



**SCHOOL OF PSYCHOLOGY**  
**DOCTORATE IN CLINICAL PSYCHOLOGY**

**Maternal emotion regulation and mother-infant interactions**

Submitted by Rachel Stone, to the University of Exeter  
as a thesis for the degree of Doctor of Clinical Psychology, 15<sup>th</sup> June 2020

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Signature:

A handwritten signature in black ink, appearing to read "Rachel Stone", followed by a period.

## **Acknowledgements**

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**SCHOOL OF PSYCHOLOGY**  
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**LITERATURE REVIEW**

**The impact of parental emotion regulation during the perinatal period on the  
parent-infant relationship and infant development outcomes.**

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Secondary Research Supervisor:	<b>Dr Jenny Limond</b> Senior Lecturer, University of Exeter and Consultant Clinical Neuropsychologist
Target Journal:	Journal of Child Psychology and Psychiatry (JCPP)
Word Count:	5957 words

**Submitted in partial fulfilment of requirements for the Doctorate Degree in  
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### **Abstract**

**Background:** Poor emotion regulation abilities are predictive of difficulties with relationships, quality of life and mental and physical health. Although there has previously been a lack of research examining the relationship of emotion regulation and mother-infant outcomes, there has been recent growth examining how parental emotion regulation impacts mother-infant outcomes. This systematic literature review aimed to examine the relationship between these variables in the context of a perinatal population.

**Method:** Studies measuring the impact of parental emotion regulation on the mother-infant relationship and infant outcomes were included in the review. A total of 57 studies were screened at full text, leading to the identification of eight suitable studies included in the review. Each study was reviewed using the Effective Public Health Practice Project (EPHPP) Quality Assessment Tool for Quantitative Studies.

**Results:** A strong association was found between maternal emotion regulation and its impacts on the mother infant relationship and infant development outcomes. No papers were identified investigating father-infant interactions. The findings suggested mothers with emotion regulation difficulties had poorer mother-infant relationships and their infants experienced a range of negative developmental outcomes as a result. The findings also highlight adaptive emotion regulation strategies such as mindfulness can help improve mother-infant interactions and prevent detrimental infant outcomes. The majority of the studies included in the review were rated as 'strong', although still have limitations and further replication is required.

**Conclusions:** The findings suggest the relationship between maternal emotion regulation and mother-infant and infant outcomes is complex but propose a clear pattern in which conclusions can be drawn. Whilst these conclusions are in line with

previous existing literature based on non-perinatal populations, further research and examination of specific additional emotion regulation strategies for a perinatal population would be beneficial.

**Keywords:** emotion regulation, mother-infant interaction, infant development, maternal, mindfulness, rumination, perinatal period

## Introduction

Maternal mental health problems during the perinatal period are highly prevalent with up to 20% of women developing a mental health problem during pregnancy or within a year of giving birth (Bauer et al., 2014). As well as being disabling and distressing, a significant body of literature demonstrates they are related to increased risk for poor relationship quality between the mother and infant and poor child emotional and social outcomes (Ross-Davie et al., 2014). The mechanisms underlying these relationships are unclear. Recent research has begun to investigate whether parental emotion regulation (ER), defined as a person's ability to effectively manage and respond to an emotional experience (Koole, 2009), is a key factor associated with child outcomes. In this systematic review the impact of specific parental ER on the parent-infant relationship and subsequent infant outcomes in the first year of life is examined.

There is extensive literature demonstrating that parental mental health is associated with the parent-child relationship (Tan & Smith, 2018), the development of child ER (Goodman et al., 2011; Morelen et al., 2016), and subsequent child social and emotional outcomes (Binion & Zalewski, 2018; Crespo et al., 2017; Maughan et al., 2007). Further, there is a considerable evidence that the parent-child relationship mediates the relationship between parental mental health and child outcomes (Satyanarayana et al., 2011). Specifically, parental sensitivity to infant needs and timely and appropriate responsiveness is associated with better infant social, emotional, health and cognitive outcomes (Newman et al., 2015). Until recently however, there has been a lack of research delineating what specific aspects of parental mental health are associated with child outcomes. This is an important question, because a number of treatment studies that have targeted and

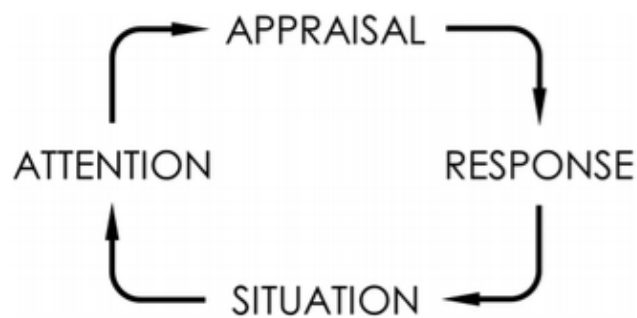
shown improvements in parental mental health have failed to find improvements in the mother-infant relationship or child outcomes (Poobalan et al., 2007). These findings suggest it is critical to understand *how* parental mental health affects the parent-infant relationship.

Recent research has begun to investigate whether parental ER is one of the key components associated with both parental mental health and the parent-infant relationship. There is an extensive literature base demonstrating the relationship between ER and mental health in the adult general literature (Sloan et al., 2017). Research has also shown individuals who have recovered from depression use more negative ER strategies and fewer adaptive ER strategies when compared to non-depressed individuals and that this is associated with the parent-infant relationship (Ehring et al., 2008), suggesting ER may be a key risk and maintaining factor for parental mental health problems.

Emotion regulation may also be especially important in parenting because of the unique and intensive regulatory challenges parenting places on individuals. Although typically interpersonal interactions can serve both as a context in which individuals need to regulate their emotions, they can also help to reciprocally support ER (Barthel et al., 2018; Coan & Maresh, 2014). The parenting relationship is a notable exception to this reciprocal pattern of interpersonal ER. The need to regulate their own emotions is great, as sensitive parenting interactions require the parent to set aside their own emotional needs to discern what the infant needs, to respond appropriately, and to help the child regulate their own emotions at the same time (Rutherford & Mayes, 2011). Parenting therefore places extraordinary pressures on parental ER, often under trying conditions such as being sleep deprived (Rutherford et al., 2015). Thus, the ability to effectively regulate emotion may be especially

critical to the parent-infant relationship and may be a core process underlying both parental mental health and child well-being.

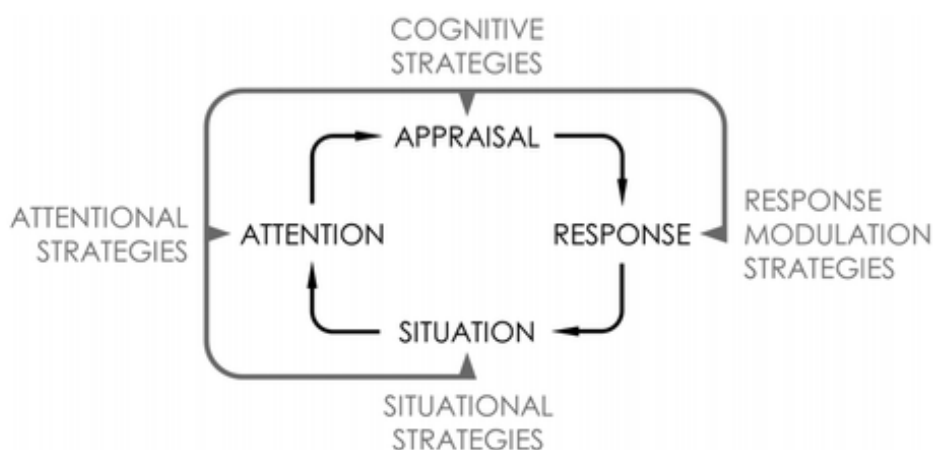
The ways in which ER may affect parenting may be considered with Gross and colleagues (2019) emotion/affect generation and regulation model (Gross et al., 2019). The model suggests affect generation is a cyclical process of attending to, appraising and responding to different experiences using four stages; situation, attention, appraisal and response (Figure 1). For example, anxiety may be experienced when a mother hears her infant crying (situation); she pays attention to the negative things this could mean (attention); appraises this situation as distressing (appraisal); and then feels anxious and an urge to turn away (response).



*Figure 1. Affect Generation Cycle*

Furthermore, the model proposes affect regulation is based on decision making and deciding where to intervene within the affect generation cycle and what regulation strategy to utilise. Four types of affect regulation strategies are suggested; situational, attentional, cognitive and response modulation strategies,

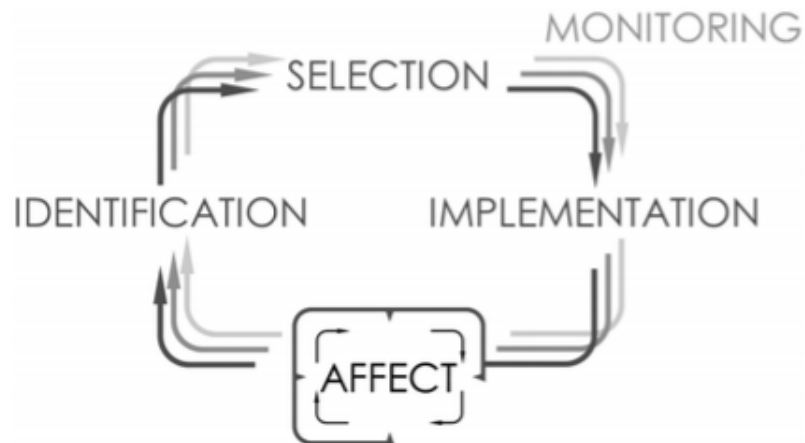
with each one referring to stages in the affect generation process (Figure 2). Each of these affect regulation strategies can be applied to a parenting context.



*Figure 2. Affect Regulation Strategies*

Situational strategies apply to the situation stage and involve modifying situations. For example, a mother struggling with negative emotions around poor infant sleep, may create a calm, soothing environment for both the infant and mother before sleep. Attentional strategies relate to attending to specific features in the environment and attempts to change what aspects are being attended too. For example, attentional biases may pull a depressed parent's attention away from positive infant cues (Gibb et al., 2016).

Cognitive strategies are used within the appraisal stage of the process and aim to modify how the situation is seen in terms of values, goals and motivational concerns. They may be either negative or positive (e.g. rumination, mindfulness, reappraisal). Response modulation strategies are related to the response stage and induce behavioural or physiological changes. Here, a mother might be in a noisy, stressful environment and as a result feel irritable towards a fussing infant and so decides to leave the room, go somewhere quieter and begin to soothe baby and themselves, reducing feelings of irritability.



*Figure 3. Affect Regulation Stages*

The model extends to add four affect regulation stages (Figure 3), in which the individual consciously or unconsciously makes their decision about how to manage. At the identification stage people decide if anything relating to their affect needs to be changed and the selection stage is where they decide what affect regulation strategy to utilise. The implementation stage allows people to decide what actions to take as part of the chosen strategy and the monitoring stage consists of updates regarding these decisions and whether ongoing efforts should be continued, swapped or ceased. Different parts of this cycle require varying levels of cognitive effort (e.g. low for attentional bias, high for appraisal process). This is important to consider given that parents of infants often have depleted levels of cognitive capacity due to sleep deprivation and the attentional demands of caring for an infant.

### **Current systematic review**

Despite the relevance of parental ER on infant outcomes, and the fact there is now a growing body of literature investigating the relationship of parental ER and the parent-infant relationship and infant outcomes, there has not been a review of this literature.

Therefore, this systematic literature review aimed to explore the relationship between parental ER and mother-infant interactions within the perinatal period. The research question was: “*what are the effects of parental emotion regulation in the perinatal period on the parent-infant relationship and infant outcomes?*”

This literature review focussed on the initial parent-infant relationship and very early infant development. Therefore, only studies during the perinatal period were included. Studies including expectant parents or parents who have had babies up to the age of one year old at time of entry to the study were not incorporated. Implications of the findings are discussed in terms of clinical application and future service directionality.

### **Method**

A systematic search of the available literature and extraction of important data using both the Cochrane Handbook for Systematic Review of Interventions (Higgins & Thomas, 2019) and PRISMA-P reporting protocol (Moher et al., 2016) was completed (Appendix A). Following this a narrative synthesis of results and critical appraisal was used to assimilate conclusions (Denyer & Tranfield, 2009).

### **Eligibility Criteria**

Eligibility criteria relating to the characteristics of studies included in the review were defined using PICOS criteria (population, interventions and comparisons, outcome and study design). Table 1 details the full inclusion and exclusion criteria.



**Table 1***Full Inclusion and Exclusion Criteria*

	Inclusion	Exclusion
Population	<ul style="list-style-type: none"> <li>• Parents</li> <li>• Male or female</li> <li>• 18 years of age or older</li> <li>• Study takes place when mother is pregnant or within the infant's first year of life.</li> </ul>	<ul style="list-style-type: none"> <li>• Parents aged 17 and under</li> </ul>
Interventions	<ul style="list-style-type: none"> <li>• Measures or interventions used must relate to the parents' emotion regulation e.g. Difficulties in Emotion Regulation Questionnaire</li> </ul>	<ul style="list-style-type: none"> <li>• Studies that do not report parental emotion regulation.</li> <li>• Studies that report information or conclusions based on parent's past experiences or previous mental health difficulties.</li> <li>• Studies that report only on parental emotion regulation and there are no parenting or infant measures.</li> </ul>
Comparators	<ul style="list-style-type: none"> <li>• Not applicable</li> </ul>	<ul style="list-style-type: none"> <li>• Not applicable</li> </ul>
Outcomes	<ul style="list-style-type: none"> <li>• Studies where the primary outcome is either related to the parent-infant relationship and / or specific infant development outcomes.</li> </ul>	<ul style="list-style-type: none"> <li>• Studies where the parent – infant relationship or infant outcomes are not looked at within the first year of life.</li> </ul>
Study Design	<ul style="list-style-type: none"> <li>• Studies with quantitative data only.</li> <li>• Studies using mixed methods but only where quantitative data is</li> </ul>	<ul style="list-style-type: none"> <li>• Exclude conference abstracts, book chapters, systematic reviews or dissertations.</li> <li>• Exclude qualitative studies and those</li> </ul>

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used to answer the primary outcomes.

not published in English.

- Study design to include cross sectional, experimental, longitudinal, retrospective and prospective designs.
  - Studies that are peer reviewed.
- 

### **Information Sources**

In order to identify relevant literature, the following electronic databases were examined – MEDLINE, EMBASE, PsycINFO, CINAHL and the Cochrane Library Database. There was no limit on the date of publication so all studies that met the criteria were included. The database searches were conducted on 9<sup>th</sup> March 2020. Reference lists of included studies were screened for references that were not identified during the initial database searches. Due to limited resources grey literature was not searched.

### **Search Strategy**

In line with Cochrane Library guidance (Higgins & Thomas, 2019) an initial scoping review was conducted to allow for identification of suitable search terms, with key words being selected following analysing search terms listed in a prior systematic review relating to ER strategies (Aldao et al., 2010). They included key words relating to parental ER strategies during the perinatal period on parenting outcomes. Table 2 displays the key search terms used. Different combinations using ‘and’ and ‘or’ were utilised as well as truncation symbols to ensure all possible combinations of terms and words with different endings were recognised.

**Table 2***Key Search Terms*

	<b>Emotion regulation "OR"</b>	<b>Perinatal Period "OR"</b>	<b>Parenting "OR"</b>	<b>Population "OR"</b>
Individual Search Terms (In title and abstracts)	Emotion regulation, self-regulation, acceptance, accepting, avoidance, self-compassion*, reapprais*, problem solving, suppressi*, mindful*, ruminati, distract*, cognitive reappraisal, self-sooth*, reappraisal, attentional control, self-aware*, meditate*, withdrawal, self-injury, emotion dysregulation, coping strateg*, coping mechanism*	Perinatal, antenatal, postpartum, postnatal, pre-birth, post birth, pregnancy, prenatal	Mother child attachment, mother child interaction, mother child relationship, mother infant attachment, mother infant interaction, mother infant relationship, father child attachment, father child interaction, father child relationship, father infant attachment, father infant interaction, father infant relationship, parent child attachment, parent child interaction, parent child relationship, parent infant attachment, parent infant interaction, parent infant relationship, maternal sensitivity, paternal sensitivity, parental sensitivity, mind-mindedness, parental problem solving, chid functioning, child outcomes	Parent, parenting, maternal, paternal mother, father
Combined Search (In title and abstracts)	Section 1 "AND" Section 2 "AND" Section 3 "AND" Section 4			

**Study Records**

**Data management.** All papers identified as part of the search were exported into the reference management software, Mendeley on 9<sup>th</sup> March 2020.

**Selection process.** Initially, the titles and abstracts of results generated were screened for edibility against the PICOS criteria. All eligible studies meeting the criteria were then screened at the full text stage to determine if they met the inclusion criteria specified.

Six studies (75%) were randomly selected and reviewed by an independent second-rater during the full text screening stage. They were asked to confirm whether they felt the paper met the inclusion criteria based on the PICOS, giving a yes/no decision. The second-assessor yielded a 100% inter-rater reliability.

### **Data Collection Process**

The extraction of all data was completed solely by the lead researcher. Data was extracted using the Data Extraction and Assessment Template from the Cochrane Public Health Group (Appendix B). Using the data extraction template form supported the identification of relevant papers and helped reduce bias.

### **Quality Appraisal**

The Quality Assessment Tool for Quantitative Studies (QAT) from the Effective Public Health Practice Project (Appendix C) was used to assess the quality rating for each study (Effective Public Health Practice Project, 1998). The tool was chosen as it is designed for use within public health research and is evaluated across components including selection bias, study design, confounders, blinding, data collection methods and numbers of withdrawals and dropouts (Thomas et al., 2004). The quality ratings available to select were strong, moderate or weak.

### **Data Synthesis**

To support the structure for the results of this systematic review, a narrative data synthesis method was adopted. This is due to the diverse methodologies and nature of the studies included in the review and is in line with recommended

guidance from the Centre for Reviews and Dissemination (2009). The aim was to identify patterns across the studies' findings and explore reasons that might explain any differences or similarities within them.

Given the range and diversity of the measures and interventions used in the studies, a meta-analysis was not deemed appropriate.

The results section adopts the narrative synthesis approach and includes study characteristics along with the prominent findings from the research base.

## **Results**

### **Search Results**

A total of 1207 articles were identified from the initial database search. 17 additional articles were identified following the screening of the reference lists of papers included in the full text screening stage. After the deletion of duplicate papers, 924 papers were screened at the title stage, leaving 292 papers that were screened by abstract. 235 articles did not meet the PICOS criteria at this stage, resulting in 57 articles being screened at the full text stage. Following the full text screening eight records fully met the PICOS criteria and were included within the review (Figure 4). Three of the included studies were selected at random to be reviewed by a second-rater using the QAT (Effective Public Health Practice Project, 1998). Inter-rater reliability was calculated, yielding good agreement between reviewers at 91.2%. Inconsistencies were discussed between raters until full agreement was reached.

### **Excluded Studies**

The 49 papers screened at full text that did not meet criteria were excluded because they looked only at infant ER or focussed on the mother's mental health and / or trauma experiences and not at maternal ER specifically. Studies included in

the review detailed outcomes of maternal ER abilities on outcomes for the infant as no studies examining paternal ER abilities were sourced. This means that all the studies populations included mothers only.

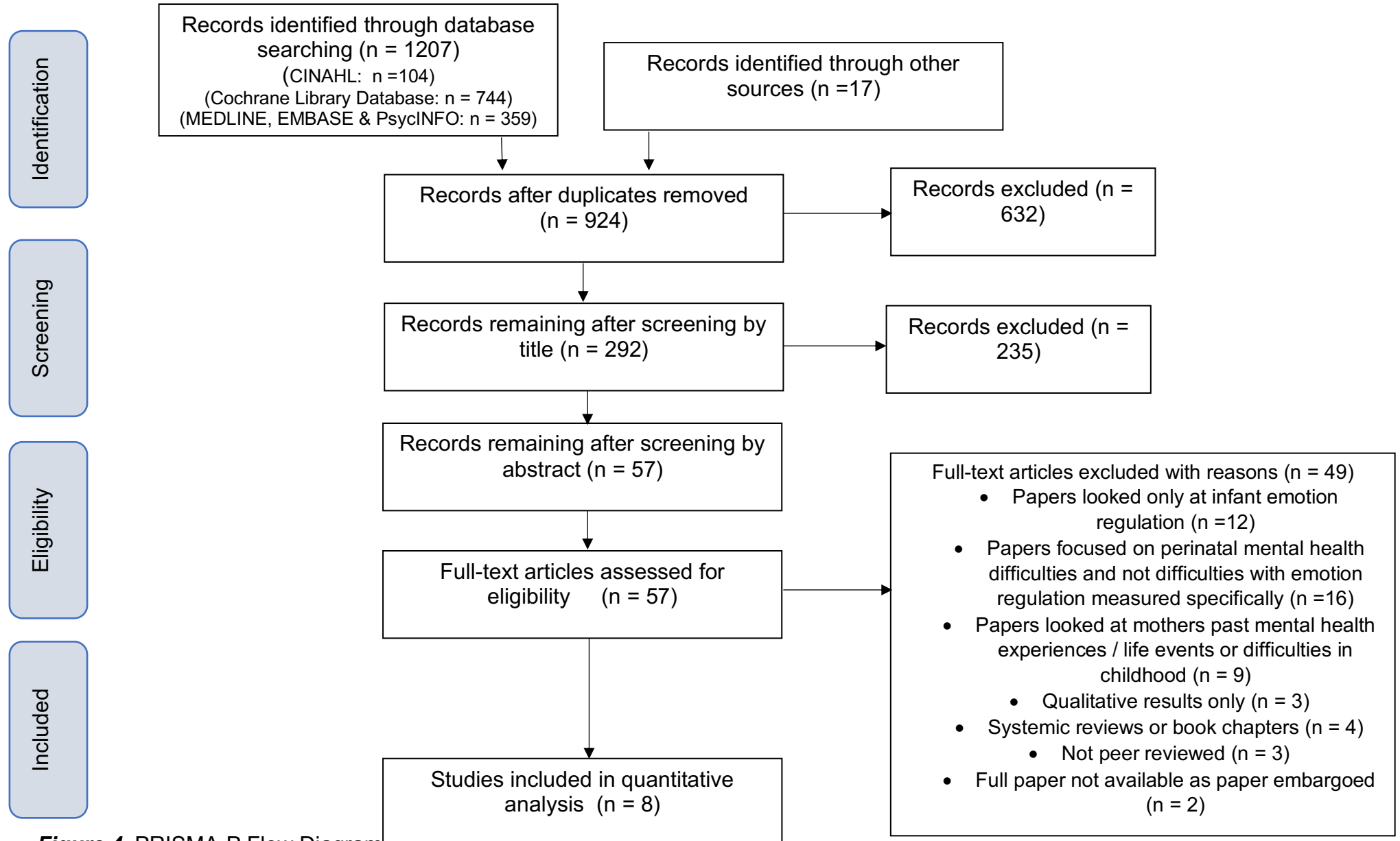


Figure 4. PRISMA-P Flow Diagram

### **Study Characteristics**

Eight studies were included in the review. Table 3 displays the study characteristics. All of the studies reported on maternal ER in some way and the outcomes of this on either the mother-infant relationship, specific infant outcomes, or both.

**Design.** Six studies used a cohort design (1, 3, 5, 6, 8) and two studies used a cohort analytic design (2, 4). Four studies directly observed the infant participants (2, 4, 6, 7), whilst three studies only used mothers' self-report data on the infants (3, 5, 8). One study looked only at the health outcomes of infants and so did not report specific infant data (1). Six papers were described as longitudinal (1, 2, 3, 6, 7, 8), with the remaining 2 papers being correlational in nature (4, 5)

**Sample size.** The majority of studies had fewer than 100 participants (2, 3, 4, 6, 7), however three studies had over 100 participants (1, 5, 8). The study with the lowest number of participants included 36 mothers (6) and the highest included 905 participants in total (1).

**Participants.** As per the PICOS criteria, all studies used participants within the perinatal period, with one study examining women in pregnancy (8) and the remaining seven studies studying women with infants during their first year of life (1, 2, 3, 4, 5, 6, 7). Six studies took part within a perinatal community setting (1, 2, 3, 5, 7, 8), one study was conducted with a perinatal clinical population (6) and the remaining study used both a community and clinical sample setting (4). The age of parent participants across the studies ranged from  $M_{age} = 31.45$  years (5, 6) to 35.2 years (2). The mean infant age ranged from  $M_{age} = 6.5$  months (7) to 11.28 months (5). Two studies did not report the mean infant age (2, 6).



There was also some diversity within the sample in terms of participant characteristics – most participants were recruited within the community, however one study (4) used dysphoric mothers and compared them to non-dysphoric mothers allowing for the comparison of a clinical and community sample. The majority of the samples were not fully representative of the general population due to them being convenience samples; some studies reported having a majority of participants who had higher education (1, 4, 6, 7) and financial statuses (7) than those of the general population and a general lack of diversity in volunteer samples (5).

A number of the studies reported on moderate attrition effects and small sample sizes (2, 3, 6, 7, 8) and all but two of the eight studies reviewed reported self-report measures being a direct limitation of their study design (1, 2, 3, 5, 7, 8).

**Outcomes.** A variety of measures were used to assess parent ER strategies. Seven of the eight studies used ER measures (1, 2, 3, 5, 6, 7, 8), whilst the remaining study involved the use of an ER induction designed to test a specific ER strategy (4). The seven studies looking at ER strategies used correlational designs measuring the relationship between trait measures of ER and various outcomes relating to the mother-infant relationship and infant development. The remaining study (4) used an experimental design that manipulated state rumination and investigated its impact on observed mother-child interaction quality. Thus, although the seven correlational studies demonstrated a relationships between trait ER measures and mother-child outcomes, it is not possible to infer causality. This inference is limited only to the latter, experimental study, which demonstrated that maternal state rumination was causally associated with poorer maternal-child interaction quality. Further, although the correlational studies suggest that trait ER, mostly mindfulness, was associated with mother-child outcomes, it is not possible

from these studies to discern whether maternal trait ER is malleable, and if so, whether changes in maternal trait ER will causally impact on the maternal-child relationship. However, the experimental study provides initial evidence supporting this hypothesis, at least in relation to maternal rumination.

