TAU). The iBA intervention was delivered as a 12-week course delivered over 17 weeks to allow for rescheduling and is detailed below.

The intervention was based on Addis and Martell's (2004) manual for BA. It was adapted for the postnatal period by O'Mahen et al. (2012) in collaboration with the Netmums parenting website and a Lived Experience Steering Committee Group comprised of three women who had previously experienced PND. Postnatal-iBA consisted of five core modules plus two
optional modules and an additional relapse prevention module. The modules were designed to help users to develop an understanding of the links between their mood and their activity levels. The support element was provided by qualified Psychological Wellbeing Practitioners (PWPs) in the form of 12 telephone support sessions over a 12-week period. The initial sessions lasted for no longer than 35 minutes, with subsequent sessions lasting between 20 and 30 minutes each. The participants in the TAU (control) condition were able to access ongoing treatment through their GP, health visitor or other healthcare provider.

Participants were assessed at baseline and post-treatment at 3 months. The baseline and post-treatment data had already been collected and was used as part of the analysis. The contribution to the Netmums trial by the author was to collect further follow up post treatment outcomes. These were collected at 6 months post-treatment and 12 months post-treatment.

Sample and Participants

All participants included were Netmums members, aged 18 years or older, and must have given birth to a live baby within 12 months of registering. Women who screened positive for depression by \( >12 \) on the Edinburgh PND Scale (EPDS; Cox et al., 1987) were then administered a clinical interview (Clinical Interview Schedule-Revised CIS-R; Brugha et al., 1999) via telephone. Those who met ICD-10 criteria for Major Depressive Disorder (MDD) were eligible for the trial provided they did not meet the exclusion criteria. The exclusion criteria for the study included co-morbid diagnoses of current substance dependence; current alcohol dependence; organic brain damage; current/past psychosis, including bipolar disorder, receiving formal
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concurrent psychotherapy, acutely suicidal and finally hearing or reading impairment which, would prevent using an online intervention supported over the telephone. A total sample of 83 participants were randomized to receive intervention in the form of postnatal-iBA or TAU, 73 women had completed the EPDS at 3 months post-randomization.

Method of Data Collection

The baseline and 3-month post treatment measures were already collected, 6 month outcomes were collected between September 2012 and January 2013, 12 month outcomes were collected between February 2013 and July 2013.

**Depression.** The women’s mood symptoms were assessed with the EPDS (Cox et al., 1987). The EPDS is a widely used, reliable and valid self-report 10-item scale measuring symptoms of postpartum depression (range 0-30).

**Anxiety.** The Generalized Anxiety Disorder Scale (GAD-7) is a 7-item measure used to assess levels of anxiety and is a screening tool and severity measure for Generalized Anxiety Disorder (Spitzer et al., 2006). The GAD-7 has been demonstrated to have good validity and reliability (Lowe et al., 2008) and accurately predicts the presence of anxiety disorders (Swinson, 2006).

**Behavioural Activation.** The BADS was used to measure changes in levels of activation and avoidance. The BADS is a 25-item measure grouped into four subscales: activation, avoidance/rumination, work/school impairment and social impairment with good psychometric properties and construct validity (Kanter et al., 2009). The activation subscale was used as a measure of activity and goal-oriented behavior. The BADS was administered at baseline, 5-weeks post-randomization, 3 months, 6 months and 12 months post-
randomisation.

**Functional Impairment.** The WSAS (Mundt et al., 2002) is a 5-item measure of functional impairment that has demonstrated very good to excellent reliability and validity (Mundt et al., 2002) and has been used with women suffering from postpartum depression (Reay et al., 2006).

**Social Support.** Social Provisions Scale (SPS; Russell & Cutrona, 1987) is a 24-item measuring the different dimensions of social support for attachment, social integration, reassurance of worth, reliable alliance, guidance and opportunity for nurturance. The scale has been shown to have good reliability and validity (Russel, Altwater, & Van Velzen, 1984).

**Bonding.** Postpartum Bonding Instrument (PBI; Brockington et al., 2001) is a 25-item questionnaire designed to look at the mother-infant relationship. The instrument has been found to have good reliability and validity (Wittkowski, 2007). The demographic data that was collected was as follows, income level, work and relationship status, education qualifications, and number of children.

**Procedure**

Please see Appendix C for a flow chart of the full procedure. Eligible participants were asked to log on to the study website and the automated computer system would randomise women to one of the two research arms (Netmums supported intervention or TAU). Randomisation was stratified by anti-depressant medication use and there was equal randomisation to each of the telephone supporters. Following randomisation the computer system emailed details of the appropriate arm to the participant. They were thanked for participating in the trial and were reminded that they would be contacted
again by phone and email in the future as part of the follow-up to the study. Emails asking the participants to complete 6 and 12-month measures were automatically sent out 6 months and 12-months after treatment completion. Each email contained a link to the webpage where participants were asked to log in and repeat the baseline measures. Participants who did not respond to the automatic emails were followed up individually via email and telephone.

**Data Analysis Strategy**

**Moderation.** A mixed model ANOVA was used to test for interactions between depression severity on the CIS-R (between), treatment condition (between) and depression symptoms (within: EPDS at baseline, 3 months and 6 months).

**Mediation.** The two subscales of the BADS, BA and avoidance/rumination were analyzed separately. Simple linear regression was used to explore the relationship between treatment condition and BA, BA and outcome and treatment and outcome. A second linear regression was used to examine the relationship between treatment condition and avoidance/rumination, avoidance/rumination and outcome and treatment and outcome. Hayes and Preacher (2010) meditational approach was used to explore indirect effects, where (a') treatment condition predicts the mediator, BA and (b') the mediator predicts mood change post intervention (Figure 3). The model offers an alternative to other models such as Baron and Kenny (1986), which assumes that all variables must have direct linear relationships. The aim of the current study was to explore any mediator effects, therefore Hayes and Preacher (2010) model was chosen because it does not assume that the treatment condition (c') must have a direct linear relationship to mood.
change post intervention for mediation to occur. Therefore this model better suited the exploratory nature of this research. There was no weekly EPDS data for the TAU group, as a result change in mood from baseline to treatment end was assessed. Bootstrapping was used for mediation, based on the recommendation that it is used for mediation analyses because of the large samples required to find effects (Shrout & Bolger, 2002). Consistent with Shrout and Bolger's (2002) recommendations, 1,000 bootstrap samples were formed from the original data set using random sampling with replacement to re-estimate the path coefficients and mean indirect effects, together with the estimates of standard errors for the distribution of these coefficients.

Simple linear regression was used to explore the relationship between change in baseline EPDS and EPDS three months post intervention and change in BA scales from week one to week five in the treatment group only. Simple linear regression was also used to assess whether change in Baseline BA to three months post intervention precedes change in EPDS score from 3 months post intervention.

**Figure 4. Model of mediation**
Post Hoc Analyses. Post Hoc analyses were be conducted to explore any sudden gains/rapid responding within the treatment group using Tang and DeRubeis, (1999) three criteria for sudden gains. Firstly, the gain has to be large, ≥ 4 for the EPDS (Matthey, 2004). Secondly, the improvement has to be large relative to symptom severity before the gain; Tang and DeRubeis (1999) suggest an improvement that was at least 25% of the score in the pre-gain session. Thirdly, that the improvement must be large relative to symptom fluctuation before and after the gain. Tang and DeRubeis (1999) suggest a t-test comparing the mean of two-three sessions before the gain to the mean of the three sessions post gain. However, Matterson et al. (2014) pointed out that the use of a t-test for this criterion has been questioned on statistical grounds because the comparison is based on repeated measurement of the same person over time, which violates the assumption of independence of errors. Instead it has been suggested that the mean score of the three sessions before the sudden gain (or two for early sudden gains) is higher than the mean of the three sessions after the sudden gain (or two for late sudden gains), where higher is defined as at least 2.78 or 1.96 for smaller samples times the pooled standard deviation. A paired samples t test was conducted to compare the mean of two-three sessions before the gain to the mean of three sessions post gain in line with Tang and DeRubeis (1999) original criteria. The pooled standard deviation was also worked out and multiplied by 1.96 in line with more recent research (Masterson et al., 2014). An ANCOVA was used to explore any differences in mood outcome post intervention between those who had a sudden gain and those who did not in the treatment only condition.
Justification of Sample Size

The study is a pilot study, which was used to inform the larger trial. As a result it is not recommended that power calculations be conducted (Thabane et al., 2010). However, Browne’s (1995) recommendation to have at least 30 participants in each arm of a pilot study was followed. This number was inflated slightly to allow for the anticipated dropout associated with supported, internet-based interventions. A total sample of 83 participants were randomized to receive postnatal-iBA or TAU, 73 women have already completed the EPDS at 17-weeks post-randomization, and 60 participants completed all outcome measures at 3 months.