Five studies utilised measures looking at specific ER strategies (1, 3, 4, 6, 8). Four studies looked at mindfulness (1, 3, 6, 8) using a range of different measures as follows – the Three Facet Mindfulness Questionnaire Short Form (TFMQ-SF) (1), the Five Facet Mindfulness Questionnaire (FFMQ) (6) and the Freiberg Mindfulness Inventory Short Form (FMI) (3, 8). One study examined rumination using visual analogue scales (VAS) measuring analytical thinking (4). The remaining 3 studies looked at ER skills and abilities more generally (2, 5, 7) using the Difficulties in Emotion Regulation Scale (DERS) (2, 7) and the Response Styles Questionnaire (RRS) (5).

The four studies that directly observed the mother-infant relationship using feeding or play interactions used scoring measures including the Observational Scale for Mother-infant Interaction (SVIA; 2), the Nursing Child Assessment Satellite Training Feeding Scale (N-CAST; 6), the CARE Index (4), Emotional Availability Scales (EAS; 7), the Maternal Postnatal Attachment Scale (MPAS) (7) and the Parent Child Interaction Scale (PCI; 6). The study assessing maternal self-report information on the mother-infant relationship (5) used both the Maternal Infant Responsiveness Instrument (MIRI) and the Postpartum Bonding Questionnaire (PBQ).

Specific developmental outcomes of infants were measured by six out of the eight studies (1, 3, 5, 6, 7, 8). The infant outcomes can be split into three different

areas – health outcomes, infant behaviour and infant social and emotional development. Two studies looked at health outcomes for the infant including both weight (1, 8) and length of gestation (8). Three studies measured infant's behaviour and temperament using two different measures – the Infant Behaviour Questionnaire Short Form (IBQ-R; (3, 5) and the infant behaviour subscales from the NCAST (6). Three studies assessed infant social and emotional development using two parent-report measures: the Brief Infant Toddler Social and Emotional Assessment (BIT-SEA; 7) and the Social and Developmental Ages and Stages Questionnaires (ASQ-SE; 3, 8).

All eight of the studies also used other measures to analyse other factors being studied such as maternal mood and mental health symptomology, perceived social support, and health outcomes including body mass index (BMI) and blood pressure which are not reported in this review.

### **Quality Appraisal**

Six studies received an overall quality rating of 'strong' (1, 2, 3, 4, 7, 8), one received a 'moderate' rating (6) and one study received a 'weak' rating (5).

**Table 3**

*A Summary of Included Articles*

Author	Participants / Population	Method / Design	Outcome Measures	Results	Conclusions	QAT Rating / Strengths & Limitations
1. (Nyklíček et al (2018))	<p><math>N = 905</math></p> <p>Setting: Perinatal community</p> <p>Age: <math>M_{age} = 30.1</math>, <math>SD = 3.6</math> (mothers), <math>M_{age} = 277.1</math> days, <math>SD = 13.0</math> (infants)</p> <p>Sex: 100% female</p> <p>Country: The Netherlands</p>	Cohort longitudinal design	<p><b>Measure of emotion regulation:</b> Three Facet Mindfulness Questionnaire Short Form (TFMQ-SF)</p> <p><b>Measure of parent-infant relationship:</b> None</p> <p><b>Measure of infant outcomes:</b> Neonatal birth weight</p>	<p><b>Key findings:</b> Regarding the obstetric medical records, only Nonreacting was (positively) associated with birth weight (<math>B = 0.09</math>, <math>p &lt; 0.01</math>).</p> <p>Controlling for gestational age, sex, parity, depressive symptoms, and health behaviour, Nonreacting predicted a normal birth weight (OR = 1.12, 95% CI = 1.06–1.19), in contrast to low birth weight.</p>	<p>A higher level of mindfulness skills was associated with a lower level of depressive symptoms, also measured later in pregnancy. A higher level of the mindfulness skill of nonreacting to one's disturbing thoughts at 22 weeks of gestation was associated with a larger probability of having a normal, as opposed to a low, birth weight neonate.</p>	<p><b>QAT:</b> Strong</p> <p><b>Strengths:</b> Relatively large sample size allowing for adequate power and effect size calculations.</p> <p>Low attrition rates (94% completed the study) and longitudinal design of the study.</p> <p><b>Limitations:</b> The self-report nature of health behaviours, such as smoking and alcohol consumption, previous depression, and body mass index.</p> <p>The generalizability of the findings being limited to Dutch, mostly white women, who had somewhat higher education compared to the national average.</p> <p>Mean ages of mother or infant participants not stated.</p>

2. (De Campora et al (2014)	<p><math>N = 65</math></p> <p>Setting: Community perinatal</p> <p>Age: <math>M_{age} = 35.2</math> years <math>SD = 4.2</math></p> <p>Sex: 100% female (mothers); 14 (50%) male, 14 (50%) female (infants)</p> <p>Country: Italy</p>	Quasi-experimental cohort analytic	<p><b>Measure of emotion regulation:</b> Difficulties in Emotion Regulation Scale (DERS)</p> <p><b>Measure of parent-infant relationship:</b> Mother-infant feeding assessed using the Observational Scale for Mother-Infant Interaction (SVIA).</p> <p><b>Measure of infant outcomes:</b> None</p>	<p><b>Key findings:</b> Using t-test analysis, when compared to the non-overweight group, the overweight group showed higher rates of difficulty in emotion regulation, with a large effect size for the total DERS score, <math>F(46.2) = 4.16, p &lt; 0.01, d = 1.02</math>) and medium to large effect sizes for the subscales.</p> <p>Correlation analysis found that when compared to the non-overweight group, the overweight group demonstrated poorer quality of feeding interactions on all the dimensions of the SVIA. Affective state of the mother: <math>F(51) = 3.25, p &lt; 0.01, d = 0.89</math>; interactional conflict: <math>F(51) = 4.02, p &lt; 0.01, d = 1.11</math>; food refusal behaviour: <math>F(51) = 2.32, p = 0.02, d = 0.64</math>; affective state of the dyad: <math>F(36.5) = 3.96, p &lt; 0.01, d = 1.12</math>.</p> <p>Correlations for the total DERS scores and subscales of the SVIA as follows: affective state of the mother (<math>r = 0.43, p &lt; 0.01</math>); interactional conflict</p>	<p>When compared to the non-overweight group, the overweight group had more difficulties in emotion regulation, was more psychologically distressed, and had poorer feeding interactions with their babies.</p> <p>The extent to which the participants were suffering difficulties in emotion regulation during pregnancy predicted, significantly and beyond the effects of pre-pregnancy BMI, the quality of the subsequent dyadic feeding interactions.</p>	<p><b>QAT:</b> Strong</p> <p><b>Strengths:</b> The findings provided additional evidence for the existence of a causal relationship between certain maternal characteristics and their subsequent dyadic feeding interactions.</p> <p>The study is the first to suggest that emotion dysregulation during pregnancy can be predictive of the subsequent development of feeding interaction problems and paves the way for future follow-ups and replication studies.</p> <p>The study design allowing for the comparison of high and low emotion regulation groups.</p> <p>Results were in line with hypotheses based on previous research.</p> <p><b>Limitations:</b> The age of the infants was not provided.</p>
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<p>3. (van den Heuvel et al (2015)</p>	<p><i>N</i> = 90</p> <p>Setting: Community perinatal</p> <p>Age: <i>M</i><sub>age</sub> = 32.13 <i>SD</i> = 3.61 (mothers); <i>M</i><sub>age</sub> =9.7 months <i>SD</i> = 1.3 (infants)</p> <p>Sex: 100% female (mothers); 44 (48.9%) female, 46 (51.1%) male (infants)</p>	<p>Prospective longitudinal cohort study</p>	<p><b>Measure of emotion regulation:</b> Freiberg Mindfulness Inventory Short Form (FMI)</p> <p><b>Measure of parent-infant relationship:</b> None</p> <p><b>Measure of infant outcomes:</b> Social and Emotional Developmental Ages &amp; Stages Questionnaire (ASQ:SE)</p>	<p><b>Key findings:</b> Maternal mindfulness was significantly negatively correlated with maternal anxiety (<math>r = -.284, p &lt; .01</math>).</p> <p>Higher maternal mindfulness during pregnancy was associated with lower scores on the 'self-regulation problems' subscale of the ASQ:SE and the 'negative affectivity' subscale of the IBQ. In contrast, higher maternal anxiety was associated with higher scores on those subscales.</p>	<p>Maternal mindfulness is associated with fewer mother-reported infant self-regulation problems and less "difficult" temperament.</p> <p>Maternal anxiety during pregnancy mediated the relation between maternal mindfulness and infant self-regulation, but not the relation between maternal mindfulness and infant negative affectivity. Moreover, the effect of maternal mindfulness on self-regulation problems</p>	<p>(<math>r = 0.44, p &lt; 0.01</math>); food refusal behaviour (<math>r = 0.38, p &lt; 0.01</math>); affective state of the dyad (<math>r = 0.29, p &lt; 0.05</math>).</p> <p>The self-report nature of measuring emotion regulation.</p> <p>Lack of outcome measures for the weight of infants born.</p> <p>Sample size was relatively small, and some attrition occurred, some analyses lacked adequate power.</p> <p>Hard to generalise findings more widely due to the numbers of withdrawals (<math>n = 12</math> (18%).</p> <p><b>QAT:</b> Strong</p> <p><b>Strengths:</b> The results contribute to a relatively unexamined area.</p> <p>Provides useful clinical implications that emphasise the potential for mindfulness interventions in both clinical and non-clinical pregnant populations.</p> <p><b>Limitations:</b> The self-report nature of assessing maternal</p>
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	Country: The Netherlands		Infant Temperament Behaviour Questionnaire Short Form (IBQ-R)	<p>A significant mediating effect of maternal anxiety during pregnancy between maternal mindfulness during pregnancy and infant self-regulation problems (95 % CI: [- .187, - .017] for male infants).</p> <p>Maternal anxiety during pregnancy also exerted a significant mediation effect (95 % CI: [- .307, - .008]) on the association between maternal mindfulness and infant negative affectivity.</p>	<p>was only mediated by anxiety for boys, and not for girls.</p>	<p>mindfulness, anxiety during pregnancy and infant outcomes increasing risk of bias.</p> <p>Relatively small size, decreasing the power to find small effects and possible generalisability.</p> <p>Unable to control for the effect of postnatal maternal mindfulness since this was not measured.</p>
4. (Tester-Jones et al (2017)	<p><i>N</i> = 79</p> <p>Setting: Perinatal clinical and community</p> <p>Age: <math>M_{age} = 32.3</math> <math>SD = 4.4</math> (mothers) <math>M_{age} = 7.2</math> months <math>SD = 2.9</math> (infants)</p> <p>Sex: 100% female (mothers)</p> <p>Country: England</p>	Cohort analytic	<p><b>Measure of emotion regulation:</b> VAS assessing levels of analytical thinking (rumination vs control condition)</p> <p><b>Measure of parent-infant relationship:</b> Mother-infant interactions coded using CARE index.</p> <p><b>Measure of infant outcomes:</b> None</p>	<p><b>Key findings:</b> In terms of analytical thinking there was a significant effect of induction type, <math>F(1, 78) = 4.08, p = .04, g^2 = .05</math>.</p> <p>Analytical thinking was significantly higher in the rumination induction condition (<math>M = 58.05, SD = 26.49</math>) than in the control condition (<math>M = 46.83, SD = 24.20</math>).</p> <p>For observed mother-infant interactions there was a significant main effect of</p>	<p>Dysphoric mothers had reduced quality of interaction with their infant compared with non-dysphoric mothers. Mothers in the rumination condition exhibited reduced sensitivity towards their infants relative to mothers in the control condition.</p> <p>Maternal sensitivity worsened further after the still-face procedure in the rumination condition, but not in the control condition.</p>	<p><b>QAT:</b> Strong</p> <p><b>Strengths:</b> Study provides novel evidence rumination causally impairs maternal sensitivity, and that maternal rumination affects maternal sensitivity to infants, both during regular and stressful mother–infant interactions.</p> <p>Rumination may be a key target in preventative and treatment interventions aimed at improving the mother–infant relationship.</p>

group,  $F(1, 74) = 19.60, p < .001, g^2_p = .21$ .

Dysphoric mothers had lower overall sensitivity ( $M = 6.29, SD = 2.75$ ) compared with non-dysphoric mothers ( $M = 8.77, SD = 2.08$ ). There was a main effect of time,  $F(2, 148) = 12.63, p < .001, g^2 = .15$ , indicating that maternal sensitivity decreased across time.

Findings suggest rumination may be a key target in preventative and treatment interventions aimed at improving the mother–infant relationship.

Extends understanding of the specific mechanisms involved in mother–infant interactions.

**Limitations:**

There was no randomisation used.

Small numbers limited the power of the findings.

Used a sample of dysphoric mothers, rather than mothers who had a clinical diagnosis of post-natal depression.

Significant differences in level of education between groups.

Each participant could take part either in their own home or at the university. This may have impacted on the level of control the experimenter had over external conditions.

Due to a loss of data it was not possible to analyse current mood after the rumination induction.



<p>5. (Tester-Jones et al (2015)</p>	<p><i>N</i> = 230</p> <p>Setting: Perinatal community</p> <p>Age: <math>M_{age} = 31.45</math> <math>SD = 5.25</math> (mothers) <math>M_{age} = 11.28</math> months <math>SD = 7.71</math> (infants)</p> <p>Sex: 100% female (mothers)</p> <p>Country: England</p>	<p>Cohort study</p>	<p><b>Measure of emotion regulation:</b> Response Styles Questionnaire (RRS)</p> <p><b>Measure of parent-infant relationship:</b> Maternal Infant Responsiveness Instrument (MIRI) Postpartum Bonding Questionnaire (PBQ)</p> <p><b>Measure of infant outcomes:</b> Infant Behaviour Revised Short Form (IBQ-r)</p>	<p><b>Key findings:</b> Brooding rumination was significantly negatively related to maternal responsiveness (<math>r = -.40, p &lt; .01</math>) and maternal bonding (<math>r = -.51, p &lt; .01</math>) and positively related to infant negative affect temperament (<math>r = .22, p &lt; .01</math>).</p> <p>For mothers who reported their infants to be high in negative affect, no relationship was observed between brooding rumination and maternal responsiveness. For mothers reporting infants lower in infant negative affect, brooding rumination fully mediated the relationship between depressive symptoms and maternal responsiveness = <math>.84</math> (<math>SE = .32</math>), <math>z = 2.56, p = .005</math>.</p> <p>Depressive symptoms were significantly associated with maternal bonding, but not brooding rumination or social support. Depressive</p>	<p>Brooding rumination is related to two self-reported aspects of mother attunement, maternal bonding and responsiveness.</p> <p>For infants high in negative affect there was no relationship between rumination and maternal responsiveness; however, for infants lower in negative affect a relationship was found for rumination as a mediator between maternal depressive symptoms and maternal responsiveness to infant.</p>	<p>The age range of the infants in this sample was broad.</p> <p><b>QAT:</b> Weak</p> <p><b>Strengths:</b> Some interesting relationships found in a rarely studied area.</p> <p>A novel and unexpected relationship was found between infant temperament, rumination and maternal responsiveness.</p> <p>The study was adequately powered.</p> <p><b>Limitations:</b> The study is limited by being cross-sectional and correlational in nature.</p> <p>There was a lack of diversity in the sample.</p> <p>Maternal-Infant Responsiveness Instrument assesses a mother's awareness of her infant needs and behaviours, rather than her ability to respond appropriately to her infant per se.</p>
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<p>6. (Pickard et al 2017)</p>	<p><i>N</i> = 36</p> <p>Setting: Perinatal clinical</p> <p>Age: <math>M_{age} = 31.45</math> <math>SD = 4.45</math> (mothers)</p> <p>Sex: 100% female (mothers)</p> <p>Country: Australia</p>	<p>Longitudinal cohort study</p>	<p><b>Measure of emotion regulation:</b> Five Facet Mindfulness Questionnaire (FFMQ)</p> <p><b>Measure of parent-infant relationship:</b> Mother-infant feeding session assessed using the Nursing Child Assessment Satellite Training-Feeding Scale (NCAST) Parent-Child Interaction Feeding Scale (PCI)</p> <p><b>Measure of infant outcomes:</b> Infant behaviour subscales from the (NCAST PCI)</p>	<p>symptoms were also negatively associated with social support, but rumination was not associated with bonding, and did not mediate the relationship between depressive symptoms and bonding, or social support and bonding.</p> <p><b>Key findings:</b> Pearson correlations found a significant positive association was found between secure attachment and observed maternal response to distress, <math>r = .41, p &lt; .05</math>. A significant negative association was found for fearful attachment, <math>r = -.43, p &lt; .001</math>, and profoundly distrustful attachment, <math>r = -.46, p &lt; .001</math>.</p> <p>A significant relationship between the mindfulness subscales 'Nonreactivity to Inner Experience' and the Response to Distress scale, <math>r = .34, p &lt; .05</math>.</p> <p>The mindfulness subscale 'Describing/Labeling With Words' correlated with three of the relationship styles: secure <math>r = .37, p &lt; .05</math>, preoccupied <math>r = -.47, p</math></p>	<p>Mindfulness did not mediate the relationship between attachment and maternal distress. The mindfulness subscale Non-Reacting was significantly associated with maternal response to distress.</p> <p>Findings identified that the mindfulness facet <i>nonreactivity to inner experience</i> predicted observable differences in maternal response to distress.</p>	<p>Self-report methods used to assess bonding and mood may have been negatively biased.</p> <p><b>QAT:</b> Moderate</p> <p><b>Strengths:</b> The longitudinal study design and the direct observational data provide significant value to understanding the relationship between attachment style, mindfulness, and early mother–infant interaction.</p> <p>Mostly medium effect sizes found.</p> <p><b>Limitations:</b> Limited variability within the sample due to education levels of the participants.</p> <p>Small sample size.</p> <p>Clinical setting for data collection as opposed to naturalistic observations.</p>
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				<p>&lt; .001, and fearful <math>r = -.50</math>, <math>p &lt; .001</math>. The dismissive relationship style was significantly associated with nonreactivity to inner experience, <math>r = .34</math>, <math>p &lt; .05</math>.</p> <p>Correlations between the mindfulness subscales and the NCAST subscales indicated possible non-significant associations between the 'Acting With Awareness' sub-scale and the Total Caregiver score, <math>r = .32</math>, <math>p = .06</math>, and the Fostering Cognitive Growth score, <math>r = .31</math>, <math>p = .07</math>.</p>		Mean age of infants not provided.
7. (Behrendt et al (2019)	<p><math>N = 61</math></p> <p>Setting = Perinatal community</p> <p>Age: <math>M_{age} = 31.89</math> <math>SD = 3.56</math> (mothers) <math>M_{age} = 6.56</math> months <math>SD = 3.56</math> (infants time 1) <math>M_{age} = 13.21</math> months <math>SD = 0.81</math> (infants time 2)</p> <p>Sex = 100% female (mothers); 28 boys, 33 girls (infants)</p>	Cohort study	<p><b>Measure of emotion regulation:</b> Difficulties in Emotion Regulation Questionnaire (DERS)</p> <p><b>Measure of parent-infant relationship:</b> Emotional Availability Scales (EAS) and Maternal Postnatal Attachment Scale (MPAS)</p> <p><b>Measure of infant outcomes:</b> Brief Infant Toddler Social &amp; Emotional Assessment (BIT-SEA)</p>	<p><b>Key findings:</b> Bivariate correlations analysis revealed maternal sensitivity and postnatal maternal bonding assessed at 6 – 8 months directly predicted children's social-emotional and behavioural outcomes at 12 months.</p> <p>Greater maternal sensitivity predicted fewer child problems, <math>z = -3.99</math>, <math>p &lt; .001</math> and stronger bonding predicted fewer problems, <math>z = -2.53</math>, <math>p = .012</math>, and more competencies, <math>z = 2.67</math>, <math>p = .008</math>. Mothers' emotion regulation</p>	<p>Mothers' sensitivity predicted fewer social-emotional and behavioural problems and that stronger bonding predicted fewer problems and more social-emotional competencies.</p> <p>Maternal emotion regulation difficulties had a significant indirect effect on child competency delay via bonding.</p> <p>Children of mothers displaying higher levels of sensitivity and postnatal bonding showed better</p>	<p><b>QAT:</b> Strong</p> <p><b>Strengths:</b> The study offers potential implications for early prevention programs to support children at risk of negative emotional outcomes due to mothers' ER postpartum.</p> <p>The results in line with present research in the area.</p> <p><b>Limitations:</b> The findings are correlational in nature and do not support</p>

Country = Germany	difficulties and symptoms of depression at 6 - 8 months had no direct effect on child outcomes.	social-emotional and behavioural outcomes.	causational interpretation.			
	Maternal regulation difficulties were positively related to symptoms of depression, $z = 3.06, p = .002$ . Maternal emotion regulation difficulties had a significant indirect effect on child competency delay via bonding. More difficulties related to poorer bonding, $z = -3.19, p = .001$ , which in turn predicted fewer competencies, $z = -2.06, p = .039$ .		By 6 to 8 months, pre-existing child social-emotional competency delay/behaviour problems could have already affected mother-infant interaction and measured maternal factors.  Measures used were self-report.  No direct descriptions of effect sizes detailed in the paper.  The sample size was small, lacking in variability and included mothers who had household incomes and educational levels above the national average for the population.			
8. (Braeken et al (2017)	N = 156  Setting = Perinatal community  Age: $M_{age} = 32.77, SD = 4.28$ (mothers, 1 <sup>st</sup> trimester), $M_{age} =$	Longitudinal prospective cohort study	<b>Measure of emotion regulation:</b> Freiburg Mindfulness Inventory Short Form (FMI).  <b>Measure of parent-infant relationship:</b> None	<b>Key findings:</b> Results were analysed using multilevel regression analyses. More mindful pregnant women had less prenatal and postnatal emotional distress ( $p < .001$ ) and higher cardiac parasympathetic activity. (b	The infants of more mindful mothers showed less negative social-emotional behaviour compared to infants of less mindful mothers and better adaptive functioning.	<b>QAT:</b> Strong  <b>Strengths:</b> Findings are in line with studies of nonpregnant women and add to the overall evidence base providing support for the possibility that enhancing

32.77, *SD* = 4.35  
(mothers, 3<sup>rd</sup>  
trimester), *M*<sub>age</sub> =  
13.48 weeks, *SD* =  
4.28 (infants)

Sex = 100%  
female (mothers)

Country = The  
Netherlands

**Measure of infant  
outcomes:**

Health outcomes at birth  
including birth weight and  
length of gestation.  
Ages & Stages  
Questionnaire (ASQ)

= 0.01, *SE* = 0.01, *p* =.03)  
and HF HRV (*b* =0.03, *SE*  
5 0.01, *p* = .02).

Infants of more mindful  
mothers displayed less  
negative social-emotional  
behaviour (*p* = .03)  
compared to infants of less  
mindful mothers.

There was an association  
between adaptive  
functioning and  
mindfulness (observed  
coefficient [OC] 5 -0.18;  
95% CI 5 [-0.29, -0.06], *p* =  
.003), indicating that infants  
of mothers who are more  
mindful tend to have better  
adaptive functioning.

psychological  
characteristics such as  
mindfulness could be  
beneficial.

A relatively large sample  
size with longitudinal  
data from the first  
trimester of pregnancy.

**Limitations:**  
Self-report measures of  
infant development and  
maternal mindfulness.

A modest attrition rate  
led to decreased  
numbers for post-natal  
observations of infant  
development and  
mother's emotional  
distress.

Mean ages of mother or  
infant participants not  
stated.

## Synthesis of Results

**Mother-infant relationship.** The two studies (2, 7) measuring maternal ER skills as a broader concept as opposed to a specific strategy, found statistically significant relationships between higher difficulties with ER and negative impacts on observed mother-infant interactional relationships. One of these studies also found mothers with ER difficulties had poorer quality of feeding interactions with their infants (2). Similarly, maternal ER difficulties were negatively associated with self-reported bonding with the infant, and this in turn predicted fewer child social and emotional difficulties aged 6-8 months (7). Both these studies were rated as strong.

Rumination was an ER strategy examined in two studies (4, 5). Both studies found negative effects of rumination on the mother-infant relationship. Maternal rumination was associated with a decrease in maternal sensitivity and the quality of mother infant interactions (4), and in another study was negatively significantly correlated with self-reported lower maternal responsiveness and bonding (5). Study 5 was methodologically weak.

One study looked at the effect of mindfulness skills on the quality of the mother-infant relationship (6). The study reported positive findings including a significant positive relationship between the mindfulness subscale of 'non-reacting' and maternal response to infant distress; and the mindfulness subscale 'describing/labelling with words' and secure mother-infant attachments. A non-significant association was also found between the mindfulness scale 'acting with awareness' and total caregiver score on the NCAST suggesting more care was given by mothers scoring higher in this mindfulness domain. The study also found a significant negative association between the 'describing/labelling words' subscale with preoccupied and fearful attachment styles, suggesting mothers less able to use

these mindfulness skills were more likely to have negative attachment styles with their infants. This study was rated to have a moderate quality rating.

Overall, the majority of studies reporting on the mother-infant relationship were rated as 'strong' (2, 4, 7), with the exception of studies 5 and 6 which were rated as 'weak' and 'moderate' respectively. The results from the studies suggest that maternal ER does have an impact on the mother-infant relationship.

**Infant outcomes.** Six studies reported on the effects of maternal ER on infant outcomes (1, 3, 5, 6, 7, 8).

One study reported on general ER abilities of the mothers, finding that maternal ER difficulties at 6-8 months had no direct effect on child outcomes. However, the study did find that infants of mothers who displayed higher levels of sensitivity and postnatal bonding showed better social and emotional developmental outcomes; suggesting bonding acts a mediator between maternal ER and infant outcomes (7).

Four studies found that higher maternal mindfulness skills had significant positive outcomes on the infant (1, 3, 6, 8), including normal predicted birth weight (1), fewer self-regulation problems and less negative temperament (3), higher scores of fostering infant cognitive growth (6), higher adaptive functioning and fewer negative social and emotional behaviours (8).

For the study that measured the effects of rumination on infant outcomes, it was found brooding rumination was significantly positively correlated with infant negative affect temperament (5).

Again, as with the outcomes relating to the mother-infant relationship, the majority of studies were scored as 'strong' (1, 3, 7, 8), with studies 5 and 6 being scored as 'weak' and 'moderate' respectively. This suggests making conclusions

about infant cognitive growth (6) and infant negative affect (5) should be considered more tentative. The results from the studies suggest that maternal ER does have an impact on infant outcomes.

**Overall findings.** In summary, the findings from studies included in the review suggest that difficulties with maternal ER lead to poor outcomes for both the mother-infant relationship and infant development specifically (2, 4, 5, 6, 7, 8). Moreover, the findings suggest a significant relationship between the adaptive ER strategy of mindfulness in having positive outcomes on the mother-infant relationship and infant temperament, behaviours and development (1, 3, 6, 8). Conversely, the findings suggest that the negative ER strategy rumination, negatively affects both the mother-infant relationship in relation to maternal sensitivity, responsiveness and bonding and infant temperament (4, 5).

### **Discussion**

The purpose of this systematic review was to explore the relationship between parental ER and its impacts on the parent-infant relationship and infant outcomes. Studies examining the interactions and relationship between mother and infant, as well as those reporting on specific outcomes for the infant's development were included. No studies examining the father-infant relationship were found. In total, eight studies were included and were all either cohort analytic or cohort study designs.

The studies reviewed produced robust and similar findings when examining the relationship between maternal ER abilities and outcomes on the mother-infant relationship and infant development. Studies looking at more general maternal ER abilities support these findings by demonstrating an association between poor ER capabilities and negative outcomes on the infant and their relationship with their



mothers. This was shown by poorer feeding interactions, lowered levels of bonding and more negative social and developmental outcomes (2, 7). Negative ER skills, such as rumination were both correlational and causally related to mother-infant relationship variables (observed maternal sensitivity and self-reported maternal responsiveness to the infant) but not to maternal self-reported bonding with the infant (4, 5). However, only one of these two studies reporting this association was quality rated as strong and so this should be taken into consideration when making conclusions. Adaptive, or positive ER skills, which were primarily operationalised in these studies as mindfulness, appear to have a strong relationship with positive outcomes on the mother-infant relationship and impact on the infant as assessed by observational methods. Positive outcomes included secure attachments, adaptive functioning and less infant regulation and temperament difficulties (1, 3, 6, 8). These results appear in line with the evidence base relating to ER abilities in non-perinatal populations (Berking & Wupperman, 2012; Hofmann et al., 2012) and an increasing evidence base of the popularity and encouragement of the use of mindfulness as a positive ER skill (Lindsay et al., 2018; Lutz et al., 2013).

Although the results appear relatively conclusive and valid, they also suggest there may be some mediating factors involved in these associations. The findings were suggestive that psychological distress may be a mediating factor between maternal ER and outcomes on the mother-infant relationship and infant development. Although it was found that maternal mindfulness was associated with infant self-regulation, it appears there are other potential factors that may play a mediating role in this relationship such as maternal mood. For example, it is well established that mental health and ER are strongly associated, however seven of the

eight studies used community samples only and the impact of this relationship was not examined in this review.

The effects of brooding rumination, whilst being negatively associated with maternal bonding, also had a mediating effect on some of the results found. Brooding rumination fully mediated the relationship between depressive symptoms and self-reported maternal responsiveness to infant. However, this was not the case for all outcomes, with rumination not mediating the relationship between depressive symptoms and maternal self-reported bonding (the mother's feelings of how close she is to the infant), or maternal social support and maternal self-report bonding.

### **Theoretical Implications**

The findings in this review provide evidence that maternal ER has an impact on mother-infant interactions and this in turn can affect a range of outcomes for the infant. The conclusions provide evidence for the notion of interpersonal ER and the transmission of intergenerational ER skills from parent to infant and that by disrupting this pattern there will be better ER outcomes for the child and generations to follow.

With all of the papers that looked directly at a specific ER strategy reporting on mindfulness and rumination, they provide support for the cognitive strategy part of the model proposed by Gross and colleagues (2019). This suggests mothers can utilise these strategies in order to modulate their emotional experience and that this can have great impacts on parenting and infant outcomes. The examination of other cognitive strategies, for example self-compassion or reappraisal, along with assessing attentional, situational and response modulation strategies would strengthen this relatively new framework of ER in the context of a perinatal population.

Other possible direct impacts on the mother-infant relationship and infant outcomes were not directly looked at such as socio-economic status, physical health disabilities or maternal sensitivity.

### **Clinical Implications**

With the findings from this review indicating that positive ER strategies can have a positive effect on mother-infant and infant outcomes, and negative ER strategies conversely having the opposite effect, it seems imperative this evidence base is used constructively within perinatal services.

If mindfulness during pregnancy has significant effects on maternal outcomes and these induce positive outcomes for offspring including healthy birth weights and less impaired socio-emotional behaviour, with more evidence, it may be useful to consider testing whether these strategies promote healthy parent-child interactions in both universal and selective prevention stages (Beddoe et al., 2009; Hughes et al., 2009; Pan et al., 2019). Likewise, with ruminative ER strategies being shown to be maladaptive in supporting the mother-infant interaction and infant outcomes, then women in the perinatal period could be offered alternative ways of managing rumination.

Aside from one study, the studies in this review examined psychologically healthy mothers from non-clinical populations, making it is hard to predict conclusions for clinical populations. However, with the evidence suggesting such strong links between poor ER and psychological distress / symptomology it is acceptable that conclusions are predicted in such a way. However, it is recommended this is examined in clinical populations to test these hypotheses directly. For the one study that tested rumination effects on both a clinical and non-

clinical population, rumination was found to affect parent-infant interactions in both depressed and non-depressed mothers suggesting its powerful impact on parenting.

It is of interest to note that despite using paternal search terms, the majority of the papers screened and the eight papers included in the review only looked at maternal ER and mother-infant interactions. This is in line with the majority of perinatal research and suggests a gap in the literature regarding fathers and the paternal relationships with infants (Hanley & Williams, 2017; Koh et al., 2015).

Overall, the findings from this systematic review demonstrate a relatively strong association between ER and mother-infant interactions and infant outcomes. However, it is unclear whether maternal ER abilities affect the quality of the mother-infant relationship, which in turn affects the infant outcomes, or whether maternal ER abilities directly influences infant outcomes. In addition, other factors such as mental health were not examined in this review.

### **Strengths and Limitations**

This is the first systematic review to examine the relationship between maternal ER and outcomes on both the mother-infant relationship and infant development. There is a strong existing evidence base highlighting how parental ER affects child outcomes, and so it has been useful for this to be considered within a perinatal context looking specifically at the first year of life only. The review also included a variety of ER skills, some adaptive and some maladaptive, evidencing the impacts of both. This provides an indication of what skills should be harnessed and encouraged during the perinatal period. The findings enabled some relatively strong and significant conclusions to be drawn suggesting specific types of ER strategies can affect the mother-infant relationship and infant development.

The variables within the review were clearly defined and many standardised measures were used, allowing for good reliability and validity of aspects studied. Including studies with clearly defined populations, reliable and valid measures and a set age range for the infants studied are strengths of the review.

The studies included in the review are from five Western countries showing that ER difficulties and strategies are similar in different cultures. This suggests wide ranging generalisability of the findings in the developed world.

Despite the strengths of the review, several limitations should be acknowledged. Despite attempting to conduct a thorough search of the literature, the search only yielded a small number of studies.

The review identified a variety of measures used to assess maternal ER, the mother-infant relationship and infant development outcomes. Some studies used direct observational measurements of the mother infant relationship which are likely to be more reliable than maternal self-report measures (Pritchett et al., 2011). Although associations were made between maternal ER and mother-infant relationship outcomes for studies that used self-report measures, they were stronger for those using observational measures. Similarly, for infant outcomes, stronger associations were made for observed infant outcomes as opposed to mother self-reported outcomes and suggests they were less open to reporter bias. A lack of consistency in the types of measures makes it difficult to draw firm conclusions on the outcomes specified.

The majority of studies examining maternal ER and mother-infant outcomes provide preliminary evidence supporting the hypothesis that maternal ER may be an important factor in mother-child outcomes. However, with the exception of one experimental study, the literature to date is largely limited to correlational studies,

which reduce the ability to infer causality. Further, these studies have only studied trait forms of ER, further limiting the ability to suggest that modifying maternal ER might promote better mother-child outcomes. Future research in this area would benefit from the use of examining both trait and state measures of ER, a wider range of ER strategies, and employing experimental designs.

There was limited diversity within the sample in terms of participant characteristics with the majority of samples not being fully representative of the general population. The majority of the studies' samples were volunteer, convenience samples and so included people who were interested in the research study's aims and methods and volunteered themselves and / or their infants to take part. Whilst a useful and common sampling method, volunteer samples are often comprised primarily of White, middle class, educated samples, and so have an inability to generalise the findings beyond this sample without a potential loss validity. This was unfortunately the case in these studies in which the samples comprised of white, middle class and higher educated women. These demographics may be especially important to consider in this area of research, as previous research in antenatal and postnatal mental health have found that income and educational levels are associated with greater stress, poorer parenting, and poorer engagement with infant preventative health (Stein et al., 2014) It is therefore possible that the relationship between maternal ER and mother-child outcomes may be moderated by income and educational status. Future research should therefore engage purposeful or random sampling strategies to ensure representative samples.

A number of studies also had moderate attrition effects which affected already relatively small sample sizes and subsequently statistical power and generalisability.

It is important to examine the QAT used and the overall quality scores given to the studies included in the review. Despite being a standardised tool, the EPHP used to evaluate the quality of the studies has some limitations. These include subjective questioning and difficulties ascertaining scores if the study characteristic does not represent the coding provided. It has been described as less sensitive than other Cochrane counterpart tools (Tanner, 2019) and open to subjective biases from raters (Armijo-Olivo et al., 2012). The majority of the eight studies selected were rated as 'strong'; which appears conflicting given the number of limitations of each study and also collectively.

Despite having a variety of ER strategies listed within the search terms the review only identified papers that looked specifically at mindfulness and rumination. This suggests that there is a lack of research into other ER strategies, such as self-compassion and suppression, in the perinatal population. Previous research in other populations, suggests other strategies such as self-compassion (Diedrich et al., 2014; Moreira et al., 2016; Psychogiou et al., 2016) or suppression (Campbell-Sills et al., 2006; Karnilowicz et al., 2018) might also contribute to mother-infant interactions and infant outcomes.

It could also be considered that all variables studied were rather broad; with maternal ER, mother-infant relationship and infant outcomes being large areas to focus on and can each be measured and conceptualised in multiple different ways. For example, the mother-infant relationship can be conceptualised and measured through a variety of concepts including perceived bonding, actual observed bonding, attachment and care giver responsiveness – all of which are linked but also separate concepts and can be studied differently, for example through maternal self-report measures or observations. This was seen in there being a mix of self-report

questionnaires, scales, feeding interactions and play sessions being means of measurement for this overall concept of the mother-infant relationship. The outcome of infant outcomes was also rather large in that this covered a large range of outcomes ranging from medical outcomes to temperament outcomes to educational attainment and social development. By having such broad outcome measures it becomes more difficult to conclude how certain maternal ER strategies affect the infant specifically, and draw firm conclusions about specific ER strategies and a particular outcome.

Additionally, quite a lot of measures were used with little replication. For example, to measure the ER strategy of mindfulness there were 3 different measures of mindfulness used to study the effects of maternal mindfulness skills. This makes it hard to draw strong conclusions based on the slightly different types of questions being asked and aspects of mindfulness being measured, and it might have been preferable to look at studies that used the same measure should this have been possible.

With the studies included in the review looking at a range of ER strategies, there remains a limited evidence base as to which types of ER skills or strategies affect the mother-infant relationship and infant outcomes more directly and how improvements can be made to enable more positive outcomes.

### **Future Research**

Studies included in this review have highlighted strong associations between maternal ER difficulties within the perinatal population and negative impacts on the mother infant relationship and infant outcomes. However, more research is needed to examine alternative ER strategies in order to build a bigger, more cohesive picture relating to adaptive and maladaptive ER strategies within this population.



A number of studies were excluded as they used mothers under the age of 18. Future research could examine ER in younger parents, who may have particular issues with ER, in part because their frontal lobes are not fully developed until age 25, and so might have more difficulties inhibiting negative emotions and responses to their infants. Given that child outcomes are worse in children of parents under the age of 25, this age group may be especially important to study.

Pertinent to future research would be evaluating longitudinal effects of parental ER on the outcomes. Such studies would ideally also examine parent-child interactions at multiple time points to assess whether these interactions mediate the relationship between parental ER and child outcomes.

Future research examining the effects of actual ER interventions, such as mindfulness courses or self-compassion workshops may be beneficial in testing whether such adaptive ER strategies are useful to both the mother and her infant and subsequently help to inform perinatal services and / or treatment pathways for perinatal clinical populations. This could have the potential to inform intervention guidelines and service delivery policies.

It is well-established that poor mental health can have direct negative outcomes on the mother-infant relationship and infant outcomes (England & Sim, 2009; Meaney, 2018) and so more evidence is needed to explore ER interventions to determine more positive outcomes and future directions for perinatal service support available. By comparing interventions on clinical and non-clinical samples the evidence base would gain more representative findings. With such a substantial evidence base suggesting mental health difficulties are known to negatively affect ER abilities, it is important to address the potential impact of this on those with pre-pregnancy mental health conditions, those who develop prenatal and postnatal

mental health conditions and provide additional top-ups for those who continue to display ER difficulties.

Further examination of the direct relationship between maternal ER and outcomes that are not mediated or confounded by aspects such as social support, anxiety or depression symptoms would be beneficial in supporting the development of appropriate services.

### **Conclusion**

The aim of this systematic literature review was to explore the relationship between maternal ER difficulties and their impacts on both the mother-infant relationship and infant development outcomes.

The findings from the review suggest that poor maternal ER affects the mother-infant relationship and infant development in detrimental and negative ways; and that adaptive ER strategies can increase positive outcomes relating to the mother-infant relationship and varying areas of infant development. However, it is still unclear as to whether maternal ER directly causes the negative impacts on an infant's development, or whether this is more closely linked to difficulties in the mother-infant relationship or other factors.

Future research is needed to explore the effects of ER more directly, clinical populations to examine the confounding and/or mediating effects of maternal mental health and psychological distress. Examining a large range of adaptive and maladaptive ER strategies on the outcomes would also help consolidate the findings and add to a growing evidence base surrounding suitable perinatal interventions and recommendations.

### **References**

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation

- strategies across psychopathology: A meta-analytic review. In *Clinical Psychology Review*, 30(2), 217–237. <https://doi.org/10.1016/j.cpr.2009.11.004>
- Armijo-Olivo, S., Stiles, C. R., Hagen, N. A., Biondo, P. D., & Cummings, G. G. (2012). Assessment of study quality for systematic reviews: A comparison of the Cochrane Collaboration Risk of Bias Tool and the Effective Public Health Practice Project Quality Assessment Tool: Methodological research. *Journal of Evaluation in Clinical Practice*, 18(1), 12–18. <https://doi.org/10.1111/j.1365-2753.2010.01516.x>
- Barthel, A. L., Hay, A., Doan, S. N., & Hofmann, S. G. (2018). Interpersonal Emotion Regulation: A Review of Social and Developmental Components. *Behaviour Change*, 35(4), 203–216. <https://doi.org/10.1017/bec.2018.19>
- Bauer, A., Parsonage, M., Knapp, M., Lemmi, V., & Adelaja, B. (2014). The costs of perinatal mental health problems. *LSE & Centre for Mental Health*, 1–44. [www.everyonesbusiness.org.uk](http://www.everyonesbusiness.org.uk),
- Beddoe, A. E., Paul Yang, C. P., Kennedy, H. P., Weiss, S. J., & Lee, K. A. (2009). The effects of mindfulness-based yoga during pregnancy on maternal psychological and physical distress. *JOGNN - Journal of Obstetric, Gynecologic, and Neonatal Nursing*, 38(3), 310–319. <https://doi.org/10.1111/j.1552-6909.2009.01023.x>
- Behrendt, H. F., Scharke, W., Herpertz-Dahlmann, B., Konrad, K., & Firk, C. (2019). Like mother, like child? Maternal determinants of children's early social-emotional development. *Infant Mental Health Journal*, 40(2), 234–247. <https://doi.org/10.1002/imhj.21765>
- Berking, M., & Wupperman, P. (2012). Emotion regulation and mental health. *Current Opinion in Psychiatry*, 25(2), 128–134.

<https://doi.org/10.1097/YCO.0b013e3283503669>

Binion, G., & Zalewski, M. (2018). Maternal emotion dysregulation and the functional organization of preschoolers' emotional expressions and regulatory behaviors.

*Emotion, 18*(3), 386–399. <https://doi.org/10.1037/emo0000319>

Braeken, M. A., Jones, A., Otte, R. A., Nyklíček, I., & Van den Bergh, B. R. (2017).

Potential benefits of mindfulness during pregnancy on maternal autonomic nervous system function and infant development. *Psychophysiology, 54*(2), 279–288. <https://doi.org/10.1111/psyp.12782>

Campbell-Sills, L., Barlow, D. H., Brown, T. A., & Hofmann, S. G. (2006).

Acceptability and suppression of negative emotion in anxiety and mood disorders. *Emotion, 6*(4), 587–595. <https://doi.org/10.1037/1528-3542.6.4.587>

Centre for Reviews and Dissemination. (2009). Systematic Reviews: CRD's guidance for undertaking reviews in health care. York: University of York.

Retrieved from: <https://www.york.ac.uk/crd/guidance/>

Crespo, L. M., Trentacosta, C. J., Aikins, D., & Wargo-Aikins, J. (2017). Maternal

Emotion Regulation and Children's Behavior Problems: The Mediating Role of Child Emotion Regulation. *Journal of Child and Family Studies, 26*(10), 2797–2809. <https://doi.org/10.1007/s10826-017-0791-8>

De Campora, G., Giromini, L., Larciprete, G., Volsi, V. L., & Zavattini, G. C. (2014).

The impact of maternal overweight and emotion regulation on early eating behaviors. *Eating Behaviors, 15*(3), 403–409.

<https://doi.org/10.1016/j.eatbeh.2014.04.013>

Denyer, D., & Tranfield, D. (2009). No Title. In D. A. B. & A. Bryman (Ed.), *The Sage Handbook of Organisational Research Methods* (pp. 671–689). SAGE

Publications Ltd.

- Diedrich, A., Grant, M., Hofmann, S. G., Hiller, W., & Berking, M. (2014). Self-compassion as an emotion regulation strategy in major depressive disorder. *Behaviour Research and Therapy*, *58*, 43–51.  
<https://doi.org/10.1016/j.brat.2014.05.006>
- Effective Public Health Practice Project. (1998). *Quality Assessment Tool for Quantitative Studies Component Ratings a) Selection Bias*. 2–5.  
[https://merst.ca/wp-content/uploads/2018/02/quality-assessment-tool\\_2010.pdf](https://merst.ca/wp-content/uploads/2018/02/quality-assessment-tool_2010.pdf)
- Ehring, T., Fischer, S., Schnülle, J., Bösterling, A., & Tuschen-Caffier, B. (2008). Characteristics of emotion regulation in recovered depressed versus never depressed individuals. *Personality and Individual Differences*, *44*(7), 1574–1584. <https://doi.org/10.1016/j.paid.2008.01.013>
- England, M. J., & Sim, L. J. (2009). Depression in parents, parenting, and children: Opportunities to improve identification, treatment, and prevention. In *Depression in Parents, Parenting, and Children: Opportunities to Improve Identification, Treatment, and Prevention*. National Academies Press.  
<https://doi.org/10.17226/12565>
- Gibb, B. E., Pollak, S. D., Hajcak, G., & Owens, M. (2016). Attentional biases in children of depressed mothers: An event-related potential (ERP) study. *Journal of Abnormal Psychology*, *125*(8), 1166–1178.  
<https://doi.org/10.1037/abn0000216>
- Goodman, S. H., Rouse, M. H., Connell, A. M., Broth, M. R., Hall, C. M., & Heyward, D. (2011). Maternal Depression and Child Psychopathology: A Meta-Analytic Review. In *Clinical Child and Family Psychology Review*, *14*(1), 1–27.  
<https://doi.org/10.1007/s10567-010-0080-1>
- Gross, J. J., Uusberg, H., & Uusberg, A. (2019). Mental illness and well-being: an

affect regulation perspective. *World Psychiatry*, 18(2), 130–139.

<https://doi.org/10.1002/wps.20618>

Hanley, J., & Williams, M. (2017). Assessing and managing paternal mental health issues. *Nursing Times*, 10.

<http://search.ebscohost.com/login.aspx?direct=true&db=jlh&AN=127095399&site=e=ehost-live>

Higgins, J., & Thomas, J. (2019). Cochrane Handbook for Systematic Reviews of Interventions. In *Cochrane Handbook for Systematic Reviews of Interventions*.

<https://doi.org/10.1002/9781119536604>

Hofmann, S. G., Sawyer, A. T., Fang, A., & Asnaani, A. (2012). Emotion dysregulation model of mood and anxiety disorders. In *Depression and Anxiety*, 29(5), 409–416. <https://doi.org/10.1002/da.21888>

Hughes, A., Williams, M., Bardacke, N., Duncan, L. G., Dimidjian, S., & Goodman, S. H. (2009). Mindfulness approaches to childbirth and parenting. *British Journal of Midwifery*, 17(10), 630–635. <https://doi.org/10.12968/bjom.2009.17.10.44470>

Karnilowicz, H. R., Waters, S. F., & Mendes, W. B. (2018). Not in Front of the Kids: Effects of Parental Suppression on Socialization Behaviors During Cooperative Parent-Child Interactions. *Emotion*, 19(7). <https://doi.org/10.1037/emo0000527>

Koh, Y. W., Lee, A. M., Chan, C. Y., Fong, D. Y. T., Lee, C. P., Leung, K. Y., & Tang, C. S. K. (2015). Survey on examining prevalence of paternal anxiety and its risk factors in perinatal period in Hong Kong: A longitudinal study Health behavior, health promotion and society. *BMC Public Health*, 15(1), 1–15.

<https://doi.org/10.1186/s12889-015-2436-4>

Koole, S. (2009). The psychology of emotion regulation: An integrative review. In *Cognition and Emotion*, 23(1), 4–41.

<https://doi.org/10.1080/02699930802619031>

Lindsay, E. K., Chin, B., Greco, C. M., Young, S., Brown, K. W., Wright, A. G. C., Smyth, J. M., Burkett, D., & Creswell, J. D. (2018). How mindfulness training promotes positive emotions: Dismantling acceptance skills training in two randomized controlled trials. *Journal of Personality and Social Psychology*, *115*(6), 944–973. <https://doi.org/10.1037/pspa0000134>

Lutz, J., Herwig, U., Opialla, S., Hittmeyer, A., Jäncke, L., Rufer, M., Holtforth, M. G., & Brühl, A. B. (2013). Mindfulness and emotion regulation-an fMRI study. *Social Cognitive and Affective Neuroscience*, *9*(6), 776–785.

<https://doi.org/10.1093/scan/nst043>

Maughan, A., Cicchetti, D., Toth, S. L., & Rogosch, F. A. (2007). Early-occurring maternal depression and maternal negativity in predicting young children's emotion regulation and socioemotional difficulties. In *Journal of Abnormal Child Psychology*, *35*(5), 685–703. <https://doi.org/10.1007/s10802-007-9129-0>

Meaney, M. J. (2018). Perinatal maternal depressive symptoms as an issue for population health. In *American Journal of Psychiatry*, *175*(11), 1084–1093. American Psychiatric Association.

<https://doi.org/10.1176/appi.ajp.2018.17091031>

Moher, D., Shamseer, L., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., Shekelle, P., Stewart, L. A., Estarli, M., Barrera, E. S. A., Martínez-Rodríguez, R., Baladia, E., Agüero, S. D., Camacho, S., Buhning, K., Herrero-López, A., Gil-González, D. M., Altman, D. G., Booth, A., ... Whitlock, E. (2016). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Revista Espanola de Nutricion Humana y Dietetica*, *20*(2), 148–160.

<https://doi.org/10.1186/2046-4053-4-1>

- Moreira, H., Carona, C., Silva, N., Nunes, J., & Canavarro, M. C. (2016). Exploring the link between maternal attachment-related anxiety and avoidance and mindful parenting: The mediating role of self-compassion. *Psychology and Psychotherapy: Theory, Research and Practice, 89*(4), 369–384.  
<https://doi.org/10.1111/papt.12082>
- Morelen, D., Shaffer, A., & Suveg, C. (2016). Maternal Emotion Regulation: Links to Emotion Parenting and Child Emotion Regulation. *Journal of Family Issues, 37*(13), 1891–1916. <https://doi.org/10.1177/0192513X14546720>
- Newman, L., Sivaratnam, C., & Komiti, A. (2015). Attachment and early brain development – neuroprotective interventions in infant–caregiver therapy. *Translational Developmental Psychiatry, 3*(1), 28647.  
<https://doi.org/10.3402/tdp.v3.28647>
- Nyklíček, I., Truijens, S. E., Spek, V., & Pop, V. J. (2018). Mindfulness skills during pregnancy: prospective associations with mother's mood and neonatal birth weight. *Journal of Psychosomatic Research, 107*, 14-19.  
<https://doi.org/10.1016/j.jpsychores.2018.01.012>
- Pan, W. L., Chang, C. W., Chen, S. M., & Gau, M. L. (2019). Assessing the effectiveness of mindfulness-based programs on mental health during pregnancy and early motherhood - A randomized control trial. *BMC Pregnancy and Childbirth, 19*(1), 346. <https://doi.org/10.1186/s12884-019-2503-4>
- Pickard, J. A., Townsend, M., Caputi, P., & Grenyer, B. F. (2017). Observing the influence of mindfulness and attachment styles through mother and infant interaction: A longitudinal study. *Infant Mental Health Journal, 38*(3), 343-350.  
<https://doi.org/10.1002/imhj.21645>
- Poobalan, A. S., Aucott, L. S., Ross, L., Smith, W. C. S., Helms, P. J., & Williams, J.