Despite the recommendation not to include a power calculation one was completed. A power calculation was worked out using G*Power software. For the correlation for 80% power, with a medium effect size of 0.15, allowing for a two-tailed test, alpha of 0.05, 55 participants are required. The regression calculation will allow for 1 tested predictor and up to 5 total predictors.

Results

Table 1 displays the baseline demographic information for participants included in the analysis. Figure 5 presents a flow diagram of participants through the trial. Table 2 displays the means and standard deviations for treatment and control groups at baseline and post treatment at 3 months for all outcome measures.
### Table 1.

**Characteristics of participants at baseline**

<table>
<thead>
<tr>
<th>Baseline characteristic</th>
<th>INT</th>
<th>TAU</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td><strong>Income,</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>£10000–£19000</td>
<td>6 (14.6)</td>
<td>10 (23.8)</td>
</tr>
<tr>
<td>£20000–£29999</td>
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<td>£30000–£39999</td>
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<td>7 (16.7)</td>
</tr>
<tr>
<td>£50000–£59999</td>
<td>6 (14.6)</td>
<td>2 (4.8)</td>
</tr>
<tr>
<td>£60000–£69999</td>
<td>7 (17.1)</td>
<td>3 (7.1)</td>
</tr>
<tr>
<td>£70000–£79999</td>
<td>2 (4.9)</td>
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<tr>
<td>£80000</td>
<td>–</td>
<td>1 (2.4)</td>
</tr>
<tr>
<td><strong>Work status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homemaker/maternity</td>
<td>32 (80.5)</td>
<td>32 (80.5)</td>
</tr>
<tr>
<td>leave/disability</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full- or part-time</td>
<td>3 (7.3)</td>
<td>6 (14.3)</td>
</tr>
<tr>
<td>employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student or volunteer</td>
<td>3 (7.3)</td>
<td>4 (9.6)</td>
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<tr>
<td><strong>Relationship status</strong></td>
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<tr>
<td>Married/cohabiting</td>
<td>38 (92.6)</td>
<td>38 (90.5)</td>
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<tr>
<td>Not in a relationship</td>
<td>3 (7.3)</td>
<td>4 (9.5)</td>
</tr>
<tr>
<td>now</td>
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<td></td>
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<tr>
<td><strong>Academic qualifications</strong></td>
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<td></td>
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<tr>
<td>None</td>
<td>1 (2.4)</td>
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<tr>
<td>Secondary</td>
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<td>11 (26.2)</td>
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<td>Post-16 years</td>
<td>13 (31.7)</td>
<td>10 (23.8)</td>
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<tr>
<td>Undergraduate degree</td>
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<td>12 (28.6)</td>
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<tr>
<td>Graduate degree</td>
<td>10 (24.4)</td>
<td>9 (21.4)</td>
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<tr>
<td><strong>Number of children</strong></td>
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<td></td>
</tr>
<tr>
<td>1</td>
<td>19 (46.3)</td>
<td>16 (38.1)</td>
</tr>
<tr>
<td>2</td>
<td>18 (43.9)</td>
<td>16 (38.1)</td>
</tr>
<tr>
<td>3</td>
<td>1 (2.4)</td>
<td>9 (21.4)</td>
</tr>
<tr>
<td>4 or more</td>
<td>3 (7.6)</td>
<td>1 (2.4)</td>
</tr>
<tr>
<td>Ethnic group</td>
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<td></td>
</tr>
<tr>
<td>White/British</td>
<td>38 (92.6)</td>
<td>39 (92.9)</td>
</tr>
<tr>
<td>Asian</td>
<td>1 (2.4)</td>
<td>n.a.</td>
</tr>
<tr>
<td>Mixed white/African/Caribbean</td>
<td>n.a.</td>
<td>2 (4.8)</td>
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<tr>
<td>African</td>
<td>n.a.</td>
<td>1 (2.4)</td>
</tr>
<tr>
<td>Other</td>
<td>2 (4.8)</td>
<td>n.a.</td>
</tr>
<tr>
<td>Age, Mean, (SD)</td>
<td>31.29 (5.35)</td>
<td>31.21 (5.64)</td>
</tr>
</tbody>
</table>

*Note. INT, Netmums intervention; TAU, treatment as usual; n.a., not applicable; SD, standard deviation.*
Figure 5. Flow diagram of participants
Table 2.

Means and Standard Deviations for EPDS, BADS, GAD-7, WSAS, SPS & PBQ

<table>
<thead>
<tr>
<th>Measure</th>
<th>Condition</th>
<th>Baseline</th>
<th>3 months follow up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean (SD) n</td>
<td>Mean (SD) n</td>
</tr>
<tr>
<td>EPDS</td>
<td>INT</td>
<td>20.27 (3.26) 41</td>
<td>11.05 (4.71) 37</td>
</tr>
<tr>
<td></td>
<td>TAU</td>
<td>21.07 (3.2) 42</td>
<td>14.26 (5.11) 34</td>
</tr>
<tr>
<td>BADS</td>
<td>INT</td>
<td>60.20 (20.1) 41</td>
<td>90.42 (22.4) 31</td>
</tr>
<tr>
<td></td>
<td>TAU</td>
<td>58.62 (19.45) 42</td>
<td>76.64 (27.8) 28</td>
</tr>
<tr>
<td>GAD-7</td>
<td>INT</td>
<td>13.09 (3.82) 41</td>
<td>8.71 (4.61) 31</td>
</tr>
<tr>
<td></td>
<td>TAU</td>
<td>14.12 (4.78) 42</td>
<td>11.29 (5.5) 28</td>
</tr>
<tr>
<td>WSAS</td>
<td>INT</td>
<td>4.72 (1.21) 41</td>
<td>3.19 (1.7) 31</td>
</tr>
<tr>
<td></td>
<td>TAU</td>
<td>4.77 (1.54) 42</td>
<td>4.13 (1.76) 28</td>
</tr>
<tr>
<td>SPS</td>
<td>INT</td>
<td>68.10 (11.14) 41</td>
<td>76.43 (11.80) 30</td>
</tr>
<tr>
<td></td>
<td>TAU</td>
<td>67.50 (12.92) 42</td>
<td>69.54 (12.89) 28</td>
</tr>
<tr>
<td>PBQ</td>
<td>INT</td>
<td>46.65 (16.34) 34</td>
<td>36.96 (12.18) 25</td>
</tr>
<tr>
<td></td>
<td>TAU</td>
<td>35.52 (11.67) 31</td>
<td>33.83 (10.82) 24</td>
</tr>
</tbody>
</table>

Note. EPDS, Edinburgh Postnatal Depression Scale; BADS, Behavioural Activation for Depression Scale; GAD-7, Generalized Anxiety Disorder Screener; WASAS, Work and Social Adjustment Scale; SPS, Social Provisions Scale; PBQ, Parental Bonding Questionnaire; INT, Netmums intervention; TAU, treatment as usual

Moderation Analyses

Severity of Depression and Outcome. The hypothesis was that individuals with mild/moderate depression would demonstrate greater change than individuals with severe depression. Depression scores at baseline on the CIS-R were categorized into mild 23% (n=19) and moderate/severe 77%
The results of a mixed methods ANOVA indicated that there was a main effect of time $F(2, 108) = 61.28, p < .01$ with depression scores decreasing across time. This main effect was qualified by a treatment condition by time interaction $F(2, 108) = 3.49, p = .03$. The interaction was explicated using one-way, repeated measures ANOVAs for the treatment and control groups separately. For the treatment group there was a significant effect of time $F(2, 60) = 87.04, p < .01$. There was also a significant effect of time for the control group $F(2, 53) = 35.53, p < .01$. There were no significant interactions between depression scores over time and CIS-R $F(2, 108) = .17, p = .84$. There was no significant 3-way interaction between randomization, depression symptoms over time and depression severity (CIS-R) $F(2, 108) = 1.52, p = .22$, although there was a trend towards greater gains at 3 months post-treatment and 6 months in the treatment group compared to TAU for those with mild depression, but not for those with moderate/severe depression (see Figures 5 and 6).