- H. G. (2007). Effects of treating postnatal depression on mother-infant interaction and child development: Systematic review. In *British Journal of Psychiatry*, 191, 378–386. <https://doi.org/10.1192/bjp.bp.106.032789>
- Pritchett, R., Kemp, J., Wilson, P., Minnis, H., Bryce, G., & Gillberg, C. (2011). Quick, simple measures of family relationships for use in clinical practice and research. A systematic review. In *Family Practice*, 28(2), 172–187. <https://doi.org/10.1093/fampra/cmq080>
- Psychogiou, L., Legge, K., Parry, E., Mann, J., Nath, S., Ford, T., & Kuyken, W. (2016). Self-Compassion and Parenting in Mothers and Fathers with Depression. *Mindfulness*, 7(4), 896–908. <https://doi.org/10.1007/s12671-016-0528-6>
- Ross-Davie, M., Butcher, G., Davidson, M., Allely, C. S., Fargie, J., Puckering, C., & Trevarthen, C. (2014). Bonding and Attachment in the peri-natal period: Supporting rich and enjoyable relationships for life. In *Maternal and early years for early years workers*. <http://www.maternal-and-early-years.org.uk/bonding-and-attachment-in-the-perinatal-period-supporting-rich-and-enjoyable-relationships-for-life-2>
- Rutherford, H. J. V., & Mayes, L. C. (2011). Primary maternal preoccupation: Using neuroimaging techniques to explore the parental brain. *Psyche*, 65(9–10), 973–988. [https://www.researchgate.net/publication/279550834\\_Primary\\_maternal\\_preoccupation\\_Using\\_neuroimaging\\_techniques\\_to\\_explore\\_the\\_parental\\_brain](https://www.researchgate.net/publication/279550834_Primary_maternal_preoccupation_Using_neuroimaging_techniques_to_explore_the_parental_brain)
- Rutherford, H. J. V., Wallace, N. S., Laurent, H. K., & Mayes, L. C. (2015). Emotion regulation in parenthood. In *Developmental Review*, 36, pp. 1–14. <https://doi.org/10.1016/j.dr.2014.12.008>

- Satyanarayana, V. A., Lukose, A., & Srinivasan, K. (2011). Maternal mental health in pregnancy and child behavior. *Indian Journal of Psychiatry*, *53*(4), 351–361. <https://doi.org/10.4103/0019-5545.91911>
- Sloan, E., Hall, K., Moulding, R., Bryce, S., Mildred, H., & Staiger, P. K. (2017). Emotion regulation as a transdiagnostic treatment construct across anxiety, depression, substance, eating and borderline personality disorders: A systematic review. In *Clinical Psychology Review*, *57*, 141–163. <https://doi.org/10.1016/j.cpr.2017.09.002>
- Stein, A., Pearson, R. M., Goodman, S. H., Rapa, E., Rahman, A., McCallum, M., Howard, L. M., & Pariante, C. M. (2014). Effects of perinatal mental disorders on the fetus and child. In *The Lancet*, *384*(9956), 1800–1819. [https://doi.org/10.1016/S0140-6736\(14\)61277-0](https://doi.org/10.1016/S0140-6736(14)61277-0)
- Tan, L., & Smith, C. L. (2018). Intergenerational Transmission of Maternal Emotion Regulation to Child Emotion Regulation: Moderated Mediation of Maternal Positive and Negative Emotion. *Emotion*. <https://doi.org/10.1037/emo0000523>
- Tanner, L. (2019). *Quality appraisal in systematic reviews – Newcastle Health Economics and Evidence Synthesis*. Quality Appraisal in Systematic Reviews. <https://blogs.ncl.ac.uk/healtheconomicsgroup/2019/02/21/quality-appraisal-in-systematic-reviews/>
- Tester-Jones, M., Karl, A., Watkins, E., & O'Mahen, H. (2017). Rumination in dysphoric mothers negatively affects mother–infant interactions. *Journal of Child Psychology and Psychiatry*, *58*(1), 38–45. <https://doi.org/10.1111/jcpp.12633>
- Tester-Jones, M., O'Mahen, H., Watkins, E., & Karl, A. (2015). The impact of maternal characteristics, infant temperament and contextual factors on maternal responsiveness to infant. *Infant Behavior and Development*, *40*, 1–1.

<https://doi.org/10.1016/j.infbeh.2015.02.014>

Thomas, B. H., Ciliska, D., Dobbins, M., & Micucci, S. (2004). A process for systematically reviewing the literature: Providing the research evidence for public health nursing interventions. *Worldviews on Evidence-Based Nursing*, 1(3), 176–184. <https://doi.org/10.1111/j.1524-475X.2004.04006.x>

Van den Heuvel, M. I., Johannes, M. A., Henrichs, J., & Van den Bergh, B. R. H. (2015). Maternal mindfulness during pregnancy and infant socio-emotional development and temperament: the mediating role of maternal anxiety. *Early Human Development*, 91(2), 103-108.

<https://doi.org/10.1016/j.earlhumdev.2014.12.003>

## Appendices

### Appendix A: PRISMA-P Reporting Protocol

**PRISMA-P (Preferred Reporting Items for Systematic review and Meta-Analysis Protocols) 2015 checklist: recommended items to address in a systematic review protocol\***

Section and topic	Item No	Checklist item	(Page No.#)
<b>ADMINISTRATIVE INFORMATION</b>			
Title:			
Identification	1a	Identify the report as a protocol of a systematic review	1
Update	1b	If the protocol is for an update of a previous systematic review, identify as such	1
Registration	2	If registered, provide the name of the registry (such as PROSPERO) and registration number	1
Authors:			
Contact	3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	1
Contributions	3b	Describe contributions of protocol authors and identify the guarantor of the review	10
Amendments	4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	1
Support:			
Sources	5a	Indicate sources of financial or other support for the review	1
Sponsor	5b	Provide name for the review funder and/or sponsor	
Role of sponsor or funder	5c	Describe roles of funder(s), sponsor(s), and/or institution(s), if any, in developing the protocol	
<b>INTRODUCTION</b>			
Rationale	6	Describe the rationale for the review in the context of what is already known	3

Objectives	7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators,	4
Processing speed in children and adolescence			
and outcomes (PICO)			
<b>METHODS</b>			
Eligibility criteria	8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	4-5
Information sources	9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	6
Search strategy	10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	6 and Appendix-A
Study records:			
Data management	11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	7
Selection process	11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	7
Data collection process	11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	7
Data items	12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	7
Outcomes and prioritization	13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	8
Risk of bias in individual studies	14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	8
Data synthesis	15a	Describe criteria under which study data will be quantitatively synthesised	9

	15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as $I^2$ , Kendall's $\tau$ )	
	15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	
	15d	If quantitative synthesis is not appropriate, describe the type of summary planned	
Meta-bias(es)	16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	10
Confidence in cumulative evidence	17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	10

Processing speed in children and adolescence

**\* It is strongly recommended that this checklist be read in conjunction with the PRISMA-P Explanation and Elaboration (cite when available) for important clarification on the items. Amendments to a review protocol should be tracked and dated. The copyright for PRISMA-P (including checklist) is held by the PRISMA-P Group and is distributed under a Creative Commons Attribution Licence 4.0.**

*From: Shamseer L, Moher D, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart L, PRISMA-P Group. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. BMJ. 2015 Jan 2;349(jan02 1):g7647.*

**Appendix B: Data Extraction and Assessment Template from the Cochrane Public Health Group**

**Cochrane Public Health Group Data Extraction and Assessment Template**

<b>Study ID:</b>	<b>Report ID :</b>	Date form completed:
First author:	Year of study:	Data extractor:
Citation:		

**1. General Information**

Publication type	Journal Article <input type="checkbox"/> Abstract <input type="checkbox"/> Other (specify e.g. book chapter) _____
Country of study:	
Funding source of study:	Potential conflict of interest from funding? Y / N / unclear

**2. Study Eligibility**

Study Characteristics		Page/ Para/ Figure #
<b>Type of study</b> (Review authors to add/remove designs based on criteria specified in protocol)	<input type="checkbox"/> Randomised Controlled Trial (RCT) <input type="checkbox"/> Cluster Randomised Controlled Trial (cluster RCT)	<input type="checkbox"/> Controlled Before and After (CBA) study <ul style="list-style-type: none"> <li>• Contemporaneous data collection</li> <li>• Comparable control site</li> <li>• At least 2 x intervention and 2 x control clusters</li> </ul>
	<input type="checkbox"/> Interrupted Time Series (ITS) <ul style="list-style-type: none"> <li>• At least 3 time points before and 3 after the intervention</li> <li>• Clearly defined intervention point</li> </ul>	<input type="checkbox"/> Other design (specify):
	<input type="checkbox"/> A process evaluation of an included study design	<i>Does the study design meet the criteria for inclusion?</i> Yes <input type="checkbox"/> No <input type="checkbox"/> → <b>Exclude</b> Unclear <input type="checkbox"/>
	Description in text:	
<b>Participants</b> (Review authors insert inclusion criteria as defined in Protocol)	Describe the participants included:	
	Are participants defined as a group having specific social or cultural characteristics?	Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear <input type="checkbox"/> Details:
	How is the geographic boundary defined?	Details: Specific location (e.g. state / country):
	<i>Do the participants meet the criteria for inclusion?</i>	Yes <input type="checkbox"/> No <input type="checkbox"/> → <b>Exclude</b> Unclear <input type="checkbox"/>

<b>Types of intervention</b> (Review authors insert inclusion criteria as defined in Protocol)	Strategies included in the intervention			
	Focus of the intervention			
	<i>Does the intervention meet the criteria for inclusion?</i>		Yes <input type="checkbox"/>	No <input type="checkbox"/> → <b>Exclude</b>
<b>Duration of intervention</b>	Start date:	Stop date:	Intervention duration:	
	<i>Is the duration of intervention adequate for inclusion?</i>		Yes <input type="checkbox"/>	No <input type="checkbox"/> → <b>Exclude</b>
<b>Types of outcome measures</b> (Review authors insert inclusion criteria as defined in Protocol)	List outcomes:			
	Outcome measured at a population level or individual level?		Details:	
	<i>Do the outcome measures meet the criteria for inclusion?</i>		Yes <input type="checkbox"/>	No <input type="checkbox"/> → <b>Exclude</b>



**Summary of Assessment for Inclusion**

<b>Include in review</b> <input type="checkbox"/>		<b>Exclude from review</b> <input type="checkbox"/>	
Independently assessed, and then compared? Yes <input type="checkbox"/> No <input type="checkbox"/>		Differences resolved Yes <input type="checkbox"/> No <input type="checkbox"/>	
Request further details? Yes <input type="checkbox"/> No <input type="checkbox"/>		Contact details of authors:	
<b>Notes:</b>			

DO NOT PROCEED IF PAPER EXCLUDED FROM REVIEW

**3. Study details**

<b>Study intention</b>	<b>Descriptions as stated in the report/paper</b>	<b>Page/ Para/ Figure #</b>
Aim of intervention	<i>What was the problem that this intervention was designed to address?</i>	
Aim of study	<i>What was the study designed to assess? Are these clearly stated?</i>	
Equity pointer: Social context of the study	<i>e.g. was study conducted in a particular setting that might target/exclude specific population s? See also Inclusion/exclusion criteria under Methods, below.</i>	
Start and end date of the study	<i>Identify which elements of planning of the intervention should be included</i>	
Total study duration		

<b>Methods</b>	<b>Descriptions as stated in the report/paper</b>	<b>Page/ Para/ Figure #</b>
Method/s of recruitment of participants <i>(How were potential participants approached and invited to participate? Where were participants recruited from? Does this differ from the intervention setting?)</i>		
Inclusion/exclusion criteria for participation in study		
Representativeness of sample: Are participants in the study likely to be representative of the target population?		
Total number of intervention groups		
Assumed risk estimate <i>(e. .baseline or population risk noted in Background)</i>	<i>References:</i>	
Sample size calculation: What assumptions were made? Were these assumptions appropriate?	<i>(Yes/No/Unclear)</i>	
What was the unit of randomisation? Allocation by individuals or cluster/groups		
What was the unit of analysis? <b>Is this the same as the unit of randomisation?</b>		

	<i>(Yes/No/Unclear)</i>	
Statistical methods used and appropriateness of these methods	<i>(Check with your statistician if unsure about appropriateness)</i>	

**Results**

<b>Participants</b> <i>Include if relevant</i>	<b>Include information for each group (i.e. intervention and controls) under study</b>	<b>Page/ Para/ Figure #</b>
<ul style="list-style-type: none"> <li>• What percentage of selected individuals agreed to participate?</li> </ul>		
<ul style="list-style-type: none"> <li>• Total number randomised (or total pop. at start of study for NRCTs)</li> </ul>		
<ul style="list-style-type: none"> <li>• Number allocated to each intervention group (no. of individuals)</li> </ul>		
<ul style="list-style-type: none"> <li>• For cluster trials, number of clusters, number of people per cluster</li> </ul>		
<ul style="list-style-type: none"> <li>• Where there any significant baseline imbalances?</li> </ul>	Yes <input type="checkbox"/> No <input type="checkbox"/> Unclear <input type="checkbox"/> Details:	
<ul style="list-style-type: none"> <li>• Number and reason for (and sociodemographic differences of) withdrawals and exclusions for each intervention group</li> </ul>		
<ul style="list-style-type: none"> <li>• Were patients who entered the study adequately accounted for?</li> </ul>		
<ul style="list-style-type: none"> <li>• What percentage of patients completed the study?</li> </ul>		
<ul style="list-style-type: none"> <li>• What percentage of participants received the allocated intervention or exposure of interest?</li> </ul>		
<ul style="list-style-type: none"> <li>• Is the analysis performed by intervention allocation status (intention to treat) rather than the actual intervention received? Have any attempts been made to impute missing data?</li> </ul>		
<ul style="list-style-type: none"> <li>• Age (median, mean and range if possible)</li> </ul>		
<ul style="list-style-type: none"> <li>• Sex</li> </ul>		
<ul style="list-style-type: none"> <li>• Race/Ethnicity</li> </ul>		
<ul style="list-style-type: none"> <li>• Principal health problem (incl. stage of illness)</li> </ul>		
<ul style="list-style-type: none"> <li>• Diagnostic criteria</li> </ul>		

<ul style="list-style-type: none"> <li>• Co-morbidity</li> </ul>		
<ul style="list-style-type: none"> <li>• Other sociodemographics (eg. Educational level, literacy level, socio-economic status, first language. Also consider possible proxies for these e.g. low baseline nutritional status )</li> </ul>		
<ul style="list-style-type: none"> <li>• PROGRESS categories reported at baseline (indicate letters of those reported: Place of residence, race, occupation, gender, religion, education, SES, social capital)</li> </ul>		
<b>Subgroups</b>	<i>Enter a description of any participant subgroups from this paper to be analysed in the review.</i>	

**Intervention Group 1**

*(copy and paste table for each Intervention group)*

<b>Group name:</b>	<i>(State brief name for this intervention group.)</i>	<b>Page/ Para/ Figure #</b>
Details of intervention or control condition <i>(Include if relevant in sufficient detail for replication)</i>		
<ul style="list-style-type: none"> <li>• Setting eg multicentre, university teaching hospitals, rural, metropolitan, school, workplace, community, GP clinic, etc.</li> </ul>		
<ul style="list-style-type: none"> <li>• Theoretical basis (include key references)</li> </ul>		
<ul style="list-style-type: none"> <li>• Content (list the strategies intended and delivered)</li> </ul>		
<ul style="list-style-type: none"> <li>• Did the intervention include strategies to address diversity/disadvantage?</li> </ul>	<i>Enter a description of any relevant strategies</i>	
<ul style="list-style-type: none"> <li>• Delivery (eg. Stages (sequential or simultaneous), timing, frequency, duration, intensity, fidelity – process indicators)</li> </ul>		
<ul style="list-style-type: none"> <li>• Providers (who, number, education/training in intervention delivery, ethnicity etc. if potentially relevant to acceptance and uptake by participants)</li> </ul>		

• Co-interventions		
Duration of intervention		
Duration of follow-up		
Was sustainability discussed by the authors? Was is a consideration in study development?		
Economic variables ie costs of the intervention, and changes in other (eg health care) costs as result of intervention <sup>^</sup>	Yes <input type="checkbox"/> → <b>List in Outcome section if appropriate</b> No <input type="checkbox"/> Unclear <input type="checkbox"/> Details:	
Other economic information (from a societal, non-healthcare view – e.g. lost wages, time)	Yes <input type="checkbox"/> No <input type="checkbox"/> Details:	
Resource requirements to replicate intervention (e.g. staff numbers, hours of implementation, equipment?)		
Subgroups	<i>Enter a description of any intervention subgroups from this report to be analysed in the review.</i>	
What are the moderators/mediators of changes stated in the study?		
Do the authors describe any political or organisational context?	<i>List relevant dot points</i>	
Were any partnerships referred to?	<i>List these as dot points</i>	
Was a process evaluation conducted?	<i>What components were included in the process evaluation? (eg. dose, frequency, consistency, implemented as intended etc)</i>	
Control/comparison (what information is provided about what the control or comparison group received?)	<i>Enter a description of what was provided for the control group, if applicable</i>	

**Outcomes**

*(This table is set up for 2 outcome measure to save spaces, copy and paste table as often as required)*

<b>Question</b>	<b>Outcome 1</b>	<b>Page/ Para/ Figure #</b>	<b>Outcome 2</b>	<b>Page/ Para/ Figure #</b>
Is there an analytic framework applied (e.g. logic model, conceptual framework)?				
Outcome definition (with diagnostic criteria if relevant)				
Type of outcome: Is this a modifiable variable (Community level,				

<sup>^</sup> Costs associated with the intervention can be linked with provider or participant outcomes in an economic evaluation (depends on the type of economic evaluation)

neighbourhood level, individual level) or desired health outcome				
Time points measured				
Time points reported				
Is there adequate latency for the outcome to be observed?				
Is the measure repeated on the same individuals or redrawn from the population / community for each time point?				
Unit of measurement (if relevant)				
For scales – upper and lower limits and indicate whether high or low score is good				
How is the measure applied? Telephone survey, mail survey, in person by trained assessor, routinely collected data, other				
How is the outcome reported? Self or study assessor				
Is this outcome/tool validated?				
...And has it been used as validated?				
Is it a reliable outcome measure?				
Is there adequate power for this outcome?				
Were PROGRESS categories analysed by outcome? Indicate the letters of those that outcomes were analysed by (place of residence, race, occupation, gender, religion, education, SES, social capital)				

**Appendix C: The Quality Assessment Tool for Quantitative Studies (QAT)**

**QUALITY ASSESSMENT TOOL FOR QUANTITATIVE STUDIES**



**COMPONENT RATINGS**

**A) SELECTION BIAS**

**(Q1) Are the individuals selected to participate in the study likely to be representative of the target population?**

- 1 Very likely
- 2 Somewhat likely
- 3 Not likely
- 4 Can't tell

**(Q2) What percentage of selected individuals agreed to participate?**

- 1 80 - 100% agreement
- 2 60 – 79% agreement
- 3 less than 60% agreement
- 4 Not applicable
- 5 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

**B) STUDY DESIGN**

**Indicate the study design**

- 1 Randomized controlled trial
- 2 Controlled clinical trial
- 3 Cohort analytic (two group pre + post)
- 4 Case-control
- 5 Cohort (one group pre + post (before and after))
- 6 Interrupted time series
- 7 Other specify \_\_\_\_\_
- 8 Can't tell

**Was the study described as randomized? If NO, go to Component C.**

No Yes

**If Yes, was the method of randomization described? (See dictionary)**

No Yes

**If Yes, was the method appropriate? (See dictionary)**

No Yes

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

**C) CONFOUNDERS**

**(Q1) Were there important differences between groups prior to the intervention?**

- 1 Yes
- 2 No
- 3 Can't tell

**The following are examples of confounders:**

- 1 Race
- 2 Sex
- 3 Marital status/family
- 4 Age
- 5 SES (income or class)
- 6 Education
- 7 Health status
- 8 Pre-intervention score on outcome measure

**(Q2) If yes, indicate the percentage of relevant confounders that were controlled (either in the design (e.g. stratification, matching) or analysis)?**

- 1 80 – 100% (most)
- 2 60 – 79% (some)
- 3 Less than 60% (few or none)
- 4 Can't Tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

**D) BLINDING**

**(Q1) Was (were) the outcome assessor(s) aware of the intervention or exposure status of participants?**

- 1 Yes
- 2 No
- 3 Can't tell

**(Q2) Were the study participants aware of the research question?**

- 1 Yes
- 2 No
- 3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

**E) DATA COLLECTION METHODS**

**(Q1) Were data collection tools shown to be valid?**

- 1 Yes
- 2 No
- 3 Can't tell

**(Q2) Were data collection tools shown to be reliable?**

- 1 Yes
- 2 No
- 3 Can't tell

RATE THIS SECTION	STRONG	MODERATE	WEAK
See dictionary	1	2	3

**F) WITHDRAWALS AND DROP-OUTS**

**(Q1) Were withdrawals and drop-outs reported in terms of numbers and/or reasons per group?**

- 1 Yes
- 2 No
- 3 Can't tell
- 4 Not Applicable (i.e. one time surveys or interviews)

**(Q2) Indicate the percentage of participants completing the study. (If the percentage differs by groups, record the lowest).**

- 1 80 -100%
- 2 60 - 79%
- 3 less than 60%
- 4 Can't tell
- 5 Not Applicable (i.e. Retrospective case-control)

RATE THIS SECTION	STRONG	MODERATE	WEAK	
See dictionary	1	2	3	Not Applicable

**G) INTERVENTION INTEGRITY**

**(Q1) What percentage of participants received the allocated intervention or exposure of interest?**

- 1 80 -100%
- 2 60 - 79%
- 3 less than 60%
- 4 Can't tell

**(Q2) Was the consistency of the intervention measured?**

- 1 Yes
- 2 No
- 3 Can't tell

**(Q3) Is it likely that subjects received an unintended intervention (contamination or co-intervention) that may influence the results?**

- 4 Yes
- 5 No
- 6 Can't tell

**H) ANALYSES**

**(Q1) Indicate the unit of allocation (circle one)**

community    organization/institution    practice/office    individual

**(Q2) Indicate the unit of analysis (circle one)**

community    organization/institution    practice/office    individual

**(Q3) Are the statistical methods appropriate for the study design?**

- 1 Yes
- 2 No
- 3 Can't tell

**(Q4) Is the analysis performed by intervention allocation status (i.e. intention to treat) rather than the actual intervention received?**

- 1 Yes
- 2 No
- 3 Can't tell



**GLOBAL RATING**

**COMPONENT RATINGS**

Please transcribe the information from the gray boxes on pages 1-4 onto this page. See dictionary on how to rate this section.

<b>A</b>	<b>SELECTION BIAS</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
<b>B</b>	<b>STUDY DESIGN</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
<b>C</b>	<b>CONFOUNDERS</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
<b>D</b>	<b>BLINDING</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
<b>E</b>	<b>DATA COLLECTION METHOD</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
<b>F</b>	<b>WITHDRAWALS AND DROPOUTS</b>	<b>STRONG</b>	<b>MODERATE</b>	<b>WEAK</b>
		1	2	3
				Not Applicable

**GLOBAL RATING FOR THIS PAPER (circle one):**

- 1      STRONG                      (no WEAK ratings)
- 2      MODERATE                   (one WEAK rating)
- 3      WEAK                            (two or more WEAK ratings)

With both reviewers discussing the ratings:

Is there a discrepancy between the two reviewers with respect to the component (A-F) ratings?

No      Yes

If yes, indicate the reason for the discrepancy

- 1      Oversight
- 2      Differences in interpretation of criteria
- 3      Differences in interpretation of study

**Final decision of both reviewers (circle one):**

- 1      STRONG**
- 2      MODERATE**
- 3      WEAK**

## **Appendix D: Journal of Child Psychology and Psychiatry- Dissemination of Finding and Instructions for Authors**

The aim is for this systematic literature review to be disseminated via publication in the Journal of Child Psychology and Psychiatry.

### **Instructions for Authors**

#### **Manuscript preparation and submission**

Papers should be submitted online. For detailed instructions please go to: [http://mc.manuscriptcentral.com/jcpp\\_journal](http://mc.manuscriptcentral.com/jcpp_journal). Previous users can check for an existing account. New users should create a new account. Help with submitting online can be obtained from the Editorial Office at [publications@acamh.org](mailto:publications@acamh.org)

1. The manuscript should be double spaced throughout, including references and tables. Pages should be numbered consecutively. The preferred file formats are MS Word or WordPerfect, and should be PC compatible. If using other packages the file should be saved as Rich Text Format or Text only.
2. Papers should be concise and written in English in a readily understandable style. Care should be taken to avoid racist or sexist language, and statistical presentation should be clear and unambiguous. The Journal follows the style recommendations given in the *Publication manual of the American Psychological Association* (5th edn., 2001).
3. The Journal is not able to offer a translation service, but, authors for whom English is a second language may choose to have their manuscript professionally edited before submission to improve the English. A list of independent suppliers of editing services can be found [here](#). All services are paid for and arranged by the author, and use of one of these services does not guarantee acceptance or preference for publication.

#### *Layout*

*Title:* The first page of the manuscript should give the title, name(s) and short address(es) of author(s), and an abbreviated title (for use as a running head) of up to 60 characters.

#### *Abstract*

The abstract should not exceed 300 words and should be structured in the following way with bold marked headings: Background; Methods; Results; Conclusions; Keywords; Abbreviations. The abbreviations will apply where authors are using acronyms for tests or abbreviations not in common usage.

#### *Key points and relevance*

All papers should include a text box at the end of the manuscript outlining the four or five key (bullet) points of the paper. These should briefly (80-120 words) outline what's known, what's new, and what's relevant.

Under the 'what's relevant' section we ask authors to describe the relevance of their work in one or more of the following domains - policy, clinical practice, educational practice, service development/delivery or recommendations for further science.

### *Headings*

Articles and research reports should be set out in the conventional format: Methods, Results, Discussion and Conclusion. Descriptions of techniques and methods should only be given in detail when they are unfamiliar. There should be no more than three (clearly marked) levels of subheadings used in the text.

### *Acknowledgements*

These should appear at the end of the main text, before the References.

### *Correspondence to*

Full name, address, phone, fax and email details of the corresponding author should appear at the end of the main text, before the References.