Further ANOVA analysis was conducted looking specifically at the different time points, baseline, 3 months and 6 months. This revealed within the treatment only group there was a significant difference between baseline and 3 month EPDS outcomes $F(1,35) = 127.51, p = <.01$, but again no significant interactions with CIS-R severity $F(1,35) = 3.16, p = .08$. There were no significant differences found between 3 and 6 month EPDS outcomes $F(1,29) = 2.70, p = .11$ within the treatment group. In the TAU group there was a significant difference between baseline and 3 month EPDS outcomes $F(1,32) = 19.84, p = <.01$, but no significant interactions with CIS-R severity $F(1,32) =$

---

1 Data available across baseline, 3 months and 6 months varies due to missing data sets at different time points.
1.37, \( p = .25 \). There was also a significant difference between 3 and 6 month outcomes \( F(1,25) = 5.29, p = .03 \), however no interaction with CIS-R severity \( F(1,25) = .07, p = .79 \).

Table 3.

*Means and Standard Deviations CIS-R Severity and EPDS at baseline, three months and six months.*

<table>
<thead>
<tr>
<th>COND</th>
<th>CIS-R</th>
<th>EPDS Baseline</th>
<th>EPDS 3 months</th>
<th>EPDS 6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>n</td>
<td>Mean</td>
</tr>
<tr>
<td>TAU</td>
<td>Mild</td>
<td>18.50</td>
<td>2.38</td>
<td>4</td>
</tr>
<tr>
<td>TAU</td>
<td>Mod/Severe</td>
<td>21.17</td>
<td>3.46</td>
<td>23</td>
</tr>
<tr>
<td>INT</td>
<td>Mild</td>
<td>18.25</td>
<td>2.61</td>
<td>8</td>
</tr>
<tr>
<td>INT</td>
<td>Mod/Severe</td>
<td>21.00</td>
<td>2.76</td>
<td>23</td>
</tr>
</tbody>
</table>

*Note.* CIS-R, The Clinical Interview Schedule-Revised; EPDS, Edinburgh Postnatal Depression Scale; INT, Netmums intervention; TAU, treatment as usual; COND, condition.

*Figure 6.* Mild depression at baseline, three months and six months for intervention and TAU groups
The seventh hypothesis was that individuals in the treatment condition would have a greater improvement in BA than individuals in the TAU at both week 5 and that this change would predict change in depression scores. Furthermore, that change in depression scores would be explained by a change in BA. A regression was conducted to look at the BA subscale as a predictor of outcome. In step one, BA at baseline and EPDS at baseline were entered. BA at 5 weeks was entered at step 2. Depressed mood at 3-months post follow-up was entered as the dependent variable. The regression indicated that the overall model was significant $F(3, 63) = 4.77, p = .01$. In step 1 of the mediation model, the regression of treatment condition on outcome, was significant $b = -3.35, p = .01 (SE=1.08)$. The next step of the mediation process showed that the mediator (activation at 5 weeks) controlling

**Figure 7.** Moderate/severe depression at baseline, three months and six months for intervention and TAU groups

**Mediation/Predictor Analyses**
for BA and mood at baseline, was not significant, $b = -.10$, $p = .29$ ($SE = .09$).

The overall model for regression exploring treatment condition as a predictor of the mediator (BA at 5 weeks), controlling for BA at baseline was significant $F(2, 68) = 6.42$, $p = <.01$. However, treatment condition did not predict activation at 5 weeks $b = -.78$, $p = .67$ ($SE = 1.82$) (Figure 7).

![Figure 8. Mediation model for BA](image)

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

The eighth hypothesis was that individuals in the treatment condition will show a reduction in scores on the avoidance/rumination scale of the BADS compared with TAU at 5 weeks and this will mediate mood outcome at 3 months. In step one, avoidance/rumination at baseline and depressed mood at baseline were entered. Avoidance/rumination at 5 weeks was entered at step 2. Depressed mood at 3-months post follow-up was entered as the dependent variable. The results of the regression indicated that the overall model was significant $F(2, 64) = 7.27$, $p = <.01$. In step 1 of the mediation model, the regression of treatment condition on depressed mood at 3 month follow-up, was significant $b = -3.34$, $p = <.01$ ($SE = 1.09$). The next step of the mediation process demonstrated that the mediator (avoidance/rumination at 5 weeks) controlling for avoidance/rumination and mood at baseline, on outcome was
also significant, $b = -.22$ $p = <.01 (SE = .072)$. However, the overall model for regression exploring treatment condition as a predictor of the mediator (avoidance/rumination at 5 weeks), controlling for avoidance/rumination at baseline was not significant $F(2, 64) = 2.61, p = .08$. Treatment condition did not predict avoidance/rumination at 5 weeks $b = -2.20$ $p = .33 (SE = 2.14)$ (Figure 8).

**Figure 9. Mediation model for Avoidance/Rumination**

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

According to Preacher and Hayes (2010) BA, neither avoidance/rumination at 5 weeks would qualify as mediators, as they are not predicted by treatment condition.

Further analyses were conducted looking at the avoidance and rumination subscales separately to see whether there were any differences in effects. The regression exploring avoidance as a predictor of change indicated that the overall model was significant $F(3, 63) = 5.09, p = <.01$. In step 1 of the
mediation model, the regression of treatment condition on outcome, was significant $b = -3.30$, $p = .01$, $(SE=1.07)$. The next step of the mediation process showed that the mediator (avoidance at 5 weeks) controlling for avoidance and mood at baseline, on outcome was also significant, $b = -.30$, $(.14) p = .05$. $(SE=.14)$ The overall model for regression exploring treatment condition as a predictor of the mediator (avoidance at 5 weeks), controlling for avoidance at baseline was not significant $F(3, 67) = 2.15$, $p = .10$. Treatment condition did not predict avoidance at 5 weeks $b = -.72$, $p = .54$. $(SE=1.13)$. (Figure 9).

![Figure 10. Mediation model for Avoidance](image)

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

The regression exploring rumination as a predictor of change indicated that the overall model was significant $F(3, 63) = 5.09$, $p = .01$. In step 1 of the mediation model, the regression of treatment condition on outcome, was significant $b = -3.53$, $p = .01$ $(SE=1.07)$. The next step of the mediation process showed that the mediator (rumination at 5 weeks) controlling for rumination and mood at baseline, on outcome was also significant, $b = -.40$, $p = .01$ $(SE=1.11)$ . The overall model for regression exploring treatment condition as a predictor of the mediator (rumination at 5 weeks), controlling for
rumination at baseline was not significant $F(2, 68) = 2.18, \ p = .12$. Treatment condition did not predict rumination at 5 weeks $b = -1.61, \ p = .20$ ($SE=1.23$). (Figure 10).

![Mediation model for Rumination](image)

*Figure 11. Mediation model for Rumination*

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

**Treatment Group Analyses.** Simple linear regression was used to explore whether change in avoidance/rumination at 5 weeks predicted change in depression scores from week 5 to post-treatment in the treatment only condition. The first model where week 5 EPDS scores and avoidance/rumination at baseline were entered was not significant $F(2, 30) = 2.44, \ p = .10$. The second model where avoidance/rumination at 5 weeks was entered was significant $F(1, 29) = 3.41, \ p = .03$. In step 1 of the mediation model, the regression of week 5 EPDS on outcome, was not significant $b = .36, \ p = .26, (SE=.28)$ avoidance/rumination at baseline on outcome was also not significant $b = .01, \ p = .96 (SE=.09)$ The next step of the regression showed that avoidance/rumination at 5 weeks closely missed the level of .05
significance, $b = -.22$, $p = .06$ ($SE = .10$) whilst controlling for avoidance/rumination at baseline and 5 week depression scores.

Further analyses were conducted on the avoidance and rumination subscales separately. The first regression was exploring rumination as a predictor of change. The first model was not significant $F(2, 30) = 2.49$, $p = .10$, however the second model was significant $F(1, 29) = 3.49$, $p = .03$. In step 1 of the mediation model, the regression of week 5 EPDS on outcome, was not significant $b = .36$, $p = .26$, ($SE = .27$) rumination at baseline on outcome was also not significant $b = .05$, $p = .80$ ($SE = .17$). The next step of the regression showed that rumination at 5 weeks was significant, $b = -.37$, $p = .05$ ($SE = .18$) at predicting outcome at 3 months whilst controlling for rumination at baseline and 5 week depression scores. The second regression was exploring avoidance as a predictor of change. The first model was not significant $F(2, 30) = 2.45$, $p = .10$, adding the avoidance at week 5 scores did not significantly improve the model $F(1, 29) = 2.40$, $p = .09$. In step 1 of the mediation model, the regression of week 5 EPDS on outcome, was not significant $b = .37$, $p = .27$, ($SE = .28$) avoidance at baseline on outcome was also not significant $b = -.02$, $p = .89$ ($SE = .14$). The next step of the regression showed that avoidance at 5 weeks was not significant, $b = -.26$, $p = .11$ ($SE = .16$) whilst controlling for avoidance at baseline and 5 week depression scores.

Post Hoc Analyses

Sudden Gains/Rapid Response

Further analyses were conducted on the weekly EPDS data to explore what was happening at an individual level across sessions Figure 11 Illustrates the weekly means and standard deviations for this group.
Figure 12. Weekly EPDS Means and Standard Deviations for treatment only group

Tang and DeRubeis, (1999) three criteria for a sudden gain was used to explore if any of the participants demonstrated sudden gains in the treatment condition.

In this sample 18 participants (48.90%) of the total sample met the first and second criteria, of these six (14.63%) participants experienced more than one sudden gain during treatment. A paired sample t test was conducted to look at differences between the mean of the two or three sessions pre-gain and the mean of the three sessions post-gain. There was a significant difference between pre-gain ($M=19.09$, $SD=3.30$) and the post-gain ($M=12.34$, $SD=2.57$) sessions $t(16)=15.02$, $p<.01$. This met the third criterion according to Tang and DeRubeis (1999) that states the improvement must be large relative to symptom fluctuation before and after the gain. The pooled standard deviation was also calculated and multiplied by 1.96 due to the sample size. However,
none of the participants met this criterion. The majority of the gains happened early on during treatment 16 participants (88.89%) experiencing a gain before week five, with 2 participants experiencing a sudden gain between weeks 5 and 6. The median pre gain session was session 2. Six people experienced more than one sudden gain, two in sessions 7-8, two in sessions 8-9 and two in sessions 10-11. However these were not included in the analysis because the participants’ either did not complete enough EPDS measures before or after the sudden gain to work out the mean for the stability criteria.

A one-way ANCOVA was conducted to compare the effect of sudden gain on 3-month post treatment mood outcomes, controlling for mood at baseline. The ANCOVA revealed that there was a significant effect of sudden gain on 3 month mood outcome $F(1, 34) = 4.46, p = .04$. Table 9. Displays the means and standard deviations for the two groups (those who experienced a sudden gain and those who did not) on the EPDS at 3 months post intervention. These results suggest better outcomes for those who had sudden gains during treatment compared to those that did not.

Table 4.

<table>
<thead>
<tr>
<th>Sudden gain</th>
<th>EPDS Mean at 3 months</th>
<th>SD</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>9.53</td>
<td>4.11</td>
<td>17</td>
</tr>
<tr>
<td>No</td>
<td>12.35</td>
<td>4.90</td>
<td>20</td>
</tr>
</tbody>
</table>

Note. EPDS, Edinburgh Postnatal Depression; SD, Standard Deviation

Discussion

The main objectives of the present study were to explore possible moderators and mediators of treatment outcomes. Contrary to the literature
(Curry et al., 2006; Field, 1992; Brennan et al., 2002) the analysis exploring severity of depression as a moderator for treatment outcome was not statistically significant. However, this is consistent with a recent meta-analysis by Bower et al. (2013) who found that those with moderate/severe depression benefited from low-intensity CBT treatment as much as those identified as having mild depression. There was some evidence to suggest that those categorized as having mild depression in the treatment group had better long-term outcomes at both 3 and 6 months post intervention than those also categorized as having mild depression in the TAU condition. The same pattern was not found in those categorized as having moderate/severe depression. However the sample sizes were too small to conduct any further analyses looking specifically at comparing those categorized with mild depression in treatment and TAU. This is an area that could be explored further in a larger trial.

The mediation analyses did not find any evidence to support the hypothesis that those in the treatment condition would experience an increase in BA, which would mediate their mood outcome post intervention. There was also no evidence to support a decrease in rumination and avoidance as a mediator of treatment outcome in the treatment group. There was evidence that rumination and avoidance did have an impact on mood outcomes at post intervention, however, this was not specific to the treatment group. This has important theoretical and treatment implications. Based on the theory behind BA, it would be expected that an increase in BA would lead to a reduction in depressive symptoms. As women increase their activity levels and begin to gain positive reinforcement from their environment their symptoms of
depression get better. Consistent with previous research (Kaufman et al., 2004; Allart-van Dam et al., 2003; Munoz et al., 1995) the present study failed to find any evidence for BA as a mechanism of change.

The fact that overall there is evidence to suggest that BA is an effective and efficacious treatment (Cuijpers, 2007; Dimidjian et al., 2006; Ekers, Webster, Van Straten, Cuijpers, Richards, & Gilbody, 2014) means that the relationship between BA as an intervention and its positive outcomes is more complicated than the theory suggests. The present study found that rumination and avoidance as opposed to activation was more related to outcome. This is interesting considering that there was no specific cognitive component to the intervention, additionally, the effect of rumination and avoidance was not specific to the treatment group anyway. Much more research is required looking at mechanisms of change in interventions for depression generally and more specifically postnatal depression as the literature so far suggests that the relationship is far more complex than the theory suggests. The measures used in this study were global measures of activation and rumination/avoidance. If more individualistic measures were used, for example, what specific goals individuals were avoiding/approaching this may have made a difference.

Given the results, further post hoc analyses were conducted exploring what and when changes were happening on an individual level in the treatment only group. Weekly EPDS data was available for the treatment only group so sudden gains analysis was explored. The results indicated that almost half of participants experienced at least one sudden gain. The sudden gains happened early on during treatment, the majority before session 5 and the
results suggested that those who did experience a sudden gain did better at outcome 3 months post intervention. The results are consistent with existing literature into sudden gains in BA, Masterson et al. (2014) also found in their study that the median pre-gain session was session 2. They also found that those who made a sudden gain were more likely to have improved at post-treatment. This is also consistent with wider research into sudden gains in CBT (Ilardi & Craighead, 1994). This is interesting considering BA was measured at week 5 and mediation hypothesis tested for this time point, however the results suggest that the majority of gains for a lot of participants was much earlier on in the treatment condition. As Kraemer et al., (2002) concludes, often studies assess possible mediators of treatment at mid-treatment with the view to explaining the effects, which was done in this study. However, with research indicating that sudden gains occur very early on in treatment Kraemer suggests that considerable thought must be given to mediators that might operate very early and intensively. They suggest that these would have to be measured early in the treatment, perhaps, on a session-by-session basis. Hayes et al. (2007) found that that early rapid responding was associated with hope in treatment but was not associated with better outcomes post treatment. It should also be noted that individuals in the TAU group may also have experienced sudden gains however no weekly EPDS measures had been collected so comparisons between the two groups were not possible.

Limitations

There are a number of limitations to the current study. Firstly, the sample size was small so would not have detected any smaller effects for the
moderation analysis. It would have been interesting to compare those
categorized as having mild depression in the treatment and TAU groups as the
pattern of results suggested there might have been a difference, with those
with mild depression in the treatment group having better outcomes than those
in the TAU. However, the study was underpowered to be able to conduct
those analyses. In terms of the mediation analyses there were no significant
results, however only had weekly EPDS data was available for the treatment
group, which meant it would not have been able to establish temporal
precedence if any mediation effects had been found. Kraemer et al., (2002)
suggests temporal precedence needs to be established to conclude whether
mediation has occurred. The analysis that was carried out with the treatment
only group for the weekly EPDS would have had no comparison group if
significant results had been found. Alternative tests of mediation include
Structural Equation Modelling (SEM). This type of test of mediation is very
stringent because it must be strong enough to exist against the backdrop of the
stability coefficients, i.e., these residualised effects explain change in other
variables. However, there was insufficient power to be able to use SEM for
this project as it is recommended that \( n < 100 \) should only employ simple
mediation models and that samples of \( n > 200 \) are needed for a good SEM
(Kline, 2005). The examination of simple mediation pathways such as in this
project would have failed to account for other causal variables that may have
explained the relationship between the predictor and the mediator. It is
acknowledged that recognising that accounting for these variables would
further strengthen the meditational test. However, the data was collected as
part of a pilot RCT, it was important to first test the possibility of BA as a
mediator and then use any information in a larger trial where causal factors may be more properly accounted for.

Future research should consider collecting weekly measures from both groups in order to try and understand mechanisms of change and compare any changes with the control group. Collecting weekly measures would also be important to identify any mediators of change at earlier time points in the treatment. BA measures were only taken at baseline, 5 weeks and post treatment in the present study however the sudden gains analysis revealed that the majority of gains happened before this time point.