### *References*

The *JCPP* follows the text referencing style and reference list style detailed in the *Publication manual of the American Psychological Association* (5th edn.)i.

### *References in text*

References in running text should be quoted as follows:

Smith and Brown (1990), or (Smith, 1990), or (Smith, 1980, 1981a, b), or (Smith & Brown, 1982), or (Brown & Green, 1983; Smith, 1982).

For up to five authors, all surnames should be cited in the first instance, with subsequent occurrences cited as et al., e.g. Smith et al. (1981) or (Smith et al., 1981). For six or more authors, cite only the surname of the first author followed by et al. However, all authors should be listed in the Reference List. Join the names in a multiple author citation in running text by the word 'and'. In parenthetical material, in tables, and in the References List, join the names by an ampersand (&). References to unpublished material should be avoided.

### *Reference list*

Full references should be given at the end of the article in alphabetical order, and not in footnotes. Double spacing must be used.

References to journals should include the authors' surnames and initials, the year of publication, the full title of the paper, the full name of the journal, the volume number, and inclusive page numbers. Titles of journals must not be abbreviated and should be italicised.

References to books should include the authors' surnames and initials, the year of publication, the full title of the book, the place of publication, and the publisher's name.

References to articles, chapters and symposia contributions should be cited as per the examples below:

Kiernan, C. (1981). Sign language in autistic children. *Journal of Child Psychology and Psychiatry*, 22, 215-220.

Thompson, A. (1981). *Early experience: The new evidence*. Oxford: Pergamon Press.

Jones, C.C., & Brown, A. (1981). Disorders of perception. In K. Thompson (Ed.), *Problems in early childhood* (pp. 23-84). Oxford: Pergamon Press.

Use Ed.(s) for Editor(s); edn. for edition; p.(pp.) for page(s); Vol. 2 for Volume 2.

### *Tables and Figures*

All Tables and Figures should appear at the end of main text and references, but have their intended position clearly indicated in the manuscript. They should be constructed so as to be intelligible without reference to the text. Any lettering or line work should be able to sustain reduction to the final size of reproduction. Tints and complex shading should be avoided and colour should not be used unless essential. Authors are encouraged to use patterns as opposed to tints in graphs. In case of essential colour figures, authors are reminded that there is a small printing charge. Authors will be contacted during the proofing stage of their accepted paper. Figures should be originated in a drawing package and saved as TIFF, EPS, or PDF files. Further information about supplying electronic artwork can be found in the Wiley electronic artwork guidelines [here](#).

### *Nomenclature and symbols*

Each paper should be consistent within itself as to nomenclature, symbols and units. When referring to drugs, give generic names, not trade names. Greek characters should be clearly indicated.

### *Supporting Information*

Examples of possible supporting material include intervention manuals, statistical analysis syntax, and experimental materials and qualitative transcripts.

1. If uploading with your manuscript please call the file 'supporting information' and reference it in the manuscript.
2. Include only those items - figures, images, tables etc that are relevant and referenced



**SCHOOL OF PSYCHOLOGY**  
**DOCTORATE IN CLINICAL PSYCHOLOGY**  
**EMPIRICAL PAPER**

**The effects of maternal emotion regulation on levels of mind-mindedness during mother-infant interactions within a perinatal population.**

Trainee Name: **Rachel Stone**

Primary Research Supervisor: **Professor Heather O'Mahen**  
Associate Professor in Perinatal  
Clinical Psychology,  
University of Exeter

Secondary Research Supervisor: **Dr Jenny Limond**  
Senior Lecturer, University of Exeter  
and Consultant Clinical  
Neuropsychologist

Target Journal: Journal of Child Psychology and  
Psychiatry (JCPP)

Word Count: 7975 words

**Submitted in partial fulfilment of requirements for the Doctorate Degree in  
Clinical Psychology, University of Exeter**

### Abstract

**Background** Poor maternal emotion regulation is associated with poor maternal mental health. In turn, poor maternal mental health is related to disrupted mother-infant interactions and risks for poor child socio-emotional outcomes. There is limited research examining the impact of different emotion regulation strategies on mother-infant interactions. This study examined the relationship between two emotion regulation strategies, self-compassion and suppression, on a mother's ability to display mind-mindedness in interactions with her infant. It was hypothesised a self-compassion induction would increase maternal mind-mindedness relative to a suppression induction, and this would be intensified following a challenging task.

**Method** A mixed (pre-post, between groups) design was utilised whereby 42 mother-infant dyads took part. Mothers were asked to complete a range of self-report measures assessing maternal mood, maternal responsiveness and emotion regulation abilities, as well as two (pre-post induction) mother-infant interaction play sessions. Participants were randomly assigned to either a self-compassion or suppression induction to assess the impact of maternal emotion regulation on maternal interactions. Videos were coded for mind-mindedness using ratio scores for both appropriate and non-attuned comments.

**Results** Consistent with hypotheses, the self-compassion induction had higher appropriate mind-related comments relative to the suppression induction. No differences were found between groups for non-attuned comments. Self-compassion was also associated with larger increases in pleasant mood and arousal, and decreases in negative mood compared to the suppression condition. Mothers in the self-compassion condition showed a greater desire to want to comfort distressed

infant faces and were less likely to turn away or feel anxious, relative to mothers in the suppression condition.

**Conclusions** Findings demonstrated that relative to suppression, self-compassion improved maternal mood and approach-oriented aspects of mother-infant interactions, including appropriate comments and responsiveness to distressed infants, but did not affect non-attuned comments. Clinical implications and future research are discussed.

**Keywords:** *emotion regulation, self-compassion, suppression, mother-infant interaction, maternal mind-mindedness*

## Introduction

### Perinatal Mental Health and Child Outcomes

Perinatal mental health difficulties are a public health problem. They are prevalent and disabling, affecting 10 – 20% of women, with post-partum psychosis affecting between 1 and 2 in 1000 women and severe depressive illness affecting 30 women in every 1000 births (National Institute for Health and Care Excellence [NICE], 2014). Critically, whilst perinatal mental health problems cause great distress to the mother's psychological and physical well-being (Royal College of Midwives [RCM], 2014), they can also cause difficulties in the mother-infant relationship, and these are associated with risk of poor social and emotional outcomes for the infant both during the perinatal period and later in childhood (Ross-Davie et al., 2014).

Extensive research demonstrates perinatal mental health problems during pregnancy and the postnatal year are associated with poorer child outcomes including higher risks of premature birth (Grigoriadis et al., 2013; Grote et al., 2010), low birth weight (Dawson et al., 2000; Talge et al., 2007), physical health complications (Rahman et al., 2004; Stewart, 2007), and poor social (Brouwers et al., 2001; Murray, 1992), emotional (Cornish et al., 2005; Dawson et al., 2003) and cognitive outcomes (Hay et al., 2001; Miller et al., 2016; Murray et al., 1996).

### Maternal Mind-Mindedness

The relationship between perinatal mental health problems and child outcomes is mediated, in part, by the quality of the mother-infant relationship (Murray & Cooper, 1997). A growing body of research suggests maternal sensitivity, or the ability to respond in a timely and appropriate manner to infant cues, is the perinatal mechanism driving quality of the mother-infant relationship (Bornstein et al., 2012). However, recent research has demonstrated maternal mind-mindedness; a



caregiver's ability to tune in to what their infant is thinking and feeling and their ability to see their infant as an individual with its own mind (Meins, 1997); explains additional variance in both the mother-infant relationship and child outcomes (Arnott & Meins, 2008).

Mind-mindedness measures are used during parent-infant interactions to assess caregiver's mind-related comments towards their infant. Comments are coded as appropriate or non-attuned (Meins & Fernyhough, 2015). Appropriate mind-related comments correlate positively with, but are conceptually distinct from, maternal sensitivity (Meins et al., 2003).

Evidence suggests a caregiver's ability to be mind-minded towards their infant is correlated with various positive infant outcomes including secure attachments aged 12 (Meins et al., 2001) and 15 months (Meins et al., 2012), and later at two years (Jensen & Jensen, 2018). Additionally, there are associations between mind-mindedness and children's mental-perspective taking abilities (Meins et al., 2013), performance on infant cognitive and emotional tasks (Laranjo et al., 2014; Meins et al., 2003; Meins & Fernyhough, 1999) and fewer behavioural problems (Meins et al., 2013).

However, there is a lack of research examining what maternal characteristics might be related to the quality of mind-mindedness in the mother-infant relationship, either in the context of mental health problems or outside it. This area is important to examine as it may support specific intervention strategies to target improvement in the quality of the mother-infant relationship.

### **Maternal Emotion Regulation**

In order to understand maternal mechanisms, it is important to understand processes that would support a mother to step back from her own perspective, to see the infant as separate from her and be able to attend to the infant's needs.

Although, the research has demonstrated links between maternal mental health problems and mind-mindedness, there has been little research investigating mechanisms that may underlie both maternal mental health and mind-mindedness, such as cognitive or emotion regulation (ER) factors that may promote maternal mind-mindedness. These are important to study because they may point to modifiable factors that can efficiently promote both maternal and infant mental health.

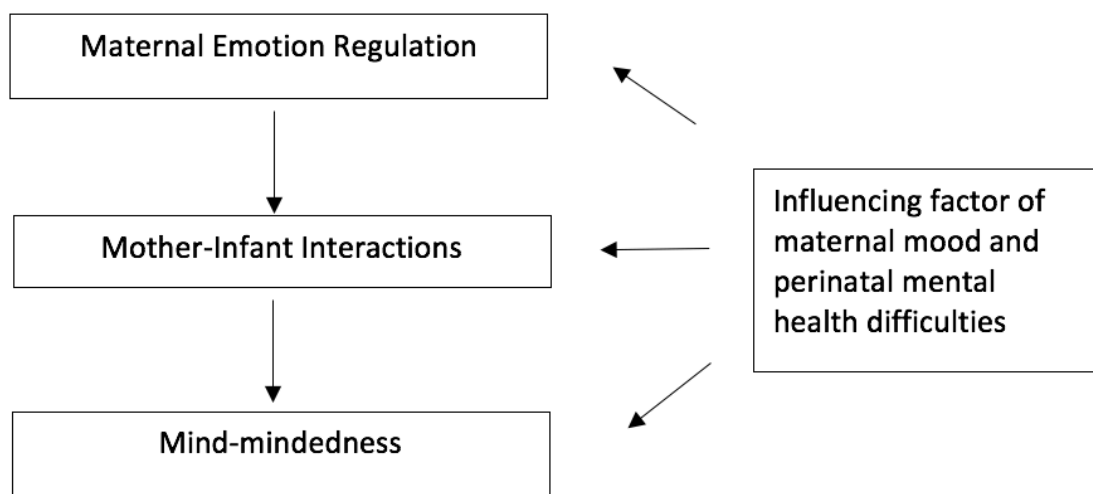
Emotion regulation, or a person's ability to manage the range of emotions they experience and respond in a way that is flexible and tolerable (Aldao et al., 2014), is one such factor that may underlie both maternal mental health and mind-mindedness. It is a complex process requiring individuals to inhibit, initiate or modulate their behaviour given the situation they find themselves in (Werner & Gross, 2010). These changes in behaviour are known as ER strategies which people use on a daily basis and are adept in applying to different contexts resulting from demands in the environment (Gross & John, 2003; Quoidbach et al., 2010)

The general adult mental health literature has shown that specific ER skills are associated with improved well-being or conversely, risk of poor mental health (Figure 1). For example, negative (i.e. suppression, distraction, rumination) ER strategies are associated with poorer mental health, whereas positive strategies (i.e. acceptance, self-compassion) have an inverse weak association with poor mental health, but a stronger, positive association with well-being (Balzarotti et al., 2016).

These conscious mental strategies help people cope with the intake of emotion experiences and information (Kobylińska & Kusev, 2019).

### Emotion Regulation and Parenting

In terms of child outcomes of poor maternal ER, research has shown detrimental effects including children showing higher levels of internalising, externalising and general psychopathology than those from mothers with better ER (Goodman et al., 2011). Research proposes poor maternal ER can negatively impact infants social development (Junge et al., 2017; Meaney, 2018), emotional adjustment (Maughan et al., 2007) and problem solving skills (Binion & Zalewski, 2018).



*Figure 1: Diagram of proposed component processes linked together*

Further, there is growing evidence that maladaptive ER strategies (i.e. rumination) are associated with poorer mother-infant interactions (Stein et al., 2014; Tester-Jones et al., 2017) and positive ER strategies such as mindfulness are associated with positive infant outcomes (Pickard et al., 2017). There has not been any research investigating the effect of these strategies on mind-mindedness.

However, it follows that strategies such as emotional suppression may be especially likely to interfere with the parent's ability to attend to the child's present needs. Emotional suppression is defined as purposefully excluding thoughts or emotions from one's consciousness in order to decrease their emotional response to a feel or event (Werner & Gross, 2010). It requires extensive cognitive capacity and is susceptible to emotional rebound effects when the individual's capacity is challenged (Wegner & Zanakos, 1994; Joormann & Gotlib, 2010); which can frequently occur during everyday parenting challenges. With emotional suppression being a behavioural component of emotion, it reduces expressive behaviour through the pushing away of emotional feelings; something mothers are likely to do if they are feeling overwhelmed by demands from their infant (Srivastava et al., 2009).

There is some support for this in studies that have found parental use of expressive suppression. This involves the suppressing expressions of emotions (rather than emotions per se) and has been associated with subsequent child use of suppression of expression (Bariola et al., 2012), negative pro-social behaviour in pre-school children (Xiao et al., 2018), and decreases in parent and children's positive mood, warmth, responsiveness and overall quality of the parent-child interaction (Karnilowicz et al., 2018).

In contrast, adaptive strategies like self-compassion, defined as the process of acting positively and kindly towards oneself in times of difficulty, failure, or perceived inadequacy (Gilbert et al., 2011), may be relatively less cognitively demanding than suppression of emotion. Self-compassion includes noticing when you are having a difficult time and reappraising your emotions with kindness and humanity (Neff, 2003) and is a core factor in mental well-being with it demonstrating positive effects on wellbeing, self-esteem and daily functioning (MacBeth & Gumley,

2012; Neff & McGehee, 2010). Therefore, self-compassion can soften parental negative emotion and improve positive emotion, feelings of warmth, contentment and calm mood (Gilbert et al., 2011; Gilbert & Procter, 2006), which may provide enhanced opportunities for parents to perceive and respond compassionately to the infant's needs.

Research highlights a link between depression and a lack of self-compassion; with depressed people showing less self-compassion towards themselves than healthy controls (Krieger et al., 2013). Similar associations have been found within a perinatal population too (Castilho et al., 2017; Felder et al., 2015). Self-compassion during pregnancy has also been associated with lower levels of perinatal mental health problems (Cohen, 2010) and a decrease in psychological distress (Dunn et al., 2012). Research has found correlations between self-compassion during pregnancy and mother-foetal attachment (Mohamadirizi & Kordi, 2016) and maternal-neonatal attachment and self-compassion in the postnatal period (Kordi & Mohamadirizi, 2018)

Positive, adaptive ER strategies may be especially important to examine during parenting because although reducing maladaptive strategies can lessen negative thinking and emotion, it has little effect on positive emotions, and positive emotions between the parent and child may be especially important for the child's well-being.

Fredrickson's (2001) broaden-and-build theory of positive emotion (Figure 2) theorises that through feeling positive emotions, such as love, contentment and joy, an individual's momentary thought-action repertoire is broadened, in turn promoting the discovery of creative adaptive actions. For example, feeling joy makes people want to play and interest makes people want to explore (Fredrickson, 2004). This

process allows for choices that induce positive emotions to build up and add to a person's personal, social, intellectual and psychological resources (Conway et al., 2013).

It is further proposed that the positive emotional states which this process elicits allows social relationships to grow and further positive emotions to be felt, ensuring a reinforcing effect (Fredrickson, 2001). The broadened mindset resulting from these positive emotions is contrasted with the narrow mindset which negative emotions elicit, thus reducing reflective and positive capabilities (Cohn & Fredrickson, 2008). Within a parenting context and thinking about mind-mindedness, having a mother who is interested and appropriately commenting on their infant's behaviour, can encourage interest within the infant also and they might be able to approach play and interactions more creatively; allowing for increases in positive emotions. This can be an important foundation on which attachment is built and reiterates the importance of healthy play between parent and infant for infant development (Burriss & Tsao, 2002; Ramchandani et al., 2005).

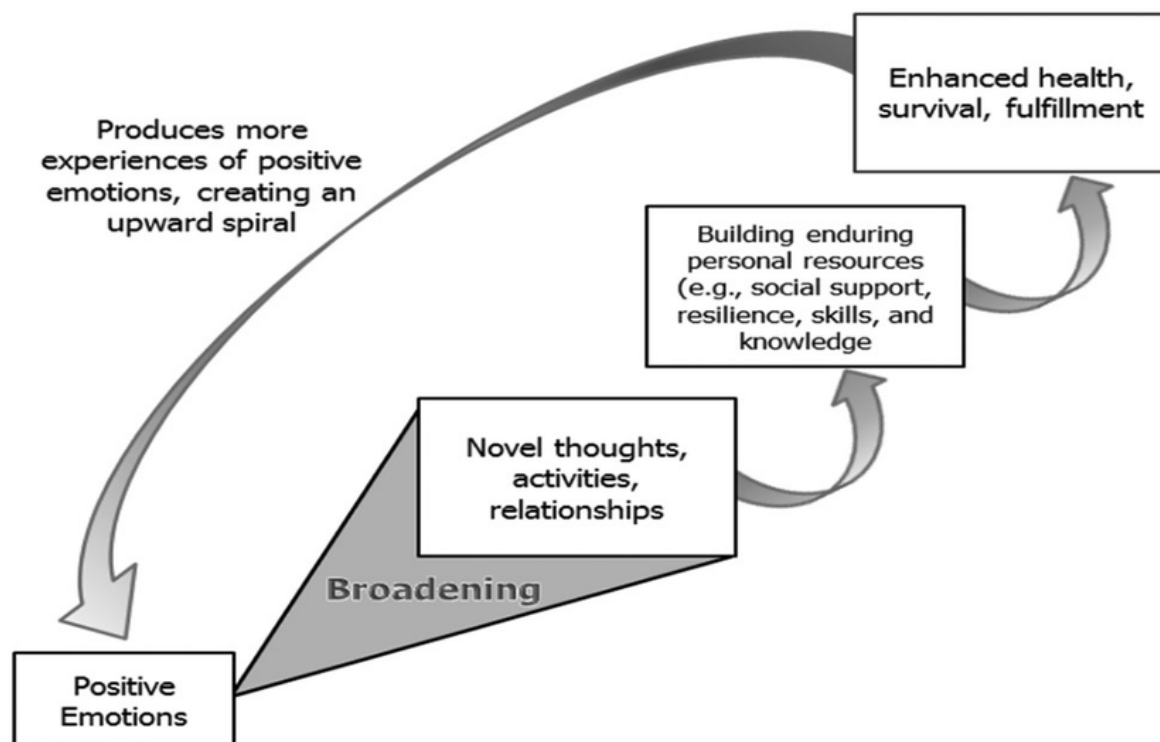


Figure 2: Fredrickson's Broaden-and-build Model of Positive Emotion

Further, using strategies that ameliorate negative parental emotions and build positive, calming mood may be particularly important for parents of very young children. This is because of the distinct pressures placed on parental ER in parenting (Rutherford & Mayes, 2011). Parenthood brings new challenges to mothers in that they need to balance the demands of managing and regulating their own emotional experience whilst also caring for their infant and facilitating ER for their infant too (Rutherford et al., 2015). This is in contrast to interpersonal ER in other relationships, where the process is reciprocal and often more balanced, with both individuals contributing to the regulatory process, upregulating positive, shared emotions and (typically) downregulating negative emotions (Coan & Maresh, 2014).

### Current Study

Due to a lack of research examining the link between maternal ER strategies and its impacts on mother-infant interactions, this empirical study aims to investigate

the relationship between self-compassion and suppression on a mother's maternal spoken interactions with her infant.

**Research questions.**

1. Does a self-compassion induction improve maternal mind-mindedness during mother-infant interactions relative to an emotion suppression induction?
2. Is this effect intensified following a challenging mother-infant interaction task?
3. Do the ER inductions have an impact on participant mood states and self-reported behavioural responses to distressed infant faces?

**Hypotheses.**

***Primary hypothesis.***

1. Mothers randomised to the self-compassion induction would show a greater increase in appropriate mind-minded statements from baseline to post-induction to post-challenging stress-inducing task, relative to those in the suppression condition. Those in the self-compassion induction would have a greater reduction in non-attuned mind-mindedness statements from pre-to post-induction to post a challenging stress-inducing task, relative to those in the suppression condition.

***Secondary hypotheses.***

2. Positive and calm mood would increase, and negative mood would decrease more in the self-compassion condition relative to the suppression condition. Following the challenging stress-inducing task, there would be no change in positive, calm and negative mood for the self-compassion condition but positive and calm mood will decrease, and negative mood would increase in the suppression condition.



3. When assessing maternal responses to distressed infant faces, mothers in the self-compassion group would demonstrate an increase in wanting to comfort the infant post-induction relative to the suppression group who would show a decrease in wanting to comfort. Mothers in the self-compassion condition would also be less likely to turn away from the infant faces and experience less anxiety than the suppression group who would be more likely to turn away and experience higher levels of anxiety.

4. Mothers scoring higher at baseline on cognitive reappraisal (trait ER) would have higher appropriate mind-mindedness scores and lower non-attuned mind-mindedness comments at baseline than those who use less cognitive reappraisal.

5. Mothers who use more expressive suppression would demonstrate less appropriate mind-mindedness comments and higher non-attuned mind-mindedness scores compared to those scoring lower for expressive suppression.

## **Method**

### **Design**

This study utilised a mixed (pre-post, between groups) design to determine whether there was a causal relationship between the ER strategy condition (independent variable) and the level of mind-mindedness displayed in mother-infant interactions (dependent variable). Participants were randomly assigned to either the self-compassion or suppression condition. Secondary measures included calm, positive and negative mood and maternal responses to pictures of infant faces. Participants completed all measures during one testing session conducted at the University of Exeter or the participant's home.

### **Sample**

**Recruitment.** The study aimed to recruit 40 mother-infant dyads with infants aged between six and 12 months. Infants within this age range were required based

on previous studies examining mind-mindedness and mind-mindedness coding criteria (Meins & Fernyhough, 2015).

Mothers were recruited from the community via a volunteer sampling method which involved advertising the study via various Facebook groups, at local mother and baby events, parent-infant play groups and libraries. Participants responded to printed adverts detailing the title and nature of the study and researcher contact details (Appendix A). Following initial contact participants were sent an information sheet via email (Appendix B). Recruitment followed a snowball effect.

**Inclusion and exclusion criteria.** Participants were eligible to participate if they were 18 years old and over and their infant was aged between six and 12 months. Participants were required to be fluent in speaking and reading English due to measures being presented in English and for ease of video transcription.

**Participants.** In total 102 people contacted the researcher for further information about the study and what participation would entail. Ninety-eight mothers were sent further information with 59 consenting to take part. Four mothers interested in the research had children that did not meet the age criteria and so were not sent further information. Sixteen mothers later decided to not go ahead with the research due to reasons including illness, older children childcare and diary clashes. One mother took part in half of the research but did not want to complete the challenging task and so her data was excluded. 42 mothers fully completed the study.

### **Measures and materials**

**Screening measure.** *The Clinical Outcomes in Routine Evaluation (CORE) – 10 (2017) (Appendix C).* The CORE-10 measures psychological distress over the past

week. Items use a 5-point likert scale, with higher scores indicating greater psychological distress (Appendix D). The CORE-10 was used to ensure participants were not actively suicidal. The CORE-10 is easy to administer and is a reliable measure of common mental health presentations. It covers areas of psychological functioning including thoughts of harm to self, sleep, dietary intake and social support. Research has demonstrated strong psychometric properties suggesting it is a reliable and valid measure (.90; Barkham et al., 2013).

**Pre- and post-intervention measures.** All measures were completed online using a university laptop. Answers were recorded using research survey software Qualtrics (Qualtrics, Provo, UT).

***Measure of self-compassion (Appendix E).*** A state measure of self-compassion was used to assess how self-compassionate participants felt towards themselves (Kirschner et al., 2019). The pre and post-induction measures consisted of 11 and 13 questions respectively. Participants scored their feelings in the current moment indicating how much they agreed or disagreed with each statement on a scale from 0-10. A higher score indicates higher self-compassion.

***Measure of suppression (Appendix F).*** A suppression measure detailing the same number and style of questions as the aforementioned self-compassion measures was created for this study. Participants were asked to rate statements based on suppressing emotions in the current moment on a scale from 0-10. Several of the statements were the same as the ones within the self-compassion measure used to measure current states of happiness, calmness and energy.

***Mood measure (Appendix G).*** The Brief Mood Introspection Scale (BMIS; Mayer & Gaschke, 1988) was administered both pre and post-induction

to measure current experience of mood. Participants were asked to rate on a 4-point likert scale how well each of the 16 adjectives presented described their current mood. The scores are then computed using four subscales: pleasant/unpleasant mood, positive/tired mood, arousal/calm mood and negative/relaxed mood, with the moods at each end of the scale acting as opposites. The BMIS has been shown to have good levels of reliability (.76 to .83) and good factor validity (Mayer & Gaschke, 1988).

***Measure of emotion regulation (Appendix H).*** The Emotion Regulation Questionnaire (ERQ) (Gross & John, 2003) was used pre-induction to measure participant's tendencies to regulate their emotions through cognitive reappraisal and expressive suppression. The ERQ has 10 items, each scored on a 7-point Likert scale. Participants were given 2 overall scores for the two subscale domains with a higher score indicating a greater use of the emotion regulation strategy. Expressive suppression would be classed as a maladaptive ER strategy and cognitive reappraisal an adaptive strategy. Research demonstrates good reliability with internal consistency scores ranging from .69 to .94 (Ioannidis & Siegling, 2015).

***Measure of maternal responses (Appendix I).*** Maternal Response Scales (MRS) (Pearson et al., 2011) were administered pre and post-induction to measure state feelings towards images of 9 infant faces. The infant faces each showed either a neutral, happy or distressed facial expression and were shown in a randomised order. The MRS is designed to assess a participant's response across three scales – a desire to comfort the infant, a desire to turn away from

the infant and feelings of anxiety. For this study only maternal responses to distressed infant faces were analysed.

**Inductions. *Self-compassion induction (Appendix J).*** Participants assigned to the self-compassion condition listened to an audio recorded loving-kindness script designed to induce self-compassion (Kirschner et al., 2019). Participants listened to the script using headphones and were invited to close their eyes. Participants were asked to pay attention to the exercise as fully as they could and were supported to think of a figure, person or animal they feel warmly towards. They were told not to think about their infant.

***Suppression induction (Appendix K).*** A suppression induction script was written for this study, designed to encourage participants to suppress and push away any emotional reactions they were having. Participants listened to the audio script using headphones and were invited to close their eyes. Participants were asked to pay attention to the exercise as fully as they could and to follow the instructions encouraging them to down regulate their external expression and internal experiences of emotion when thinking of a recent difficult past event.

***Challenging stress inducing task (Appendix L).*** During the post-induction mother-infant play session, participants were asked to complete the challenging stress-inducing task. This took the form of the still face paradigm (Cohn & Tronick, 1983) where participants were given full instructions to follow. This task lasted 3 minutes.

***Demographic variables.*** Demographic information for participants was obtained and included age, education level, ethnicity, number of children and the

age of their infant. Participants were also asked if they had any mental health diagnoses.

**Outcome measurement.** The outcome measure used was maternal mind-mindedness within mother-infant interactions. Participants were asked to complete two mother-infant interaction free play sessions whilst being videoed. They were asked to complete the first five-minute video pre-induction and the second 10-minute video post-induction. The second, longer video included the challenging task. Participants were given the instruction of “please play with your baby as you would if you had some free time together at home”. They were able to play with toys provided.

Videos were coded in line with the Mind-Mindedness Coding Manual (Meins & Fernyhough, 2015; Appendix M), with mind-related comments identified. All mind-related comments were scored as appropriate or non-attuned.

**Participant feedback questions (Appendix N).** Nine questions regarding the feasibility and suitability of the study were designed and asked, giving participants the opportunity to share their feedback on what they liked and did not like about the study, what they found helpful or unhelpful and whether they had any suggestions for improvements. Six of these questions were open ended and the 3 questions were closed questions with yes/no options.

## **Procedure**

**Pilot of study.** A brief pilot was conducted with two mother-infant dyads with a six-month and 11-month old infant. The pilot followed the same procedure and allowed for participant feedback about the study’s flow and ease of completion, leading to a change in the challenging task.

**Procedure.** Women who responded to the study's advertisements and contacted the researcher were sent information about the study's aims and what participation would entail. Potential participants were invited to complete the screening form to ensure they met the eligibility criteria. If eligible a face to face session was arranged either at the University of Exeter or the participant's home. Participants were required to give signed consent (Appendix O).

During the session, participants were first asked to complete the measures of emotion regulation, mood and maternal response scales. Following this they participated in a filmed five-minute mother-infant interaction play session before completing either the self-compassion or suppression measure and subsequent induction which they were randomly assigned to using Qualtrics.

Following the induction, participants completed the post-induction self-compassion or suppression measures, along with a second mood check. Participants then partook in the second mother-infant interaction video where they were asked to complete the challenging stress-inducing task. Subsequently, participants completed the post-mood measure and maternal response scales, as well as a final mood check. Participants were asked to complete the feasibility questions also.

Before finishing, participants completed a supported restorative play session guided by the researcher which involved a bubble playing exercise. Participants listened to a short, guided mindfulness exercise and watched videos of laughing babies to increase positive mood and repair any distress caused by the challenging task. All participants were given a debrief sheet (Appendix P) and

signposting information for local mental health support (Appendix Q). Participants were thanked for their participation with a £10 Amazon gift card.

**Ethics.** Ethical approval was obtained through the University of Exeter research and ethics committee (Appendix R).

### **Data Analysis Plan**

All analyses were completed using IBM SPSS Statistics (Version 25.0; <http://www.ibm.com/uk-en/analytics/spss-statistics-software>). Prior to analysis all data was cleaned, and no missing values were identified. There were no problems with homogeneity of variance and so parametric tests were undertaken. All videos were transcribed verbatim and coded for mind-mindedness by the lead researcher using the Mind-mindedness Coding Manual (Meins & Fernyhough, 2015), with scores controlled for differences in verbosity.

To examine hypothesis one, independent t-tests were conducted to identify any baseline differences between groups for appropriate or non-attuned mind-mindedness comments. Repeated measures ANOVAs were computed for both appropriate and non-attuned comments comparing each condition. To test hypothesis two repeated measures ANOVAs were conducted for the four BMIS subscales.

A series of three ANCOVAS, controlling for baseline MRS characteristic (comfort / turn away / anxiety) were conducted to address hypothesis three and correlational analyses were used to address hypotheses four and five. Participant feedback was collated as a narrative synthesis.

### **Power**



Initial G\*Power (Erdfelder et al., 2009) calculations for a mixed repeated measures ANOVA analysis comparing two between subjects conditions (self-compassion versus suppression) were calculated. With a small effect size of .25, an alpha level of .05, a power level of .80 and 2 predictors a sample of 42 participants was needed.

## Results

Participant demographics are displayed in Table 1. A total of 42 mother-infant dyads took part in the research. Participant ages ranged from 24 to 46 years,  $M_{age} = 34.52$ ,  $SD = 4.430$ , with the mean age of the infants being 9 months,  $M_{age} = 9.40$ ,  $SD = 2.073$ . The infant sample consisted of 23 females (54.8%) and 19 males (45.2%).

**Table 1**

*Demographics of Sample*

<b>Characteristics</b>	<b>M</b>	<b>SD</b>	<b>Range</b>
Maternal Age (years)	34.52	4.43	24 – 46
Infant Age (months)	9.40	2.08	6 – 12
CORE Score	5.31	5.68	0 – 31
Number of Children	1.76	1.06	1 – 5
	<i>University (%) Participant Home (%)</i>		
Study Location	7 (16.7)	35 (83.3)	
	<i>Female (%) Male (%)</i>		
Infant Gender	23 (54.8)	19 (45.2)	
	<i>Yes (%) No (%)</i>		
Mental Health Diagnosis	10 (23.8)	32 (76.2)	

*Note:* M = mean; SD = standard deviation

### Induction manipulations

There were no significant changes between pre and post scores for the suppression condition,  $F(1,21) = 1.025, p = .323$ , suggesting the induction had no impact on participant's suppression of their emotional reactions in the present moment. However, a significant difference was found for the self-compassion condition,  $F(1, 19) = 11.611, p = .003$ , with scores suggesting the self-compassion induction significantly made participants feel more self-compassionate.

Repeated measures ANOVAs were conducted to assess the impact of the inductions on happy, calm and energetic feelings. No significant main effects of time,  $F(1,40) = 2.946, p = .09, \eta_p^2 = .39$ , or interaction,  $F(1,40) = 1.403, p = .24, \eta_p^2 = .21$ , were found for happiness scores. However, a significant main effect of condition was found,  $F(1,40) = 5.441, p = .03, \eta_p^2 = .62$ . When exploring this finding, a significant difference was found for the suppression condition,  $F(1,21) = 4.667, p = .04, \eta_p^2 = .18$ , showing happiness decreased post-induction. No significant results were found for self-compassion,  $F(1,19) = .128, p = .73, \eta_p^2 = .007$ , demonstrating no change for happiness scores.

When analysing calm scores a significant interaction,  $F(1, 40) = 15.461, p = .000, \eta_p^2 = .97$ , and main effect of condition,  $F(1, 40) = 4.359, p = .04, \eta_p^2 = .53$ , was found. No significant differences were found for groups across time,  $F(1, 40) = .208, p = .65, \eta_p^2 = .73$ .

Further analysis of the significant main effect of condition was explored revealing significant differences for both the self-compassion,  $F(1, 19) = 10.329, p = .005, \eta_p^2 = .35$ , and suppression,  $F(1, 21) = 7.223, p = .01, \eta_p^2 = .26$ , conditions. As

expected self-compassion participants showed a significant increase in calm scores and the suppression condition showed a significant decrease in calmness.

No main effects of time,  $F(1,40) = .050$ ,  $p = .825$ ,  $\eta_p^2 = .06$ ; condition,  $F(1, 40) = .42$ ,  $p = .523$ ,  $\eta_p^2 = .10$ , or interaction,  $F(1,40) = .954$ ,  $p = .34$ ,  $\eta_p^2 = .16$ , were found for energetic scores.

**Table 2**

*Means and Standard Deviations for Emotion Regulation Induction*

Measure	Time Point	Suppression		Self-Compassion	
		M	SD	M	SD
Suppression	Pre	52.82	8.77	-	-
	Post	50.23	10.98	-	-
Self-compassion	Pre	-	-	45.65	11.47
	Post	-	-	50.6	8.25
Happiness	Pre	7.68	1.52	8.45	1.43
	Post	7.14	1.75	8.35	1.23
Calmness	Pre	7.91	1.77	7.80	1.67
	Post	6.77	1.79	8.70	1.22
Energetic	Pre	6.23	1.72	6.30	2.16
	Post	5.91	1.93	6.50	1.67

**Hypothesis 1**

To determine if higher levels of appropriate mind-mindedness were seen in the self-compassion condition compared to the suppression condition post induction, a repeated measures ANOVA was computed. The same was computed for non-attuned mind-mindedness comments.

An independent t-test was conducted to determine if there were any baseline differences between groups for appropriate,  $t(40) = -1.160$ ,  $p = .25$ , or non-attuned,  $t(40) = -.511$ ,  $p = .61$ , comments. No significant differences were found and so repeated measures ANOVAs were conducted.

**Table 3***Repeated Measure Analysis of Variance & Mean Scores for Mind-minded Comments*

	Pre		Post		Post Challenging Task		df	F	P	$\eta_p^2$
<b>Appropriate comments</b>										
	<b>M</b>	<b>SD</b>	<b>M</b>	<b>SD</b>	<b>M</b>	<b>SD</b>				
Self-Compassion Suppression	.08	.06	.08	.08	.08	.07				
	.06	.37	.05	.04	.05	.05				
Within groups							2, 80	.023	.98	.000
Between groups							1, 40	4.43	.04*	.10
Interaction							2, 80	.162	.85	.004
<b>Non-attuned comments</b>										
	<b>M</b>	<b>SD</b>	<b>M</b>	<b>SD</b>	<b>M</b>	<b>SD</b>				
Self-compassion Suppression	.02	.02	.22	.03	.02	.03				
	.02	.02	.02	.03	.03	.04				
Within groups							1, 39	.045	.83	.001
Between groups							1, 40	.033	.85	.001
Interaction							1, 39	.918	.34	.02

When analysing changes across time for appropriate comments following the post-challenging task, no main effects of time or interaction effects were found.

However, there was a significant main effect of condition, suggesting a significant difference between groups on appropriate mind-mindedness scores following the

challenging task. None of the main effects of time, condition or the interaction were significant for non-attuned comments following the challenging task.

### **Hypothesis 2**

A series of repeated measures ANOVAS were conducted for the four BMIS subscales. Positive mood was analysed using the pleasant/unpleasant and positive/tired subscales of the BMIS; calm mood was assessed using the arousal/calm subscale and negative mood using the negative/relaxed subscale.

No significant main effects were found across time or between the groups in terms of pleasant mood. However, an interaction effect was found with further analysis displaying a significant difference in pleasant mood for both the self-compassion,  $F(1, 19) = 21.775, p = .000, \eta_p^2 = .99$ , and suppression group,  $F(1, 21) = 15.490, p = .001, \eta_p^2 = .96$ . Results indicated that within the self-compassion condition participant pleasant mood increased and unpleasant mood decreased following the induction; and for the suppression condition the results were oppositional with pleasant mood decreasing and unpleasant mood increasing. This was in line with predictions.

There were no significant main effects of time, condition or interaction for the positive/tired mood scale.

**Table 4**

*Repeated Measure Analysis of Variance & Mean Scores for BMIS Subscales*

BMIS Subscale	Time Point	Suppression (n=22)		Self-Compassion (n=20)		df	F	P	$\eta_p^2$
		M	SD	M	SD				
<b>Pleasant/Unpleasant</b>	Pre	46.86	7.56	46.45	6.67				
	Post	43.14	8.49	51.20	7.54				
	Within groups					1, 40	.542	.47	.01
Between groups						1, 40	2.895	.10	.07
Interaction						1, 40	37.265	.000**	.48
<b>Positive/Tired</b>	Pre	<u>19.45</u>	<u>1.68</u>	<u>18.85</u>	<u>3.42</u>				
	Post	19.41	3.81	18.50	4.54				
	Within groups					1, 40	.110	.74	.06
Between groups						1, 40	.705	.41	.13
Interaction						1, 40	.065	.80	.06
<b>Arousal/Calm</b>	Pre	<u>28.23</u>	<u>3.09</u>	<u>27.70</u>	<u>2.76</u>				
	Post	26.05	5.38	32.95	4.05				
	Within groups					1, 40	4.582	.038*	.55
Between groups						1, 40	10.249	.003*	.88
Interaction						1, 40	22.881	.000**	.10
<b>Negative/Relaxed</b>	Pre	<u>11.41</u>	<u>2.79</u>	<u>12.05</u>	<u>3.62</u>				
	Post	12.82	3.36	11.40	4.30				

Within groups	1, 40	.839	.36	.15
Between groups	1, 40	.148	.70	.07
Interaction	1, 40	6.172	.017*	.68

Note: \* = Significant at the <.05 level; \*\* = Significant at <.01 level

In terms of calm mood there were significant main effects of time and condition. A significant interaction effect was also found, suggesting there was a change across time that was different for one group than the other. Further significant differences in calm mood from pre-post were found for both the self-compassion,  $F(1, 19) = 22.015, p = .000, \eta_p^2 = .99$ , and suppression conditions,  $F(1, 21) = 5.708, p = .03, \eta_p^2 = .63$ . For self-compassion calm mood significantly decreased and thus arousal increased, this was not in line with predictions. For suppression calm mood significantly increased and thus arousal decreased, again not in line with expected directionality.

No main effects of time or condition were found for negative mood; however a significant interaction effect was found, suggesting scores changed for one condition more than the other. A significant difference in negative mood was found for the suppression condition,  $F(1,21) = 6.881, p = .02, \eta_p^2 = .25$ , with negative mood significantly increasing and thus relaxed mood significantly decreasing. No significant difference was found for the self-compassion condition,  $F(1,19) = 1.039, p = .32, \eta_p^2 = .05$ .

### Hypothesis 3

Three ANCOVAs were conducted, controlling for baseline MRS characteristics (comfort / turn away / anxiety).



**Table 5***Mean Scores for Maternal Responses to Distressed Infant Faces*

Maternal Response	Time Point	Suppression (n=22)		Self-Compassion (n=20)	
		M	SD	M	SD
Wanting to comfort	Pre	21.18	2.81	21.55	2.50
	Post	21.18	3.36	21.90	2.73
Wanting to turn away	Pre	5.95	4.01	4.60	2.37
	Post	5.95	4.88	4.00	2.43
Feeling anxious	Pre	8.36	5.21	6.60	3.17
	Post	8.55	6.68	6.75	3.68

For participant's desire to comfort the distressed infant faces there was a significant between groups effect,  $F(1,39) = 10.359$ ,  $p = .003$ ,  $\eta_p^2 = .21$ , post-induction, with the self-compassion group being more likely to want to comfort than the suppression condition.

A significant difference was also found for participant's desire to turn away from the distressed infant faces,  $F(1,39) = 81.547$ ,  $p = .000$ ,  $\eta_p^2 = .67$ ), with the suppression condition being more likely to turn away than the self-compassion condition as expected.

In line with hypotheses, the suppression condition was also found to make participants statistically more likely to feel anxious when looking at the distressed infants than the self-compassion condition,  $F(1,39) = 127.080$ ,  $p = .000$ ,  $\eta_p^2 = .77$ .

**Hypothesis 4**

To examine hypothesis four bivariate Pearson's correlations were computed. No significant correlations between cognitive reappraisal and appropriate comments,  $r(40) = -.028$ ,  $p = .86$ , or between cognitive reappraisal and non-attuned comments at baseline were found,  $r(10) = -.120$ ,  $p = .45$ .

**Hypothesis 5**

Pearson's correlations were also computed to assess hypothesis five. No significant correlations were found between expressive suppression use and appropriate mind-minded comments,  $r(40) = -.063$ ,  $p = .69$ , or between expressive suppression use and non-attuned mind-minded comments at baseline,  $r(40) = .027$ ,  $p = .87$ .

**Mood and Mind-mindedness**

To examine the relationship between participant baseline mood and baseline mind-mindedness a series of bivariate Pearson correlations were conducted. No significant correlations were found between any mood states and mind-mindedness scores.

However, a significant negative correlation was found between the pleasant/unpleasant scale and the negative/relaxed scale,  $r(40) = -.692$ ,  $p = .000$ , suggesting the more a participant's pleasant mood increased, the less negative they felt. Similarly, a negative correlation was also found between the negative/relaxed and positive/tired subscales,  $r(40) = -.423$ ,  $p = .005$ , suggesting the more negative a participant felt, the less positive they felt also.

A significant positive correlation was found between the pleasant/unpleasant and positive/tired scale,  $r(40) = .553$ ,  $p = .000$ , demonstrating that as participant pleasant mood increased, so did their levels of positive mood. A significant positive correlation was also found between the arousal/calm and negative/relaxed scale,

$r(40) = .665, p = .000$ , indicating that the more aroused a participant felt the more negative they felt, and the more calm a participant felt, the more relaxed they felt also.

A significant negative correlation was found between the pleasant/unpleasant and arousal/calm subscale,  $r(40) = -.304, p = .05$ , indicating that the more pleasant a participant felt, the less aroused they felt and therefore the calmer they felt.

**Table 6**

*Pearson Correlational Analysis for Mood & Baseline Mind-Mindedness (r)*

Measure	N	1	2	3	4	5	6
1. Baseline appropriate comments	42	-	.19	.04	.02	.01	-.07
2. Baseline non-attuned comments	42	.19	-	.05	-.08	-.05	.01
3. Pleasant / unpleasant score	42	.04	.05	-	-.30*	-.70**	.55**
4. Arousal / calm score	42	.02	-.08	-.30*	-	.66**	.12
5. Negative / relaxed score	42	.01	-.05	-.69**	.67**	-	-.42**
6. Positive / tired score	42	-.07	.10	.55**	.12	-.42**	-

*Note: \* = Significant at the 0.05 level; \*\* = Significant at the 0.01 level*

### ERQ and MRS

Bivariate Pearson's correlations were computed to determine if there was any association between participant's scores on the ERQ and baseline responses to distressed infant faces. No significant correlations were found. A significant correlation between a participant's desire to turn away and feel anxious was found,

$r(40) = .715, p = .000$ . This is expected as it is likely if participants are feeling anxious they would want to turn away from the distressing image.

**Table 7**

*Pearson Correlational Analysis for ERQ Scores & Maternal Responses (r)*

<b>Measure</b>	<b>N</b>	<b>4</b>	<b>5</b>
1. Desire to comfort	42	.06	.08
2. Desire to turn away	42	-.11	.17
3. Anxiety	42	.08	.16
4. Cognitive reappraisal	42	-	.07
5. Expressive suppression	42	.07	-

### **Participant Feedback**

Feedback from participants was promising and positive. A synthesis of the feedback can be found in Appendix S.

### **Discussion**

This study is the first experimental study to show different maternal ER strategies affect maternal mind-mindedness towards infants. The study compared a commonly used negative ER strategy, suppression, with a positive ER strategy, self-compassion. Consistent with predictions a significant difference between the groups for appropriate comments following the induction was found with self-compassion demonstrating higher levels of appropriate comments. However, there were no between group differences for non-attuned comments.

Further, the results indicated self-compassion was associated with higher arousal and pleasant mood and less negative mood, relative to suppression. Mothers in the self-compassion condition also reported they were more likely to want to comfort a distressed infant and less likely to turn away from them and feel anxious. Together, these results suggest that self-compassion, even in a community sample of relatively high-functioning mothers, can improve the quality of maternal interaction with the infant and reduce negative maternal emotions, relative to suppression.

Whilst a significant association was found for self-compassion and higher appropriate mind-mindedness, it is important to consider why no significant differences were found for the non-attuned comments. It could be argued that the self-compassion induction was strong enough for this community sample of mothers, but the suppression induction was not strong enough to induce negative ER. Alternatively, it is possible mothers were more accustomed to using suppression than self-compassion, so the former did not produce a novelty effect. With the sample being relatively high-functioning mothers it is possible they were mostly naturally appropriate in their interactions to begin with. Without a control condition it is hard to determine whether the suppression induction may have taken something away from the mothers, made them worse or whether this is just normal behaviour for them.

The results are somewhat consistent with the broader ER literature which suggests that negative ER strategies, particularly in people who have emotional health problems, increase negative emotions and behaviours, but that positive ER strategies do not have such an effect on positive emotions and behaviours. These

findings are consistent with those of Aldao and colleagues (2010) whose meta-analysis concluded that positive ER strategies had little impact on positive emotions.

It may also be the case that as mothers were more self-compassionate they were more able to be reflective and attuned to their infant's needs. It is important to note that for both groups the overall number of non-attuned comments was much lower than appropriate comments, suggesting that within this sample the mother's frequency of appropriate comments is much higher. We may expect this to be different within a clinical population.

The ER inductions appeared to have a large impact on maternal mood states and it can be hypothesised that this increase in pleasant mood and arousal for the self-compassion condition ensured there was no decrease in appropriate comments following the challenging task. The increase in arousal seen within the self-compassion condition could suggest that when taking care of an infant a mother is required to be alert and pay attention to their needs and behaviour and thus it would therefore be a positive thing to be motivated and energised to respond to an infant's cues. Constantly saying appropriate comments to your infant requires a high level of cognitive control, which may be depleted by the sleep deprivation experienced by mothers of infants.

With mothers in the suppression condition reporting less pleasant and more negative and calm mood states it could be understood that they do not have the energy which is required to make appropriate comments and attend to their infant in this manner. It is also to be expected that when asked to think of a distressing event and subsequently push any emotional reactions to this away, that mothers would feel less happy afterwards.

These changes in mood and mind-mindedness are interesting to consider in terms of the MRS scores to distressed infant faces. Mothers in the self-compassion condition were significantly more likely to comfort and less likely to turn away and feel anxious in response to the faces, relative to the suppression condition. Therefore, the increase in arousal may have been predictive of them taking a more active role in approaching and comforting the infant and feeling less anxious when caring for them. There are some limitations to this measure in terms of validity as the mothers were self-reporting to images and there was no actual infant crying in the study. However, participants did experience a challenging stress-inducing task whereby the results were the same, supporting the triangulation of data and bolstering confidence in the results.

It is probable that with mothers in the self-compassion induction seeing an increase in self-compassion they may have felt safer and more confident in their abilities to comfort the distressed infants. With the suppression condition being told to minimise their emotions, think of a negative experience, as well as making them feel less pleasant and more negative in mood, may have felt less willing and confident in their abilities to comfort an infant whilst also trying to manage their own emotion reactions.

Whilst a strong relationship between maternal sensitivity and attachment security is described in the literature (Susman-Stillman, Kalkoske, & Egeland, 1996; McElwain & Booth-LaForce, 2006), it is suggested mind-mindedness is an additional cognitive extension of maternal sensitivity and so serves to explain some of the variance in these well-documented associations (Meins, 1999). Research has also found correlations between mind-mindedness and maternal sensitivity (Meins, Fernyhough, Fradley, & Tucker, 2001) and mind-mindedness and attachment

security (Bernier & Dozier, 2010; Meins et al., 2003). Research has also explored the impact of maternal sensitivity in mediating the relationship between mind-mindedness and attachment security either fully (Lundy, 2003) or partially (Laranjo, Bernier, & Meins, 2008), suggesting mind-mindedness can explain the additional variance beyond what maternal sensitivity explains within child outcomes. This advocates that using mind-mindedness to assess mother-infant relationships and subsequently child outcomes, is a valuable and effective tool, with results from this study supporting its effectiveness.

However, there are some limitations to the mind-mindedness coding scheme as noted by the researcher. For example, it at times appeared that even though a mother's transcript had a number of non-attuned comments listed, when simultaneously watching the interaction video, these did not appear to negatively affect the interaction or possible attachment between mother and infant. Mind-mindedness scoring is completed by assessing the care givers comments and do not take into account maternal or infant gaze, facial expression or touch; all of which help to provide a more complete picture of whether a care-giver is fully attuned to their infant. The researcher noticed that at times it appeared a participant's transcript had many non-attuned comments, although during the observation of the play session it seemed like the mother was very attuned to the infant's needs and interests and so was therefore surprised during the transcription and coding to see the differences between the coded statements and the researcher's impressions. Conversely this was also observed for the number of appropriate comments a mother scored with some interactions feeling less comfortable in the room during the play session and thus not matching the researcher's intuitive sense of attunement and attachment between the dyad. Some mother's scored as having high levels of



appropriate mind-mindedness, however this did not necessarily mean the infant appeared content within the session or that the interaction was particularly warm. These observations suggest that it may be possible that some part of the mother-infant interaction that gets missed when solely using the mind-mindedness coding to assess mother-infant interactions and that it would be best used in conjunction with another mother-infant interaction assessment scheme that measures sensitivity and responsiveness.

### **Strengths and Limitations**

This novel study is the first study to examine the effects of two ER inductions on mind-mindedness in mother-infant interactions and offers promising conclusions relating to the positive impact of self-compassion on appropriate mind-minded comments. The study also had relatively large numbers given the timescale of the project and the addition of qualitative participant feedback providing evidence on the feasibility of such research and suggestions for future directions.

There were however several limitations to the study. Firstly, a second coder for mind-mindedness was not utilised meaning there was no inter-rater reliability for the coding of comments. Unfortunately, using a second coder was not feasible in terms of timing and expenses. This meant it was also not viable for the researcher to be blind to the condition they were coding. A further drawback of the study is the low power, meaning only small changes were found.

Due to the study having a small sample size, mediation analysis exploring whether maternal emotion directly mediated the relationships between the ER conditions and mind-mindedness was not completed. This would be an interesting investigation for future research.