The sudden gains analysis did meet the three criteria outlined by Tang and DeRubeis (1999) however it did not meet the revised third criteria, which consisted of multiplying the pooled standard deviation by the difference in means. This has been suggested as a better way of assessing stability over time and concluding that the sudden gains were not a result of normal symptom fluctuation (Matterson et al., 2014). This is important to consider when interpreting the results. One reason why this criterion was not met could be that that the symptom fluctuation in women with postnatal depression differs from that of other populations with MDD.

Conclusions

In conclusion, this study has examined potential moderator and mediator variables of mood outcomes in women with postnatal depression. It did not find any significant results in terms of moderation or mediation. However post hoc analysis indicated that many women made sudden gains very early on during the intervention, these gains appear to be related to better outcomes 3 months post intervention. This study has provided useful information for the
planning of a Phase III trial of Netmums, in terms of the importance of collecting weekly measures from both treatment and TAU groups in order to conduct further analysis exploring what mechanisms underpin change.

**Ethical Approval and Considerations**

Ethical approval for this research was obtained from the University of Exeter Psychology Research Ethics Committee (reference number 2010/269). Participants were provided with written participant information at the start of the study. This outlined possible risks, such as the time-consuming nature of an online intervention, and the possibility of emotional distress when thinking about or discussing personal issues. Participants were made aware that the telephone support workers and researchers were fully trained to discuss sensitive issues to minimise any distress, and that answering questions that caused distress was not compulsory (although they were informed that the latter would have meant difficulties with continuing with the trial). They were made aware that they could withdraw themselves from the study at any time by contacting the team or by filling out the relevant form on the online system. All participants gave their full informed consent for participation by signing the online consent form.

**Acknowledgements**

This trial was conducted with funding from the National Institute for Health Research (NIHR) Collaboration for Leadership in Applied Health Research and Care (CLAHRC) for the South West Peninsula. The views expressed in this publication are those of the author and not necessarily those of the National Health Service (NHS), the NIHR or the Department of Health in
England.

**Conflict of Interest**

The author has no conflict of interest to declare.
References


Anxiety Disorder Screener (GAD-7) in the general population. *Medical Care.* 46, 266-74.


Appendix A

Copy of the Ethical Approval Documentation

To: Heather O’Mahen  
From: Cris Burgess  
CC: David Richards  
Re: Application 2010/269 Ethics Committee  
Date: July 20, 2015

The School of Psychology Ethics Committee has now discussed your application, 
2010/269 – Netmums: A pilot randomised controlled trial (RCT) to investigate the feasibility and effectiveness of an online Behavioural Activation (iBA) intervention, supported over the telephone, in comparison to treatment-as-usual (TAU). The project has been approved in principle for the duration of your study. Although not a condition of approval, we feel that the time required to complete the interviews and questionnaires wasn’t clear in the Information Sheet. We feel this should be specified, given there are quite a few questionnaires and the interview is fairly lengthy.

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.

Cris Burgess
Chair of Psychology Research Ethics Committee
Appendix B

Copy of the Online Participant Information Sheet

**Netmums Helping with Depression Study**

Thank you for your interest in taking part in the Netmums Helping with Depression Research Study. Before you agree to take part in this study it is really important for you to understand more about the study and what being involved will mean. Please read this information sheet carefully before you decide whether or not to take part. In order to read each section, select a question from the left and the information will pop up.

You may also like to discuss taking part in this research with your family, friends, GP or Health Visitor. If you have any questions at all after reading this please feel free to contact the research team directly (contact details are at the bottom of this page).

What is the purpose of the study?

What are the treatments being studied?

Do I have to take part?

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

What information do you want to know about me?

Will I be in the online CBT programme group or the group continuing to receive usual care? How is this decided?

What does taking part in the online CBT programme group on the group continuing to receive usual care involve?

How will you check to see how I am getting on?

What are the possible disadvantages and risks of taking part?

What are the possible benefits of taking part?

What happens when the research study stops?

What if new information becomes available?

What if something goes wrong?

Will my taking part in this study be kept confidential?

What will happen to the results of the research study?

Who is organising and funding the research? Who has reviewed the study?

What happens next?
What if I have any questions or concerns either now or in the future?

What is the purpose of the study?

Postnatal depression is very common. There are many changes that happen when you have a baby. Your lifestyle, your role in life, the type and hours of work you do, your relationships, sleep patterns, and hormone levels all change. Although motherhood may bring much happiness, it is understandable that, faced with all these changes, many women find that they struggle with depression as well as irritable, anxious and sad moods. If you are one of those women it is absolutely not your fault.

Also, many women with low mood experience difficulty accessing appropriate psychological treatment. When we are a busy mum it can be really hard to find time to see a therapist or counsellor – or find someone to care for our baby when we do. Also there are sometimes very long waiting lists to see someone. Some mums also find it difficult to speak to people about feeling low or depressed and don’t feel comfortable taking to health professionals.

An online cognitive behavioural therapy (CBT) programme for postnatal depression, supported over the telephone, may help with some of these difficulties. There is evidence to suggest that supported online programmes can help improve how people feel but this has not yet been studied in women experiencing postnatal depression.

We are interested in comparing the online programme, supported over the telephone for 12 weeks, with the usual care women with postnatal depression receive.

This study is an extension to some studies we ran between 2009 and 2011. During these studies we compared an older version of the current online programme with usual care currently received by women with postnatal depression. 384 women completed the study with 66% of women receiving the online intervention for 12 weeks no longer experienced postnatal depression at the end of receiving treatment, compared with 46% of women who received usual care.

Although these studies suggest that the online intervention is more effective than usual care for women with postnatal depression we know from other research studies that online interventions can be even more effective when support is received from a mental health care professional. This new study will see whether providing telephone support increases the effectiveness of the programme. We will also look to see if the effects last for longer than 12 weeks and therefore the study will last for 12 months.

What are the treatments being studied?

We are comparing an online cognitive behavioural therapy (CBT) programme, which is based on a specific type of CBT – behavioural activation (BA) - supported over the telephone with the usual care received for postnatal
depression. Earlier studies have found that BA is effective in helping people suffering from low mood feel better.

**The Online CBT Programme**

Online treatments based on CBT are currently recommended by NICE for the treatment of depression however currently no programmes exist for women who are experiencing postnatal depression.

The online CBT programme lasts for 12 weeks and support is provided over the telephone by a mental health professional, specially trained in providing support to this type of programme. There will be one telephone support session a week for the 12 weeks of the programme which will last for approximately 30 minutes. The telephone calls can be held at any time that is convenient, including during the evening or at the weekend. The support sessions mainly consist of helping mums work through the material and answering any questions that mums might have.

The online CBT programme is based on Behavioural Activation which is a Cognitive Behavioural Approach. It is focused on helping people improve how things are for them right now. There are two ways the approach can do this:

1. By helping you recognise how your mood is closely linked to the things you do – the programme is based on evidence which shows that if we change the way behave or mood can be lifted.

2. By helping you become more effectively involved in areas of your life that are important to you (e.g., improving your communication skills and getting support from those around you, in turn reducing isolation, and improving your relationship with your infant)

The online programme has a number of modules. The first module, which lasts over about 5 sessions, is based on helping you understand and work with the Behavioural Activation approach. You can then choose two additional modules to complete over the next 6 weeks which cover: anxiety; improving communication and support, changes in roles and relationships, problems with sleep, problems with negative thinking or worry which often occur when we are feeling low and parenting. In the final week you will complete a module on preventing depression in the future. At the end of the 12 weeks you can work through other modules but the telephone support sessions will only last for 12 weeks.

**Continuing to Receive Usual Care**

Usual care for postnatal depression could include a variety of things. You may receive care from your GP or your Health Visitor for example. Your GP may prescribe you with antidepressant medication or refer you to a mental
health professional. Your Health Visitor may provide support during visits or encourage you to speak to your GP about other forms of treatment.

**Do I have to take part?**

No, it is up to you to decide whether or not to take part in the study. If you do decide to take part in this study we will take you through an online consent process. The consent process will confirm that you have agreed to enter the study and understand what taking part in the study involves.

If you decide to take part you are free to withdraw at any time and without giving a reason. The study clinician may also withdraw you from the study if they feel it would be in your best interests. A decision to withdraw at any time, or a decision not to take part, will not affect the standard of care you receive.

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

Taking part in this study involves a number of stages over the next 12 months:

1. Getting to know more about you
2. Receiving the online CBT programme with telephone support or continuing to receive usual care
3. The research team seeing how you are doing over the next 12 months
4. Some mums who receive the online CBT programme will be invited to take part in an interview to understand their experiences of using the online programme

Everyone who takes part in this research will be asked to complete some questionnaires online at the beginning of the study, at 5 weeks into the study and 3, 6 and 12 months later. You will also be asked to speak to a researcher over the telephone at the beginning of the study, and 3, 6 and 12 months later to understand more about you and how you are getting on. These telephone calls are all extra from what you would normally have for the management of your depression.