There was a lack of representativeness of the volunteer sample. It is unclear if the results of the study could be generalised to a broader population as most of the participants included were White British, middle class mothers who all had partners and appeared to be a relatively high-functioning population. However, in light of this, it could also be suggested that even in a sample of high-functioning mothers it is possible to observe such positive effects of ER inductions. Therefore, it would be interesting to see if this would be similar for mothers less high-functioning and those within a clinical perinatal population.

Unrepresentative and non-diverse samples is a wider issue within perinatal, parent-infant and the majority of mental health research. This is an important issue within research as it significantly limits the generalisability and potential validity of research. There are several factors which may have impacted on this, and these could be potentially addressed in future research.

Firstly, the researcher was a White British, middle class woman. This may have impacted on the willingness of more diverse groups to participate in the study, because they may have not identified with the researcher.

Both the tight time frame for the research and location of the research might have added to the lack of representativeness of the sample gained. For example, the South West of England has a very high proportion of White British families, limiting the ability to recruit from more ethnically diverse groups. Regarding income levels, it may have been that mothers who were less well educated or of a lower social class may not have felt comfortable with attending a research session at the university or have felt comfortable inviting the researcher into their home. It may also be that mothers with lower incomes may not see research as something directed at them, but as belonging to women of higher educational attainment or incomes. It is also

noteworthy that the research was highly advertised at places and within groups where mothers of a higher socio-economic status were more likely to access, such as paid swimming classes and musical groups.

Future research could purposefully target more minority groups who are often missed when completing perinatal research, and could seek to employ researchers or peers of similar backgrounds to support research recruitment. This might involve advertising specifically in black and ethnic minority parenting groups or attending groups that did not require additional expenses for the parents to join. Having a representative from a minority group participating in the research may then have a snowball effect in them being able to encourage other similar mothers to participate and therefore increase the diversity within the sample. Similarly, advertising through groups for parents whose children have learning disabilities may also have targeted another minority subset of parents and added to the diversity of both the sample and the interactions between mother and infant.

The novel suppression script did not appear to affect the mother's abilities to be mind-minded; however, the script was successful in lowering maternal positive mood and made mothers feel more negative and unhappy. With most of the previous literature having examined expressive suppression, this study was original in encouraging mothers to suppress the emotion itself and not just their expression of emotion. Often in real life people try not to show emotions and push down their negative feelings in order to move forwards and gain some control over their experience. Therefore, with this study using an original suppression inductions script, it may have increased external validity and relevance to everyday experiences of suppression.

The suppression task within the study was an induction and not a measure and therefore can be hard to measure its direct validity. Given no significant change was found after the suppression induction of participant's suppression of emotion, it suggests the induction script did not adequately induce suppression as predicted. On the other hand, it is possible that the manipulation check did not adequately assess suppression. Previous research has found that the use of a shorter, related suppression manipulation check was successful in producing significant changes in participant's suppression (Wilson, Halligan, Safazadeh, & O'Mahen, 2020).

### **Clinical and Theoretical Implications**

Clinically the findings are suggestive that self-compassion, a positive ER strategy, has an impact on mood, maternal self-report behaviours and produces higher appropriate mind-minded comments relative to a suppression. This study has strong clinical relevance and could impact various areas of perinatal psychology and infant development. Service implication recommendations relating to self-compassion provide further evidence for the use of this positive ER strategy as a skill that could be provided to the perinatal population to improve outcomes for both the mother and the infant (Sacristan-Martin et al., 2019). With self-compassion exercises being relatively widely available, it is advantageous to assume that its benefits could reach a large amount of people with the right promotion and resources (Hulsbosch et al., 2020). With the large increase in funding and interest around perinatal mental health, it could be useful for services to consider the role of self-compassion both antenatally and postnatally.

In terms of mind-mindedness and mothers being able to respond to their infant, seeing them as a separate psychological agent, it is plausible that mind-mindedness does not need to be taught directly to parents; but that self-compassion

could be an indirect route to increasing maternal mind-mindedness. If mothers can be taught self-compassion skills, they might be given the opportunity to have more positive space and reflective energy in order to attend to their infant's needs and respond appropriately in their communication. This reiterates the notion behind Fredrickson's (2001) broaden-and-build theory of positive emotion which theorises negative emotions narrow our focus and that the immediate effects of experiencing positive emotions can broaden our cognitive, attentional and behavioural capabilities and in turn this enables us to see wider and more positive possibilities having an enduring reinforcing effect (Cohn & Fredrickson, 2008; Fredrickson, 2001). The results are also in line with the proposal outlined in Figure 1 demonstrating the associations between maternal ER, its impact on mother-infant interactions, subsequent mind-mindedness and mood as an important contributory factor.

### **Future Research**

Future research would benefit from directly assessing the possible mediating role of maternal mood on mind-mindedness.

Interestingly, when utilising other mother-infant coding systems the scores are often focused on the infant reactions. With mind-mindedness coding the focus is on the mothers' communication and use of mind-related comments meaning that when viewing a mother-infant interaction there might be other behaviours that occur around the mind-related comments that enable the interaction to still appear attuned. This notion proposes that a mother may score lower for appropriate mind-related comments, but her other behaviours such as being present, using facial expressions and showing interest in her infant compensate for a lack of comments and still allow for the interaction to appear attuned. This would suggest mind-mindedness would be

usefully studied in conjunction with another mother-infant interaction coding framework such as maternal sensitivity.

Replication using a clinical sample to see if the similar effects could be found would increase the clinical relevance of conclusions. Looking at additional positive and negative ER strategies such as mindfulness and rumination may also be noteworthy. With the majority of perinatal research being focused on mothers and the mother-infant relationship future research could be directed towards fathers and the paternal role within mind-mindedness and the development of infant ER.

### **Conclusion**

The current study aimed to examine whether a self-compassion or suppression induction had an impact on a mother's ability to be mind-minded during interactions with her infant. The findings of this study suggest a self-compassion induction can, not only increase positive mood, decrease negative mood and alter maternal responses to infant faces, but also demonstrate higher levels of appropriate mind-mindedness compared to a suppression induction. Future research would benefit from expanding this research to include a clinical sample, address methodological weaknesses and analyse the potential mediating effect of maternal mood on maternal ER and mind-mindedness.

### **References**

- Aldao, A., Jazaieri, H., Goldin, P. R., & Gross, J. J. (2014). Adaptive and maladaptive emotion regulation strategies: Interactive effects during CBT for social anxiety disorder. *Journal of Anxiety Disorders, 28*(4), 382–389.  
<https://doi.org/10.1016/j.janxdis.2014.03.005>
- Arnott, B., & Meins, E. (2008). Continuity in mind-mindedness from pregnancy to the first year of life. *Infant Behavior and Development, 31*(4), 647–654.

<https://doi.org/10.1016/j.infbeh.2008.07.001>

Balzarotti, S., Biassoni, F., Villani, D., Prunas, A., & Velotti, P. (2016). Individual Differences in Cognitive Emotion Regulation: Implications for Subjective and Psychological Well-Being. *Journal of Happiness Studies*, *17*(1), 125–143.

<https://doi.org/10.1007/s10902-014-9587-3>

Bariola, E., Hughes, E. K., & Gullone, E. (2012). Relationships Between Parent and Child Emotion Regulation Strategy Use: A Brief Report. *Journal of Child and Family Studies*, *21*(3), 443–448. <https://doi.org/10.1007/s10826-011-9497-5>

Barkham, M., Bewick, B., Mullin, T., Gilbody, S., Connell, J., Cahill, J., Mellor-Clark, J., Richards, D., Unsworth, G., & Evans, C. (2013). The CORE-10: A short measure of psychological distress for routine use in the psychological therapies. *Counselling and Psychotherapy Research*, *13*(1), 3–13.

<https://doi.org/10.1080/14733145.2012.729069>

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

Binion, G., & Zalewski, M. (2018). Maternal emotion dysregulation and the functional organization of preschoolers' emotional expressions and regulatory behaviors. *Emotion*, *18*(3), 386–399. <https://doi.org/10.1037/emo0000319>

Bornstein, M. H., Suwalsky, J. T. D., & Breakstone, D. A. (2012). Emotional relationships between mothers and infants: Knowns, unknowns, and unknown unknowns. In *Development and Psychopathology*, *24*(1), 113–123.

<https://doi.org/10.1017/S0954579411000708>

Brouwers, E. P. M., Van Baar, A. L., & Pop, V. J. M. (2001). Maternal anxiety during pregnancy and subsequent infant development. *Infant Behavior and*

- Development*, 24(1), 95–106. [https://doi.org/10.1016/S0163-6383\(01\)00062-5](https://doi.org/10.1016/S0163-6383(01)00062-5)
- Burriss, K. G., & Tsao, L. L. (2002). Review of Research: How Much Do We Know about the Importance of Play in Child Development? *Childhood Education*, 78(4), 230–233. <https://doi.org/10.1080/00094056.2002.10522188>
- Castilho, P., Carvalho, S. A., Marques, S., & Pinto-Gouveia, J. (2017). Self-Compassion and Emotional Intelligence in Adolescence: A Multigroup Mediation Study of the Impact of Shame Memories on Depressive Symptoms. *Journal of Child and Family Studies*, 26(3), 759–768. <https://doi.org/10.1007/s10826-016-0613-4>
- Coan, J. A., & Maresh, E. L. (2014). Social baseline theory and the social regulation of emotion. In *Handbook of Emotion Regulation* (Vol. 2, pp. 221–236). The Guilford Press.
- Cohen, S. (2010). *Mindfulness and Self-Compassion in the Transition to Motherhood: A Prospective Study of Postnatal Mood and Attachment*. Columbia University.
- Cohn, J. F., & Tronick, E. Z. (1983). Three-Month-Old Infants' Reaction to Simulated Maternal Depression. *Child Development*, 54(1), 185. <https://doi.org/10.2307/1129876>
- Cohn, M. A., & Fredrickson, B. L. (2008). Positive Emotions. In L. F. B. (Eds. . M. Lewis, J. M. Haviland-Jones (Ed.), *Handbook of emotions* (pp. 777–796). The Guilford Press. <https://doi.org/10.1093/oxfordhb/9780195187243.013.0003>
- Conway, A. M., Tugade, M. M., Catalino, L. I., & Fredrickson, B. L. (2013). The broaden-and-build theory of positive emotions: Form, function, and mechanisms. *The Oxford Handbook of Happiness*, March, 17–34. <https://doi.org/10.1093/oxfordhb/9780199557257.013.0003>



- Cornish, A. M., McMahon, C. A., Ungerer, J. A., Barnett, B., Kowalenko, N., & Tennant, C. (2005). Postnatal depression and infant cognitive and motor development in the second postnatal year: The impact of depression chronicity and infant gender. *Infant Behavior and Development, 28*(4), 407–417. <https://doi.org/10.1016/j.infbeh.2005.03.004>
- Dawson, G., Ashman, S. B., & Carver, L. J. (2000). The role of early experience in shaping behavioral and brain development and its implications for social policy. *Development and Psychopathology, 12*(4), 695–712. <https://doi.org/10.1017/S0954579400004089>
- Dawson, G., Ashman, S. B., Panagiotides, H., Hessler, D., Self, J., Yamada, E., & Embry, L. (2003). Preschool Outcomes of Children of Depressed Mothers: Role of Maternal Behavior, Contextual Risk, and Children's Brain Activity. *Child Development, 74*(4), 1158–1175. <https://doi.org/10.1111/1467-8624.00599>
- Dunn, C., Hanieh, E., Roberts, R., & Powrie, R. (2012). Mindful pregnancy and childbirth: Effects of a mindfulness-based intervention on women's psychological distress and well-being in the perinatal period. *Archives of Women's Mental Health, 15*(2), 139–143. <https://doi.org/10.1007/s00737-012-0264-4>
- Erdfelder, E., Faul, F., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G\*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods, 41*(4), 1149–1160. <https://doi.org/10.3758/BRM.41.4.1149>
- Felder, J. N., Lemon, E., Shea, K., Kripke, K., & Dimidjian, S. (2015). *Role of self-compassion in psychological well-being among perinatal women.* <https://doi.org/10.1007/s00737-016-0628-2>
- Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist, 56*(3),

218–226. <https://doi.org/10.1037/0003-066X.56.3.218>

Fredrickson, B. L. (2004). The broaden-and-build theory of positive emotions.

*Philosophical Transactions of the Royal Society B: Biological Sciences*,  
359(1449), 1367–1377. <https://doi.org/10.1098/rstb.2004.1512>

Gilbert, P., McEwan, K., Matos, M., & Rivis, A. (2011). Fears of compassion:

Development of three self-report measures. *Psychology and Psychotherapy:  
Theory, Research and Practice*, 84(3), 239–255.

<https://doi.org/10.1348/147608310X526511>

Gilbert, P., & Procter, S. (2006). Compassionate mind training for people with high  
shame and self-criticism: Overview and pilot study of a group therapy approach.

In *Clinical Psychology and Psychotherapy*, 13(6), 353–379.

<https://doi.org/10.1002/cpp.507>

Goodman, S. H., Rouse, M. H., Connell, A. M., Broth, M. R., Hall, C. M., & Heyward,

D. (2011). Maternal Depression and Child Psychopathology: A Meta-Analytic  
Review. In *Clinical Child and Family Psychology Review*, 14(1), 1–27.

<https://doi.org/10.1007/s10567-010-0080-1>

Grigoriadis, S., VonderPorten, E. H., Mamisashvili, L., Tomlinson, G., Dennis, C. L.,

Koren, G., Steiner, M., Mousmanis, P., Cheung, A., Radford, K., Martinovic, J.,

& Ross, L. E. (2013). The impact of maternal depression during pregnancy on  
perinatal outcomes: A systematic review and meta-analysis. In *Journal of*

*Clinical Psychiatry*, 74(4). <https://doi.org/10.4088/JCP.12r07968>

Gross, J. J., & John, O. P. (2003). Individual Differences in Two Emotion Regulation

Processes: Implications for Affect, Relationships, and Well-Being. *Journal of*  
*Personality and Social Psychology*, 85(2), 348–362.

<https://doi.org/10.1037/0022-3514.85.2.348>

- Grote, N. K., Bridge, J. A., Gavin, A. R., Melville, J. L., Iyengar, S., & Katon, W. J. (2010). A meta-analysis of depression during pregnancy and the risk of preterm birth, low birth weight, and intrauterine growth restriction. *Archives of General Psychiatry*, *67*(10), 1012–1024.  
<https://doi.org/10.1001/archgenpsychiatry.2010.111>
- Hay, D. F., Pawlby, S., Sharp, D., Asten, P., Mills, A., & Kumar, R. (2001). Intellectual problems shown by 11-year-old children whose mothers had postnatal depression. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *42*(7), 871–889. <https://doi.org/10.1111/1469-7610.00784>
- Hulsbosch, L. P., Nyklíček, I., Potharst, E. S., Meems, M., Boekhorst, M. G., & Pop, V. J. (2020). Online mindfulness-based intervention for women with pregnancy distress: design of a randomized controlled trial. *BMC Pregnancy and Childbirth*, *20*(1), 1-10. <https://doi.org/10.1186/s12884-020-2843-0>
- Ioannidis, C. A., & Siegling, A. B. (2015). Criterion and incremental validity of the emotion regulation questionnaire. *Frontiers in Psychology*, *6*(MAR), 247.  
<https://doi.org/10.3389/fpsyg.2015.00247>
- Jensen, A., & Jensen, A. (2018). *Relations Among Parents' Mind-Mindedness and Depression in Infancy, and Children's Attachment Security at Age 2* by.  
[https://ir.uiowa.edu/honors\\_theses](https://ir.uiowa.edu/honors_theses)
- Joormann, J., & Gotlib, I. H. (2010). Emotion regulation in depression: Relation to cognitive inhibition. *Cognition and Emotion*, *24*(2), 281-298.  
<https://doi.org/10.1080/02699930903407948>
- Junge, C., Garthus-Niegel, S., Slinning, K., Polte, C., Simonsen, T. B., & Eberhard-Gran, M. (2017). The Impact of Perinatal Depression on Children's Social-Emotional Development: A Longitudinal Study. *Maternal and Child Health*

*Journal*, 21(3), 607–615. <https://doi.org/10.1007/s10995-016-2146-2>

- Karnilowicz, H. R., Waters, S. F., & Mendes, W. B. (2018). Not in Front of the Kids: Effects of Parental Suppression on Socialization Behaviors During Cooperative Parent-Child Interactions. *Emotion*, 19(7). <https://doi.org/10.1037/emo0000527>
- Kirschner, H., Kuyken, W., Wright, K., Roberts, H., Brejcha, C., & Karl, A. (2019). Soothing Your Heart and Feeling Connected: A New Experimental Paradigm to Study the Benefits of Self-Compassion. *Clinical Psychological Science*, 7(3), 545–565. <https://doi.org/10.1177/2167702618812438>
- Kobylińska, D., & Kusev, P. (2019). Flexible Emotion Regulation: How Situational Demands and Individual Differences Influence the Effectiveness of Regulatory Strategies. *Frontiers in Psychology*, 10, 72. <https://doi.org/10.3389/fpsyg.2019.00072>
- Kordi, M., & Mohamadirizi, S. (2018). Neonatal-Maternal Attachment and Self-compassion in Postpartum Period. *Iranian Journal of Neonatology*, 2, 9. <https://doi.org/10.22038/ijn.2018.25128.1327>
- Krieger, T., Altenstein, D., Baettig, I., Doerig, N., & Holtforth, M. G. (2013). Self-Compassion in Depression: Associations With Depressive Symptoms, Rumination, and Avoidance in Depressed Outpatients. *Behavior Therapy*, 44(3), 501–513. <https://doi.org/10.1016/j.beth.2013.04.004>
- Laranjo, J., Bernier, A., Meins, E., & Carlson, S. M. (2014). The roles of maternal mind-mindedness and infant security of attachment in predicting preschoolers' understanding of visual perspective taking and false belief. *Journal of Experimental Child Psychology*, 125(1), 48–62. <https://doi.org/10.1016/j.jecp.2014.02.005>
- Lundy, B. L. (2003). Father–and mother–infant face-to-face interactions: Differences

- in mind-related comments and infant attachment?. *Infant Behavior and Development*, 26(2), 200-212. [https://doi.org/10.1016/S0163-6383\(03\)00017-1](https://doi.org/10.1016/S0163-6383(03)00017-1)
- MacBeth, A., & Gumley, A. (2012). Exploring compassion: A meta-analysis of the association between self-compassion and psychopathology. *Clinical Psychology Review*, 32(6), 545–552. <https://doi.org/10.1016/j.cpr.2012.06.003>
- Maughan, A., Cicchetti, D., Toth, S. L., & Rogosch, F. A. (2007). Early-occurring maternal depression and maternal negativity in predicting young children's emotion regulation and socioemotional difficulties. In *Journal of Abnormal Child Psychology*, 35(5), 685–703. <https://doi.org/10.1007/s10802-007-9129-0>
- Mayer, J. D., & Gaschke, Y. N. (1988). The Experience and Meta-Experience of Mood. *Journal of Personality and Social Psychology*, 55(1), 102–111. <https://doi.org/10.1037/0022-3514.55.1.102>
- McElwain, N. L., & Booth-LaForce, C. (2006). Maternal sensitivity to infant distress and nondistress as predictors of infant-mother attachment security. *Journal of Family Psychology*, 20(2), 247. <https://doi.org/10.1037/0893-3200.20.2.247>
- Meaney, M. J. (2018). Perinatal maternal depressive symptoms as an issue for population health. In *American Journal of Psychiatry*, 175(11), 1084–1093. <https://doi.org/10.1176/appi.ajp.2018.17091031>
- Meins, E. (1997). Security of attachment and maternal tutoring strategies: Interaction within the zone of proximal development. *British Journal of Developmental Psychology*, 15(2), 129–144. <https://doi.org/10.1111/j.2044-835x.1997.tb00730.x>
- Meins, E., Centifanti, L. C. M., Fernyhough, C., & Fishburn, S. (2013). Maternal mind-mindedness and children's behavioral difficulties: Mitigating the impact of low socioeconomic status. *Journal of Abnormal Child Psychology*, 41(4), 543–

553. <https://doi.org/10.1007/s10802-012-9699-3>

Meins, E., & Fernyhough, C. (1999). Linguistic Acquisitional Style and Mentalising Development: The Role of Maternal Mind-mindedness. *Cognitive Development*, 14(3), 363–380. [https://doi.org/10.1016/S0885-2014\(99\)00010-6](https://doi.org/10.1016/S0885-2014(99)00010-6)

Meins, E., & Fernyhough, C. (2015). *Mind-Mindedness Coding Manual 1*. 1–27. <https://outlook.office.com/owa/?realm=yale.edu&path=/attachmentlightbox>

Meins, E., Fernyhough, C., de Rosnay, M., Arnott, B., Leekam, S. R., & Turner, M. (2012). Mind-Mindedness as a Multidimensional Construct: Appropriate and Nonattuned Mind-Related Comments Independently Predict Infant-Mother Attachment in a Socially Diverse Sample. *Infancy*, 17(4), 393–415. <https://doi.org/10.1111/j.1532-7078.2011.00087.x>

Meins, E., Fernyhough, C., Fradley, E., & Tuckey, M. (2001). Rethinking Maternal Sensitivity: Mothers' Comments on Infants' Mental Processes Predict Security of Attachment at 12 Months. *Journal of Child Psychology and Psychiatry*, 42(5), 637–648. <https://doi.org/10.1111/1469-7610.00759>

Meins, E., Fernyhough, C., Wainwright, R., Clark-Carter, D., Das Gupta, M., Fradley, E., & Tuckey, M. (2003). Pathways to Understanding Mind: Construct Validity and Predictive Validity of Maternal Mind-Mindedness. *Child Development*, 74(4), 1194–1211. <https://doi.org/10.1111/1467-8624.00601>

Miller, L., Hevey, D., Underdown, A., & Barlow, J. (2016). Promoting Infant Mental Health: A Public Health Priority and Approach. In *Policy Issues in the Early Years* (pp. 45–60). SAGE Publications Ltd. <https://doi.org/10.4135/9781473957787.n4>

Mohamadirizi, S., & Kordi, M. (2016). The relationship between multi-dimensional self-compassion and fetal-maternal attachment in prenatal period in referred

- women to Mashhad Health Center. *Journal of Education and Health Promotion*, 5(1), 21. <https://doi.org/10.4103/2277-9531.184550>
- Murray, L., & Cooper, P. J. (1997). Effects of postnatal depression on infant development. In *Archives of Disease in Childhood* (Vol. 77, Issue 2, pp. 99–101). BMJ Publishing Group. <https://doi.org/10.1136/adc.77.2.99>
- Murray, L. (1992). The Impact of Postnatal Depression on Infant Development. *Journal of Child Psychology and Psychiatry*, 33(3), 543–561. <https://doi.org/10.1111/j.1469-7610.1992.tb00890.x>
- Murray, L., Fiori-Cowley, A., Hooper, R., & Cooper, P. (1996). The Impact of Postnatal Depression and Associated Adversity on Early Mother-Infant Interactions and Later Infant Outcome. *Child Development*, 67(5), 2512. <https://doi.org/10.2307/1131637>
- Neff, K. D. (2003). Self-Compassion Scale. *Self and Identity*, 2, 223–250. <https://doi.org/10.1080/15298860390209035>
- Neff, K. D., & McGehee, P. (2010). Self-compassion and psychological resilience among adolescents and young adults. *Self and Identity*, 9(3), 225–240. <https://doi.org/10.1080/15298860902979307>
- Pearson, R. M., Heron, J., Melotti, R., Joinson, C., Stein, A., Ramchandani, P. G., & Evans, J. (2011). The association between observed non-verbal maternal responses at 12 months and later infant development at 18 months and IQ at 4 years: A longitudinal study. *Infant Behavior and Development*, 34(4), 525–533. <https://doi.org/10.1016/j.infbeh.2011.07.003>
- Pickard, J. A., Townsend, M., Caputi, P., & Grenyer, B. F. S. (2017). Observing the influence of mindfulness and attachment styles through mother and infant interaction: a longitudinal study. *Infant Mental Health Journal*, 38(3), 343–350.

<https://doi.org/10.1002/imhj.21645>

Quoidbach, J., Berry, E. V., Hansenne, M., & Mikolajczak, M. (2010). Positive emotion regulation and well-being: Comparing the impact of eight savoring and dampening strategies. *Personality and Individual Differences, 49*(5), 368–373.

<https://doi.org/10.1016/j.paid.2010.03.048>

Rahman, A., Iqbal, Z., Bunn, J., Lovel, H., & Harrington, R. (2004). Impact of maternal depression on infant nutritional status and illness: A cohort study. *Archives of General Psychiatry, 61*(9), 946–952.

<https://doi.org/10.1001/archpsyc.61.9.946>

Ramchandani, P., Stein, A., Evans, J., & O'Connor, T. G. (2005). Paternal depression in the postnatal period and child development: A prospective population study. *Lancet, 365*(9478), 2201–2205. [https://doi.org/10.1016/S0140-6736\(05\)66778-5](https://doi.org/10.1016/S0140-6736(05)66778-5)

RCM. (2014). *Maternal mental health - Improving emotional wellbeing in postnatal care*. [https://www.rcm.org.uk/sites/default/files/Pressure Points - Mental Health - Final\\_0.pdf](https://www.rcm.org.uk/sites/default/files/Pressure Points - Mental Health - Final_0.pdf)

Ross-Davie, M., Butcher, G., Davidson, M., Allely, C. S., Fargie, J., Puckering, C., & Trevarthen, C. (2014). Bonding and Attachment in the peri-natal period: Supporting rich and enjoyable relationships for life. In *Maternal and early years for early years workers*. <http://www.maternal-and-early-years.org.uk/bonding-and-attachment-in-the-perinatal-period-supporting-rich-and-enjoyable-relationships-for-life-2>

Rutherford, H. J. V., & Mayes, L. C. (2011). Primary maternal preoccupation: Using neuroimaging techniques to explore the parental brain. *Psyche, 65*(9–10), 973–988.



[https://www.researchgate.net/publication/279550834\\_Primary\\_maternal\\_preoccupation\\_Using\\_neuroimaging\\_techniques\\_to\\_explore\\_the\\_parental\\_brain](https://www.researchgate.net/publication/279550834_Primary_maternal_preoccupation_Using_neuroimaging_techniques_to_explore_the_parental_brain)

Rutherford, H. J. V., Wallace, N. S., Laurent, H. K., & Mayes, L. C. (2015). Emotion regulation in parenthood. In *Developmental Review*, 36, 1–14.