Those mums allocated to receive the online programme will receive 12 telephone support sessions lasting 30 minutes each during each week of the 12 week programme.

Some mums who receive the online programme will be invited to participate in a telephone interview after they have finished the 12 weeks of treatment. This will be with a researcher and will consist of questions about your experience of using the programme and the telephone support sessions.

**What information do you want to know about me?**

The first thing we will want to do is to find out a bit more about you.
First we need to check that you are suitable for this study. We will firstly ask you to complete some questions online about your current and past mental health, current symptoms, current relationships, support you receive and some questions around you and your baby. We will also ask you to give us some information about your age, occupation, marital status, home background, education and treatments you may have already received for your depression. If you would rather speak to a researcher over the telephone, some of these questions can be filled out over the telephone instead. These questionnaires will take around 30 minutes to 1 hour to complete. These questions are important so we can understand how you are doing currently. They will also help us to see if the programme helps you or not.

We will then need to speak you over the telephone to ask you some more questions about your current and past mental health, what experiences you have had of depression and how this affects you. We expect these questions to take between 1 and 2 hours. We understand that finding 1-2 hours when you are a busy mum can be really tough so we can call you at a time convenient to you – which includes evenings or weekends. We can also hold the interview over a couple of telephone calls if this helps.

If you are suitable and would like to take part in the trial you will need to log onto the study website and complete a final consent form.

With your permission, we would like to audiotape the telephone call to make sure that the researchers are doing a good job. These audiotapes will be stored securely in a locked cabinet in the Mood Disorders Centre and will be accessible only to members of the research team. You can however opt out of having the telephone calls taped if you wish to.

**Will I be in the online CBT programme group or the group continuing to receive usual care? How is this decided?**

After you have completed all of the questionnaires and the questions of the telephone with a researcher you will need to log back onto the website and complete a final consent form. The website will tell you whether you have been allocated to receive the online programme with telephone support, or to continue receiving usual care.

Because we don’t know whether the online CBT programme with telephone support is better than the usual care provided for postnatal depression we need to make comparisons. This is why some mums will receive the online programme with telephone support and why other mums will continue to receive usual care – then we can compare the two groups to see which one is better.

The groups are selected randomly – by chance. You have a 50% change of being allocated to the online programme with telephone support and a 50% change of being allocated to continue to receive usual care.

**What does taking part in the online CBT programme group on the group continuing to receive usual care involve?**
Online CBT Programme: If you are in this group you will be provided with a web link to the online programme, which is only available to mums in this study who are randomly allocated to this group. You will need to register for the online programme and can then start working through the modules over the 12 weeks of the course.

When allocated to receive the online CBT programme you will be asked to provide some days and times that would be suitable to be contacted by the person providing the telephone support so that you can organise your first telephone support session. With your permission, each telephone support session will be recorded so we can make sure that the telephone supporters are doing a good job. If you don’t want the telephone support sessions to be recorded this is fine too. As with all out tapes, these will be stored in a locked cabinet in the Mood Disorders Centre.

Continuing Usual Care: if you are in this group you will continue to receive the standard care you are currently receiving for your postnatal depression. This may include care through your GP or Health Visitor. The usual care you receive may change during the course of the study so we will ask some questions around this when we contact you during the 12 months to find out how you are getting on.

You will also gain access to the Netmums Coping with Depression open forum.

How will you check to see how I am getting on?

You will be given a set of questionnaires online and asked some questions over the telephone about how you are doing over the next 12 months. We will normally do this after 5 weeks, and after 3, 6 and 12 months.

We would also like to ask some mums who receive the online CBT programme with telephone support about their experiences of using the programme. If you are one of the mums chosen to do this, we will invite you to have a chat over the telephone with one of our researchers about your experiences. We would want to find out about what you thought about the online CBT programme and telephone support – what was useful and also what was not useful. We would like to audiotape these with your permission. These tapes will be stored in a locked cabinet in the Mood Disorders Centre and will be accessible only to members of the research team.

What are the possible disadvantages and risks of taking part?

Taking part in this study will involve you taking some time to complete the questionnaires and talk to the researchers over the telephone about how you are getting on. As these questions are about you some of the questions are personal and it can be upsetting to discuss these issues. You don’t have to discuss anything you don’t want to and the researchers are trained to make sure that they are sensitive to your feelings and concerns.
If you are in the online CBT programme and telephone support group you will have to agree to work through the programme and attend the telephone support sessions. You will also need to complete exercises and practice the new skills and techniques you learn during the programme. Taking part in the online programme does involve time, effort and commitment, however many people who have used the programme have found it worthwhile, and it has helped them with their low mood. We have designed the course with other mothers who have taken the course in the past to make sure that the materials and work are not too burdensome.

**What are the possible benefits of taking part?**

We hope that either continuing normal care or the online CBT programme with telephone support will help you with your postnatal depression. Online CBT is recommended for depression by NICE (The National Institute for Clinical Excellence) and the continued usual care received may include other treatments recommended by NICE. However, we cannot guarantee that these treatments will help you.

The information we get from this study will help us to treat future mums experiencing postnatal depression better. We will keep an eye on everyone in the study to see how they are doing and if they show signs of severe deterioration we will help ensure they have access to appropriate help.

**What happens when the research study stops?**

At the end of the study you should discuss with your GP or health visitor how to continue your treatment plan.

Those allocated to the online CBT programme can continue to use the programme whenever they wish.

At the end of the 12 months, those mums allocated to the usual care group will also be able to access the online CBT programme – but this will not be part of this research study.

**What if new information becomes available?**

Sometimes during the course of a research study new information becomes available about the treatment which is being studied. If this does happen, we will tell you about it and discuss with you whether you would like to continue in the study. If you decide to continue in the study you would need to sign a new consent form. Sometimes when we receive new information we may consider it to be suitable to withdraw you from the study. If this happens we will explain the reasons and provide you with alternative sources to gain support from.

**What if something goes wrong?**

If you are experiencing problems or you feel that something is going wrong then please let us know immediately and we will do our very best to deal with the issue properly.
You can talk to your telephone supporter if you are in the online CBT programme and whichever group you are in your can contact the research team. You can also contact the Principal Investigator, Dr Heather O'Mahen, on h.o’mahen@exeter.ac.uk or 01392 724651. If you wish to complain about any aspect of the research team’s work you can also raise this with Dr Heather O’Mahen or with Netmums.

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

All information collected about you during the course of the research will be kept strictly confidential. Information about you will have your name / email removed so that you cannot be recognised from it. Any personal details will be stored in a separate locked cabinet from all the information we collect and we never put your name on any of the questionnaires we ask you to fill out. The only exception would be if the questionnaires, interview or support sessions (if allocated to the online CBT programme) revealed a significant risk of harm to yourself or others, in which case information may be fed back to your doctor but normally only after discussion with you.

**What will happen to the results of the research study?**

The researchers will aim to present this work at conferences and to publish it in an academic journal. We will also provide all those who take part with regular newsletters during the 12 months of the trial with updates. At the end of the study you will also be sent an information sheet detailing the results we have found. Your identity will never be revealed in any report of publication.

**Who is organising and funding the research? Who has reviewed the study?**

The research is jointly funded by PenCLAHRC – the Peninsula Collaboration for Leadership in Applied Health Research and Care and the University of Exeter. The research has been approved by the University of Exeter, School of Psychology Ethics Committee.

**What happens next?**

You will need to click on the link at the bottom of the webpage to take you through to the online consent process and the online questionnaires. If you are still happy and suitable to take part you will then have a telephone meeting with one of the researchers to complete the process of getting to know you a little better.

**What if I have any questions or concerns either now or in the future?**

If you have any questions or concerns please feel free to talk to the Netmums Study research team:

The NETMUMS Trial

Mood Disorders Centre
College of Life and Environmental Sciences
Washington Singer Laboratories
University of Exeter
EX4 4QG
Telephone: 01392 XXX XXX
Email: Netmums.HelpingStudy@exeter.ac.uk

Any questions, concerns or complaints can also be addressed to Dr Heather O’Mahen, the Principal Investigator for the study:

Dr Heather O’Mahen
Mood Disorders Centre
College of Life and Environmental Sciences
Washington Singer Laboratories
University of Exeter
EX4 4QG
Telephone: 01392 724651
Email: h.o’mahen@exeter.ac.uk

Appendix C
Advertisements placed in www.netmums.com newsletter and web banner.

Participants willing to consider participation follow the link to the Netmums Study website

Provided with brief information about the study on the Netmums Study website homepage

Provided with full information sheet

Full online consent process

If consent is received participants provide initial contact details and the date of birth of the youngest child. Participants with a child > 12 months excluded and receive email thank-you for time and list of other places they may be able to seek support from.

Eligibility screening questions online.

Automated decision on eligibility given

EPDS <13; history of bipolar disorder or psychosis, alcohol or substance misuse, currently receiving psychological intervention, hearing or reading impairment which would prevent the participant from using an online intervention supported over the telephone.

No

Provided with the full baseline questionnaire

Yes

Automated email to thank for time and list other places they may be able to seek support from.
Complete baseline questionnaires online (or over the telephone if requested or not completed within 7 days).
Full demographic data and GAD-7; BADS; WASAS; ISI; DAS; SPS; PBI; Health Economics

Participants provide details of when convenient to be contacted by the researcher to complete the CIS-R over the telephone.

CIS-R completed over the telephone to confirm diagnosis of major depression

Diagnosis of Major Depression confirmed

No diagnosis of Major Depression

Participant thanked for time and provided with a list of other places they may be able to seek support from.

Participants told to log back on to the Netmums study website and are randomised

50% participants randomised to iBA+ telephone support offered – 12 x 30 minute sessions

Pop-Up. Details of randomisation arm and “Thank you, please fill in the box below, with times that may be suitable for us to call you to give you telephone contact: Week grid – am/pm/evening”

Randomisation details sent to PI and telephone supporter (not the researcher as the researcher remains blind to allocation)

50% participants randomised to TAU plus access to the general www.netmums.com depression forum

Pop-Up. Details of randomisation arm.

Randomisation details sent to PI (not the researcher as the researcher remains blind to allocation)
Start of Intervention

Participant receives 5 weekly 30 minute telephone support sessions and works through the online programme

Automated email to complete the 5 weeks BADS. If not completed within 7 days participant is called by a researcher to complete the BADS over the telephone.

Participant receives 7 additional weekly 30 minute telephone support sessions and works through the online programme

End of Telephone Support Intervention

Send participants email to remind them that it is important for us to monitor their intervention and that we will be sending them questionnaires and would appreciate their time to complete these and that we will also need to conduct an interview over the telephone.

Automated emails at 12 weeks (+ 3 weekly reminders if no response) with follow up questionnaires: GAD-7; BADS; WASAS; ISI; DAS; SPS; PBI; Health Economics (Telephone reminder with the 1st and 2nd week email reminder) Email request to arrange the CIS-R over the telephone – again 3 weekly reminders if no response and telephone reminder with the 1st and 2nd week email reminders)

Automated emails at 12 weeks (+ 3 weekly reminders if no response) with follow up questionnaires: GAD-7; BADS; WASAS; ISI; DAS; SPS; PBI; Health Economics (Telephone reminder with the 1st and 2nd week email reminder) Email request to arrange the CIS-R over the telephone – again 3 weekly reminders if no response and telephone reminder with the 1st and 2nd week email reminders)

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Automated emails at 12 weeks (+ 3 weekly reminders if no response) with follow up questionnaires: GAD-7; BADS; WASAS; ISI; DAS; SPS; PBI; Health Economics (Telephone reminder with the 1st and 2nd week email reminder) Email request to arrange the CIS-R over the telephone – again 3 weekly reminders if no response and telephone reminder with the 1st and 2nd week email reminders)

9 months

15 months
Appendix D

Screen Shot of the Participant Consent Form

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
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<tbody>
<tr>
<td>I confirm that I have read and understood the participant information</td>
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<td>sheet for the study and have had the opportunity to ask questions:</td>
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<td>I understand that my participation is voluntary and that I am free to</td>
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<td>withdraw at any time, without giving a reason, without my usual care or</td>
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<td>legal rights being affected:</td>
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<td>I understand that I may not be eligible to take part in the study:</td>
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<td>I understand that details of my participation will be stored</td>
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<tr>
<td>anonymously on file and may be used in the final analysis of data:</td>
<td></td>
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<tr>
<td></td>
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</tr>
<tr>
<td>I agree to complete the screening questionnaires online and the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>screening interview over the telephone:</td>
<td></td>
<td></td>
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<tr>
<td></td>
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<tr>
<td>I agree to take part in the study:</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>I agree for my General Practitioner to be informed if my condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>deteriorates in a way that there are concerns that I may be suicidal or</td>
<td></td>
<td></td>
</tr>
<tr>
<td>at significant risk of harm to myself or others:</td>
<td></td>
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<tr>
<td></td>
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</tr>
<tr>
<td>I agree to allow a tape recording of my telephone support sessions to</td>
<td></td>
<td></td>
</tr>
<tr>
<td>be made if I am allocated to this group (you may say no to this item</td>
<td></td>
<td></td>
</tr>
<tr>
<td>but still take part in the trial):</td>
<td></td>
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<tr>
<td></td>
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</tr>
<tr>
<td>I am willing to be interviewed about my experiences of using the online</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBT programme over the telephone if I am allocated to this group and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>for this interview to be tape recorded (you may say no to this item</td>
<td></td>
<td></td>
</tr>
<tr>
<td>but still take part in the trial):</td>
<td></td>
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<tr>
<td>I am willing to be contacted by the Mood Disorders Centre about</td>
<td></td>
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<tr>
<td>additional research in the future (you may say no to this item but</td>
<td></td>
<td></td>
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<tr>
<td>still take part in the trial):</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>If you are happy with the answers you have provided above</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Continue
Appendix E

Study Measure: Edinburgh Postnatal Depression Scale

Please select the answer which comes closest to how you have felt in the past 7 days, not just how you feel today.

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

2. I have looked forward with enjoyment to things.
   ___ As much as I ever did
   ___ Rather less than I used to
   ___ Definitely less than I used to
   ___ Hardly at all

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

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

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

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

7. I have been so unhappy that I have had difficulty sleeping.

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

8. I have felt sad or miserable.

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

9. I have been so unhappy that I have been crying.

___ Yes, most of the time
___ Yes, quite often
___ Only occasionally
___ No, never

10. The thought of harming myself has occurred to me.

___ Yes, quite often
___ Sometimes
___ Hardly ever
___ Never
Appendix F

Study Measure: Behavioural Activation for Depression Scale

Please read each statement carefully and then circle the number which best describes how much the statement was true for you DURING THE PAST WEEK, INCLUDING TODAY.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at all</th>
<th>A little</th>
<th>A lot</th>
<th>Completely</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I stayed in bed for too long even though I had things to do</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. There were certain things I needed to do that I didn't do</td>
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<td></td>
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</tr>
<tr>
<td>3. I am content with the amount and type of things I did</td>
<td></td>
<td></td>
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<tr>
<td>4. I engaged in a wide and diverse array of activities.</td>
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<tr>
<td>5. I made good decisions about what type of activities and/or situations I put myself in.</td>
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<tr>
<td>6. I was active, but did not accomplish any of my goals for the day.</td>
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<tr>
<td>7. I was an active person and accomplished the goals I set out to do.</td>
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<tr>
<td>8. Most of what I did was to escape from or avoid something unpleasant.</td>
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<tr>
<td>9. I did things to avoid feeling sadness or other painful emotions.</td>
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<tr>
<td>10. I tried not to think about certain things.</td>
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<tr>
<td>11. I did things even though they were hard because they fit in with my long-term goals for myself.</td>
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<tr>
<td>12. I did something that was hard to do but it was worth it.</td>
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<tr>
<td>13. I spent a long time thinking over and over about my problems.</td>
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<tr>
<td>14. I kept trying to think of ways to solve a problem but never tried any of the solutions.</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15. I frequently spent time thinking about my past, people who have hurt me, mistakes I've made, and other bad things in my history.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16. I did not see any of my friends.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. I was withdrawn and quiet, even around people I know well.</td>
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</tr>
<tr>
<td>18. I was not social, even though I had opportunities to be.</td>
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<td></td>
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<tr>
<td>19. I pushed people away with my negativity.</td>
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<td></td>
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</tr>
<tr>
<td>20. I did things to cut myself off from other people.</td>
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</tr>
<tr>
<td>21. I took time off of work/school/chores/responsibilities simply because I was too tired or didn't feel like going in.</td>
<td></td>
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<tr>
<td>22. My work/schoolwork/chores/responsibilities suffered because I was not as active as I needed to be.</td>
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<tr>
<td>23. I structured my day's activities.</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
24. I only engaged in activities that would distract me from feeling bad.
25. I began to feel badly when others around me expressed negative feelings or experiences.

Over the **last 2 weeks**, how often have you been bothered by the following problems?

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Several days</th>
<th>More than half the</th>
<th>Nearly every day</th>
</tr>
</thead>
</table>
### Appendix G

Study Measure: Generalised Anxiety Disorder Scale

<table>
<thead>
<tr>
<th>Days</th>
<th>Feeling nervous, anxious or on edge</th>
<th>Not being able to stop or control worrying</th>
<th>Worrying too much about different things</th>
<th>Trouble relaxing</th>
<th>Being so restless that it is hard to sit still</th>
<th>Becoming easily annoyed or irritable</th>
<th>Feeling afraid as if something awful might happen</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Appendix H

Study Measure: Work and Social Adjustment Scale

People's problems sometimes affect their ability to do certain day-to-day tasks in their lives. To rate your problems look at each section and determine on the scale provided how much your problem impairs your ability to carry out the activity.

1. **WORK** - if you are retired or choose not to have a job for reasons unrelated to your problem, please choose N/A (not applicable)

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all</td>
<td>Slightly</td>
<td>Definitely</td>
<td>Markedly</td>
<td>Very severely, I cannot work</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

2. **HOME MANAGEMENT** – Cleaning, tidying, shopping, cooking, looking after home/children, paying bills etc

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all</td>
<td>Slightly</td>
<td>Definitely</td>
<td>Markedly</td>
<td>Very severely</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

3. **SOCIAL LEISURE ACTIVITIES** - With other people, e.g. parties, pubs, outings, entertaining etc.

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all</td>
<td>Slightly</td>
<td>Definitely</td>
<td>Markedly</td>
<td>Very severely</td>
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</table>

4. **PRIVATE LEISURE ACTIVITIES** – Done alone, e.g. reading, gardening, sewing, hobbies, walking etc.

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<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all</td>
<td>Slightly</td>
<td>Definitely</td>
<td>Markedly</td>
<td>Very severely</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

5. **FAMILY AND RELATIONSHIPS** – Form and maintain close relationships with others including the people that I live with

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all</td>
<td>Slightly</td>
<td>Definitely</td>
<td>Markedly</td>
<td>Very severely</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Appendix I

Study Measure: Social Provisions Scale

<table>
<thead>
<tr>
<th>Number</th>
<th>Statement</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>There are people I can depend on to help me if I really need it.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2</td>
<td>I feel that I do not have close personal relationships with other people.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>There is no one I can turn to for guidance in times of stress.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>4</td>
<td>There are people who depend on me for help.</td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td>There are people who enjoy the same social activities I do.</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>Other people do not view me as competent.</td>
<td></td>
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<tr>
<td>7</td>
<td>I feel personally responsible for the well-being of another person.</td>
<td></td>
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</tr>
<tr>
<td>8</td>
<td>I feel part of a group of people who share my attitudes and beliefs.</td>
<td></td>
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<tr>
<td>9</td>
<td>I do not think other people respect my skills and abilities.</td>
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<tr>
<td>10</td>
<td>If something went wrong, no one would come to my assistance.</td>
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</tr>
<tr>
<td>11</td>
<td>I have close relationships that provide me with a sense of emotional security and well-being.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>12</td>
<td>There is someone I could talk to about important decisions in my life.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>13</td>
<td>I have relationships where my competence and skills are recognized.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>There is no one who shares my interests and concerns.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>15</td>
<td>There is no one who really relies on me for their well-being.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>There is a trustworthy person I could turn to for advice if I were having problems.</td>
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<td></td>
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</tr>
<tr>
<td>17</td>
<td>I feel a strong emotional bond with at least one other person.</td>
<td></td>
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<tr>
<td>18</td>
<td>There is no one I can depend on for aid if I really need it.</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>There is no one I feel comfortable talking about problems with.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>There are people who admire my talents and abilities.</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>I lack a feeling of intimacy with another person.</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>22</td>
<td>There is no one who likes to do the things I do.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>There are people I can count on in an emergency.</td>
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</tr>
<tr>
<td>24</td>
<td>No one needs me to care for them.</td>
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</tbody>
</table>
Appendix J

Study Measure: Postpartum Bonding Instrument

<table>
<thead>
<tr>
<th>THE POSTPARTUM BONDING INSTRUMENT</th>
<th>NAME:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please indicate how often the following are true for you.</td>
<td>DATE:</td>
</tr>
<tr>
<td>There are no “right” or “wrong” answers.</td>
<td></td>
</tr>
<tr>
<td>Choose the answer which seems right in your recent experience.</td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>Very often</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>I feel close to my baby</td>
<td></td>
</tr>
<tr>
<td>I wish the old days when I had no baby would come back</td>
<td></td>
</tr>
<tr>
<td>I feel distant from my baby</td>
<td></td>
</tr>
<tr>
<td>I love to cuddle my baby</td>
<td></td>
</tr>
<tr>
<td>I regret having this baby</td>
<td></td>
</tr>
<tr>
<td>The baby does not seem to be mine</td>
<td></td>
</tr>
<tr>
<td>My baby winds me up</td>
<td></td>
</tr>
<tr>
<td>My baby irritates me</td>
<td></td>
</tr>
<tr>
<td>I feel happy when my baby smiles or laughs</td>
<td></td>
</tr>
<tr>
<td>I love my baby to bits</td>
<td></td>
</tr>
<tr>
<td>I enjoy playing with my baby</td>
<td></td>
</tr>
<tr>
<td>My baby cries too much</td>
<td></td>
</tr>
<tr>
<td>I feel trapped as a mother</td>
<td></td>
</tr>
<tr>
<td>I feel angry with my baby</td>
<td></td>
</tr>
<tr>
<td>I resent my baby</td>
<td></td>
</tr>
<tr>
<td>My baby is the most beautiful baby in the world</td>
<td></td>
</tr>
<tr>
<td>I wish my baby would somehow go away</td>
<td></td>
</tr>
<tr>
<td>I have done harmful things to my baby</td>
<td></td>
</tr>
<tr>
<td>My baby makes me anxious</td>
<td></td>
</tr>
<tr>
<td>I am afraid of my baby</td>
<td></td>
</tr>
<tr>
<td>My baby annoys me</td>
<td></td>
</tr>
<tr>
<td>I feel confident when changing my baby</td>
<td></td>
</tr>
<tr>
<td>I feel the only solution is for someone else to look after my baby</td>
<td></td>
</tr>
<tr>
<td>I feel like hurting my baby</td>
<td></td>
</tr>
<tr>
<td>My baby is easily comforted</td>
<td></td>
</tr>
</tbody>
</table>
Appendix K

Study Measure: Clinical Interview Schedule – Revised

<table>
<thead>
<tr>
<th></th>
<th>CISR - DEPRESSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1</td>
<td>Felt depressed in past month</td>
</tr>
<tr>
<td>G2</td>
<td>Able to enjoy / take interest in things as usual in past month</td>
</tr>
<tr>
<td>G4</td>
<td>Felt depressed in past week</td>
</tr>
<tr>
<td>G5</td>
<td>Able to enjoy / take interest in things as usual in past week</td>
</tr>
<tr>
<td>G6</td>
<td>No. of days in past week felt depressed</td>
</tr>
<tr>
<td>G7</td>
<td>Felt depressed &gt;3 hrs in total on any day</td>
</tr>
<tr>
<td>G9</td>
<td>Felt happy if nice thing happened in past week</td>
</tr>
<tr>
<td>G10</td>
<td>Duration of depression</td>
</tr>
<tr>
<td>DVG11</td>
<td>(D) CISR - DEPRESSION Symptom score [from G5, G6, G7 &amp; G9]</td>
</tr>
</tbody>
</table>
Appendix L

Dissemination Statement

This thesis will be adapted in line with journal requirements and submitted for publication to the Journal of Behaviour Research and Therapy. This journal has an international scope encompassing CBT. It covers theoretical and experimental analyses of psychopathological processes, the developmental and evaluation of empirically supported interventions, predictors, moderators and mechanisms of behaviour change and dissemination and implementation of evidence-based treatments to general practice. In 2013 it had an impact factor of 3.845. It is therefore a highly appropriate journal in terms of maximizing the likelihood that this work will have an important impact. The findings will be presented to interested parties within the University of Exeter. They will also be published on the Netmums Facebook page, and in the participants’ regular termly newsletter. Upon publication, Netmums will advertise the results on their webpage.