<https://doi.org/10.1016/j.dr.2014.12.008>

Sacristan-Martin, O., Santed, M. A., Garcia-Campayo, J., Duncan, L. G., Bardacke, N., Fernandez-Alonso, C., ... & Montero-Marin, J. (2019). A mindfulness and compassion-based program applied to pregnant women and their partners to decrease depression symptoms during pregnancy and postpartum: study protocol for a randomized controlled trial. *Trials*, 20(1), 654.

<https://doi.org/10.1186/s13063-019-3739-z>

Srivastava, S., Tamir, M., McGonigal, K. M., John, O. P., & Gross, J. J. (2009). The Social Costs of Emotional Suppression: A Prospective Study of the Transition to College. *Journal of Personality and Social Psychology*, 96(4), 883–897.

<https://doi.org/10.1037/a0014755>

Stein, A., Pearson, R. M., Goodman, S. H., Rapa, E., Rahman, A., McCallum, M., Howard, L. M., & Pariante, C. M. (2014). Effects of perinatal mental disorders on the fetus and child. In *The Lancet*, 384(9956), 1800–1819.

[https://doi.org/10.1016/S0140-6736\(14\)61277-0](https://doi.org/10.1016/S0140-6736(14)61277-0)

Stewart, R. C. (2007). Maternal depression and infant growth - A review of recent evidence. In *Maternal and Child Nutrition*, 3(2), 94–107. John Wiley & Sons, Ltd.

<https://doi.org/10.1111/j.1740-8709.2007.00088.x>

Susman-Stillman, A., Kalkoske, M., Egeland, B., & Waldman, I. (1996). Infant temperament and maternal sensitivity as predictors of attachment security. *Infant Behavior and Development*, 19(1), 33-47.

[https://doi.org/10.1016/S0163-6383\(96\)90042-9](https://doi.org/10.1016/S0163-6383(96)90042-9)

Talge, N. M., Neal, C., & Glover, V. (2007). Antenatal maternal stress and long-term effects on child neurodevelopment: How and why? In *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 48(3–4), 245–261. John Wiley & Sons, Ltd. <https://doi.org/10.1111/j.1469-7610.2006.01714.x>

Tester-Jones, M., Karl, A., Watkins, E., & O'Mahen, H. (2017). Rumination in dysphoric mothers negatively affects mother–infant interactions. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 58(1), 38–45. <https://doi.org/10.1111/jcpp.12633>

Tester-Jones, M., O'Mahen, H., Watkins, E., & Karl, A. (2015). The impact of maternal characteristics, infant temperament and contextual factors on maternal responsiveness to infant. *Infant Behavior and Development*, 40, 1–1. <https://doi.org/10.1016/j.infbeh.2015.02.014>

Wegner, D. M., & Zanakos, S. (1994). Chronic thought suppression. *Journal of Personality*, 62(4), 615–640. <https://doi.org/10.1111/j.1467-6494.1994.tb00311.x>

Werner, K., & Gross, J. J. (2010). Emotion regulation and psychopathology: A conceptual framework. *Emotion Regulation and Psychopathology*, 13–37. <https://doi.org/10.4324/9781410610898>

Wilson, K., Halligan, S. L., Safazadeh, S., & O'Mahen, H. A. (2020). *Blocking out baby's crying: Maternal emotion regulation, mood and parental problem solving*. Manuscript submitted for publication.

Xiao, S. X., Spinrad, T. L., & Carter, D. B. (2018). Parental emotion regulation and preschoolers' prosocial behavior: The mediating roles of parental warmth and inductive discipline. *Journal of Genetic Psychology*, 179(5), 246–255. <https://doi.org/10.1080/00221325.2018.1495611>

## Appendices

### Appendix A: Advertisement for Study



**UNIVERSITY OF EXETER**



**RESEARCH PARTICIPANTS NEEDED!**

Are you interested in helping us understand more about how mothers manage their emotions and interact with their babies?

Are you over 18 years old?

Are you a mother with a baby aged between 6 and 12 months?

**Interested?**  
Contact Rachel Stone for more information!  
Call or text – 07881 375 855  
Email – [rs694@exeter.ac.uk](mailto:rs694@exeter.ac.uk)



Thank you £10 shopping voucher.  
Travel costs reimbursed.

**Appendix B: Participant Information Sheet****Participant Information Sheet*****Study title: Growing together: does self-compassion help mothers and babies?***

Name of researcher: Rachel Stone

Name of supervisor: Dr Heather O'Mahen

**We would like to invite you and your infant to take part in this research study. We are looking at how mothers feel and how they play with their infants. The research is being conducted by a Trainee Clinical Psychologist in collaboration with the University of Exeter.**

**Before you agree to taking part, it is important you understand why the study is being completed and what it will involve for you and your infant.**

**Please take the time to read and consider the following information carefully. You are welcome to discuss it with family or friends if you wish. Please feel free to contact the researcher, on the contact details below, should you have any questions or if there is anything you would like to know more about.**

**Thank you for taking the time to read this information sheet and for your interest in participating in this study.**

**Who is organising and funding this study?**

This research is being conducted by Rachel Stone. She is a Trainee Clinical Psychologist. She is doing this study as part of her Doctorate in Clinical Psychology at the University of Exeter. The research is being supervised by Dr Heather O'Mahen, a Research Clinical Psychologist from University of Exeter. The research is sponsored and funded by the University of Exeter.

**Purpose of the research:**

We want to see if how a mother feels about herself affects how she plays with her infant. We think that helping mothers feel better about themselves may also improve the play experience with their infant. For example, there is a lot of research now showing that when we can be kind towards ourselves, we may feel closer to other people as well. This can help people have a better experience with others. But, no one has done any research to see if this approach can help parents with their infant. That is what we want to do. We think this may help all parents, but it might be especially helpful for parents who might be feeling low or anxious. We will be using different approaches to managing emotions to see the impacts they have on mother's moods and interactions and compare any differences the strategies may lead to.

**Why have I been approached?**

We are interested in mothers who are feeling well. You may have been approached in a community setting or heard about the study on social media.

We are interested in recruiting mother and infant pairs who:

- Mother is 18 years old or over

- You have a child aged between 6-12 months.

**What would taking part involve?**

Should you wish to take part in the study, you will be contacted by the researcher and asked some screening questions about your current mood.

Following this, you and your baby will be asked to either come to meet with the researcher at the Community Perinatal Mental Health Clinic, University of Exeter or alternatively the researcher can visit you at home or other appropriate venue if you prefer.

You will be asked to complete some short questionnaires then asked to play with your baby for 5 minutes. This play session will be video recorded. After the video you will be asked to answer some more questions before listening to a voice recording of someone asking you to complete a thinking task. After this you will be invited to complete another play session with your baby for 10 minutes where you will be asked to engage in a task with your baby; this will also be video recorded. After this you will be able to spend some time with the researcher and your baby and will be able to ask any questions about the study and your participation; this will not be recorded. This is estimated to take about 1 1/2 hours.

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

You will have the opportunity to spend some time with your baby interacting and learning about each other.

To thank you for your time you will be given a £10 shopping voucher and you will be reimbursed for your travel costs.

Research like this can deliver wider benefits to parents, and we think it's important to give parents a range of strategies to help them be the parents they want to be.

**What are the possible disadvantages and risks of taking part?**

Part of the study will involve thinking about your mood, feelings and how you manage your emotions. It is possible that some participants might find this difficult and upsetting. Some mothers find playing with their infants while being filmed challenging, although we will try to minimise the difficulties with this as much as possible (e.g., the researcher will sit far back in the room).

The researcher will be with you and available to answer any questions or concerns at any time and there will be time for you to spend with the researcher after the studying. We will also encourage you to contact your GP or healthcare professionals involved in your care if you find any of the tasks upsetting.

**What will happen if I change my mind or I don't want to carry on with the study?**

Your participation in this study is completely voluntary. You may withdraw from the study at any time without any consequences or judgement. You do not have to give a reason for changing your mind or withdrawing.

Even if you complete the study and then change your mind, you can still withdraw your data up to the point where it becomes anonymised by contacting the researcher.

**How will my information be kept confidential?**

The University of Exeter processes personal data for the purposes of carrying out research in the public interest. The University will endeavour to be transparent about its processing of your personal data and this information sheet should provide a clear explanation of this. If you have any queries about the University's processing of your personal data that cannot be resolved by the research team, further information may be obtained from the University's Data Protection Officer by emailing [dataprotection@exeter.ac.uk](mailto:dataprotection@exeter.ac.uk) or at [www.exeter.ac.uk/dataprotection](http://www.exeter.ac.uk/dataprotection).

For the purposes of this study we will also use consent to protect your confidentiality and provide you with choice in your participation. All information collected in this study will be kept strictly confidential and stored either on an encrypted password protected computer, or in a locked cabinet at the University, which can only be accessed by the researcher and research supervisors. This is in accordance with the Data Protection Act 2018, and General Data Protection Regulation (GDPR). Exceptions to this rule are that if the researcher has any concerns about your safety or the safety of others (including your child) then they will contact appropriate professionals involved in your care.

During participation you will be allocated a unique participant number, which will ensure the information from your responses will be protected and cannot be identified by anyone else. Any personally identifiable information will be stored separately and securely from information obtained from the research. All data collected on paper copies will be scanned into digital format, and paper copies will be shredded immediately. All personal data will be destroyed immediately following the completion of your involvement with the study.

The digitally recorded videos will be immediately transferred to an encrypted USB flash drive and within a one-week period will be transferred to the University's computer system. Only the research team will have access to the videos. To access the file, a computer password will be required, and the folder will be by permission only to the researcher and the research supervisors.

Your rights to access, change or move your information are limited, as we need to manage your information in specific ways in order for the research to be reliable and accurate. To safeguard your rights, we will use the minimum personally identifiable information possible. Your anonymised data will be kept for 7 years from the point of the study ending or most recent point of publication, whichever is longer, and then permanently destroyed. This is in line with the Exeter ORE guidelines. This allows for full utilisation of the data and prevents unnecessarily having to gather data from participants in the future.

When the results from the study are written up, they will not include your name or any other identifiable information. The research will be used as part of a doctorate in clinical psychology professional qualification with plans to submit to an academic journal. No identifiable information will be used in any publication. If you wish to find out the results of the study, upon request these can be made available to you.

#### **Who has reviewed this study?**

The research has been reviewed by the School of Psychology Ethics Committee, University of Exeter.

#### **Who can I contact for further information?**

If you could like to contact the researcher for more information or would like to participate in the study, then please use the following contact details:

Lead researcher: Rachel Stone – Email: [rs694@exeter.ac.uk](mailto:rs694@exeter.ac.uk) Tel: 07881 375 855

OR

If you have any complaints about any aspect of the study, please contact Dr Heather O'Mahen - [H.OMahen@exeter.ac.uk](mailto:H.OMahen@exeter.ac.uk) or the Chair of Exeter University's Ethics Committee Nick Moberly – [n.j.moberly@ex.ac.uk](mailto:n.j.moberly@ex.ac.uk)

**Thank you for your interest in this project.**

**Appendix C: CORE Screening Measure**

**CLINICAL OUTCOMES in ROUTINE EVALUATION**

**CORE-10 Screening Measure**

**IMPORTANT - PLEASE READ THIS FIRST**  
 This form has 10 statements about how you have been OVER THE LAST WEEK.  
 Please read each statement and think how often you felt that way last week.  
 Then tick the box which is closest to this.  
*Please use a dark pen (not pencil) and tick clearly within the boxes.*

**Over the last week...**

	Not at all	Only occasionally	Sometimes	Often	Most or all of the time
1 I have felt tense, anxious or nervous	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
2 I have felt I have someone to turn to for support when needed	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
3 I have felt able to cope when things go wrong	<input type="checkbox"/> 4	<input type="checkbox"/> 3	<input type="checkbox"/> 2	<input type="checkbox"/> 1	<input type="checkbox"/> 0
4 Talking to people has felt too much for me	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
5 I have felt panic or terror	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
6 I made plans to end my life	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
7 I have had difficulty getting to sleep or staying asleep	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
8 I have felt despairing or hopeless	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
9 I have felt unhappy	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4
10 Unwanted images or memories have been distressing me	<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4

**Total (Clinical Score\*)**

\* **Procedure:** Add together the item scores, then divide by the number of questions completed to get the mean score, then multiply by 10 to get the Clinical Score.  
**Quick method for the CORE-10 (if all items completed):** Add together the item scores to get the Clinical Score.

**Thank you for your time in completing this questionnaire**

CORE-10 Copyright CORE System Trust (February 2006)

**DEACTIVATED**



### Appendix D: CORE Screening Cut Off Scores

Symptom descriptors and clinical cut off scores for the CORE-10

#### *CORE-10 Items*

Item	Problem area	Item	Intensity
1	Anxiety	I have felt tense, anxious or nervous	Low
5	Anxiety	I have felt panic or terror	High
9	Depression	I have felt unhappy	Low
8	Depression	I have felt despairing or hopeless	High
7	Physical	I have had difficulty getting to sleep or staying asleep	Low
10	Trauma	Unwanted images or memories have been distressing me	High
2	Close relationships	I have felt I have someone to turn to for support when needed	Low
4	Social relationships	Talking to people has felt too much for me	High
3	General functioning	I have felt able to cope when things go wrong	High
6	Risk	I have made plans to end my life	High

#### *Clinical Cut Off Scores for the CORE-10*

Score	Severity of psychological distress
0-5	Healthy
5-10	Low level problems
10-15	Mild psychological distress
15 – 20	Moderate distress
20 – 25	Moderately severe
25 – 40	Severe psychological distress



**Appendix E: Self-Compassion Measure (Pre-Post)**

**PRE Self-Compassion Measure**

**Now we are going to ask about your feelings and emotions.**

**Please answer the questions based on how you feel right now in this present moment.**

Right now..  
**I do not feel happy at all** **I feel very happy**

0    1    2    3    4    5    6    7    8    9    10

Right now..  
**I do not feel low at all** **I feel very low**

0    1    2    3    4    5    6    7    8    9    10

Right now..  
**I do not feel like criticising myself at all** **I feel like criticising myself very much**

0    1    2    3    4    5    6    7    8    9    10

Right now..  
**I do not feel energetic at all** **I feel very energetic**

0    1    2    3    4    5    6    7    8    9    10

Right now..  
**I do not feel like being kind and understanding towards myself at all** **I feel like being very kind and understanding towards myself**

0    1    2    3    4    5    6    7    8    9    10

Right now..  
**I do not feel loved and safe at all** **I feel very loved and safe**

0    1    2    3    4    5    6    7    8    9    10

Right now..  
**I do not need to feel loved at all** **I really need to feel loved**

0    1    2    3    4    5    6    7    8    9    10

Right now..

The idea of being emotionally close to someone does not make me nervous at all

The idea of being emotionally close to someone makes me very nervous

0 1 2 3 4 5 6 7 8 9 10

Right now..

I do not feel a sense of togetherness with others at all

I very much feel a sense of togetherness with others

0 1 2 3 4 5 6 7 8 9 10

Right now..

I do not feel calm at all

I feel very calm

0 1 2 3 4 5 6 7 8 9 10

Right now..

I am not tolerant of my flaws and inadequacies at all

I am very tolerant of my flaws and inadequacies

0 1 2 3 4 5 6 7 8 9 10

**POST Self-Compassion Measure**

Now we will ask you some questions following the listening task you have just completed.

Please answer the questions based on how you feel right now in this present moment.

In regard to the listening task..

I could not follow the instructions at all I could follow the instructions very well

0 1 2 3 4 5 6 7 8 9 10

In regard to the listening task..

I did not pay attention to the exercise at all

I paid full attention to the exercise

0 1 2 3 4 5 6 7 8 9 10

Right now..

I do not feel happy at all

I feel very happy

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I do not feel low at all**

**I feel very low**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I do not feel like criticising myself at all**

**I feel like criticising myself very much**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I do not feel energetic at all**

**I feel very energetic**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I do not feel like being kind and understanding towards myself at all**

**I feel like being very kind and understanding towards myself**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I do not feel loved and safe at all**

**I feel very loved and safe**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I do not need to feel loved at all**

**I really need to feel loved**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**The idea of being emotionally close to someone does not make me nervous at all**

**The idea of being emotionally close to someone makes me very nervous**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I do not feel a sense of togetherness with others at all**

**I very much feel a sense of togetherness with others**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I do not feel calm at all**

**I feel very calm**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I am not tolerant of my flaws and inadequacies at all**

**I am very tolerant of my flaws and inadequacies**

0      1      2      3      4      5      6      7      8      9      10

**Appendix F: Suppression Measure (Pre-Post)**

**PRE Suppression Measure**

**Now we are going to ask you about your feelings and emotions.**

**Please answer the questions based on how much you feel the statement is representative of how you feel in the present moment.**

Right now..  
**I do not feel happy at all** **I feel very happy**

0    1    2    3    4    5    6    7    8    9    10

Right now..  
**I am not trying to stop myself from feeling emotions** **I am trying to stop myself from feeling emotions**

0    1    2    3    4    5    6    7    8    9    10

Right now..  
**I feel unable to put my emotions aside and think of other things** **I feel able to put my emotions aside and think of other things**

0    1    2    3    4    5    6    7    8    9    10

Right now..  
**I feel unable to hide my emotions from others** **I feel able to hide my emotions from others**

0    1    2    3    4    5    6    7    8    9    10

Right now..  
**I do not feel energetic at all** **I feel very energetic**

0    1    2    3    4    5    6    7    8    9    10

Right now..  
**I am bottling up my emotions** **I am not bottling up my emotions**

0    1    2    3    4    5    6    7    8    9    10

Right now..  
**I am smothering my feelings** **I am not smothering my feelings**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I do not feel calm**

**I feel very calm**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I feel unable to keep my feelings inside**

**I feel able to keep my feelings inside**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I am working hard to keep out my feelings**

**I am not working hard to keep out my feeling**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I am trying to keep my emotions to myself**

**I am not trying to keep my emotions to myself**

0 1 2 3 4 5 6 7 8 9 10

**POST Suppression Measure**

**Now we will ask you some questions following the listening task you have just completed.**

**Please answer the questions based on how you feel right now in this present moment.**

In regard to the listening task..

**I could not follow the instructions at all I could follow the instructions very well**

0 1 2 3 4 5 6 7 8 9 10

In regard to the listening task..

**I did not pay attention to the exercise at all**

**I paid full attention to the exercise**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I do not feel happy at all**

**I feel very happy**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I am not trying to stop myself from feeling emotions**

**I am trying to stop myself from feeling emotions**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I feel unable to put my emotions aside and think of other things**

**I feel able to put my emotions aside and think of other things**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I feel unable to hide my emotions from others**

**I feel able to hide my emotions from others**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I do not feel energetic at all**

**I feel very energetic**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I am bottling up my emotions**

**I am not bottling up my emotions**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I am smothering my feelings**

**I am not smothering my feelings**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I do not feel calm**

**I feel very calm**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I feel unable to keep my feelings inside**

**I feel able to keep my feelings inside**

0 1 2 3 4 5 6 7 8 9 10

Right now..

**I am working hard to keep out my feelings**

**I am not working hard to keep out my feeling**

0      1      2      3      4      5      6      7      8      9      10

Right now..

**I am trying to keep my emotions to myself**

**I am not trying to keep my emotions to myself**

0      1      2      3      4      5      6      7      8      9      10



**Appendix G: Brief Mood Introspection Scale**

**Brief Mood Introspection Scale (BMIS)**

**By John D. Mayer**

INSTRUCTIONS: Circle the response on the scale below that indicates how well each adjective or phrase describes your present mood.

1 (definitely do not feel) 2 (do not feel ) 3 (slightly feel) 4 (definitely feel)

Lively	1	2	3	4	Drowsy	1	2	3	4
Happy	1	2	3	4	Grouchy	1	2	3	4
Sad	1	2	3	4	Peppy	1	2	3	4
Tired	1	2	3	4	Nervous	1	2	3	4
Caring	1	2	3	4	Calm	1	2	3	4
Content	1	2	3	4	Loving	1	2	3	4
Gloomy	1	2	3	4	Fed up	1	2	3	4
Jittery	1	2	3	4	Active	1	2	3	4

Overall my mood is:

Very unpleasant

Very pleasant

-10 -9 -8 -7 -6 -5 -4 -3 -2 -1 0 1 2 3 4 5 6  
7 8 9 10



**Emotion Regulation Questionnaire (ERQ)<sup>1</sup>**  
**Scoring Instructions**

- **NB:** Do not change item order, as items 1 and 3 at the beginning of the questionnaire define terms “positive emotion” and “negative emotion”.
- Sum items on the two subscales according to the key below.

Items	No. Items	Subscale	Possible Range
1, 3, 5, 6, 8, 10	6	Cognitive Reappraisal	6 - 42
2, 4, 6, 9	4	Expressive Suppression	4 - 28

**Appendix I: Maternal Response Scales****Maternal Response Scales****Questions:****I want to comfort:**

1      2      3      4      5      6      7      8

not at all      slightly      somewhat      extremely

**I want to turn away:**

1      2      3      4      5      6      7      8

not at all      slightly      somewhat      extremely

**I feel anxious:**

1      2      3      4      5      6      7      8

not at all      slightly      somewhat      extremely

**Faces:**



Happy 1



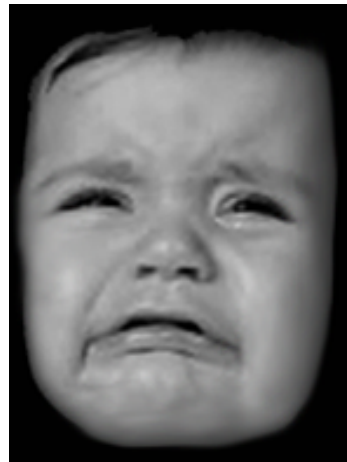
Happy 2



Happy 3



Distressed 1



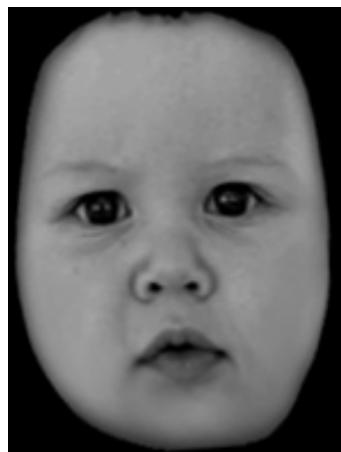
Distressed 2



Distressed 3



Neutral 1



Neutral 2



Neutral 3

## Appendix J: Self-Compassion Induction Script

*Script used for the short pre-recorded audio recording.*

Sit in a comfortable position, reasonably upright and relaxed. (Pause) Close your eyes fully or partly. (Pause) You will now be guided through a few minutes exercise.

Bring to mind a person with whom you have a positive relationship, someone who you feel naturally warmly towards. This could be a child, a grandparent, a former teacher or mentor your cat or dog - whoever naturally brings happiness to your heart. Allowing yourself to feel what it's like to be in that being's presence (pause for 2 sec).

(Pause)

Holding this person in mind now extending best wishes towards them. Repeat softly with this person in mind:

***May you be safe.***

***May you be peaceful.***

***May you be healthy.***

***May you live with ease.***

(Pause)

***May you be safe.***

***May you be peaceful.***

***May you be healthy.***

***May you live with ease.***

(Pause)

When you notice that your mind has wandered, return to the words and the image of the loved one you have in mind. Savour any warm feelings that may arise. Go slow.

(Pause)

Now add yourself to your circle of good will. Put your hand over your heart and feel the warmth and gentle pressure of your hand (for just a moment or for the rest of the exercise), saying:

***May I be safe.***

***May I be peaceful.***

***May I be healthy.***

***May I live with ease.***

(Pause)

***May I be safe.***

***May I be peaceful.***

***May I be healthy.***

***May I live with ease.***

(Pause)

Holding your body in awareness, notice any stress or uneasiness that may be lingering within you, and offer kindness to yourself.

***May I be safe.***

***May I be peaceful.***

***May I be healthy.***

***May I live with ease.***

Repeat the phrases inwardly with enough space between them so that they are pleasing you. As best you can, gather all your attention behind one phrase at a time.

(Pause)

If you find your attention wandering, don't worry, that's what minds do. You can simply let go of distractions and begin from here you are.

***May I be safe.***

***May I be peaceful.***

***May I be healthy.***

***May I live with ease.*** (Pause)

Feelings, thoughts, or memories may come and go; allow them to arise and pass away. Let the anchor be the repetition of these phrases:

***May I be safe.***

***May I be peaceful.***

***May I be healthy.***

***May I live with ease.*** (Pause)

Just rest and sit quietly in your own body, savouring the good will and compassion that flows naturally from your own heart. Know that you can return to the phrases anytime you wish.

(Pause for 15 sec)

**(Pause, then end)** Now, in your own time, slowly open eyes. The exercise is over.

## Appendix K: Suppression Induction Script

*Script used for the short pre-recorded audio recording.*

Sit in a comfortable position, reasonably upright and relaxed. (pause) Close your eyes fully or partly. (pause) You will now be guided through a few minutes exercise.

Bring to mind a recent tricky situation that brought up difficult or unpleasant emotions for you. This could be a situation involving conflict, sadness or frustration. For example, this could be a time when you had an argument with a friend, a time when you heard some difficult news or a time when you felt frustrated or irritated when caring for your infant.

(pause for 2 secs).

I want you to try and imagine the situation as clearly as possible, with as much detail as you can.

(pause)

It might be the case that a few situations come into your mind. Try to choose only one, maybe the situation that comes to you most strongly in your mind.

Once you have a situation in your mind, imagine it as clearly as you can, recalling in your mind what happened. Involve yourself fully in the image you can see, as if you were back there.

Think about where you were and what you can see.

(pause)

Try to recall what was said and how this made you feel. Maybe you felt angry. Maybe you felt sad. Maybe you felt disappointed. Try to bring to mind how that felt in your body, in your tummy, your chest, your shoulders, your jaw. Putting yourself back in that place, recall the emotion and what it felt like to be in that place.

Recalling the event in detail, try to suppress any emotional responses that you are having. Stop any emotions you are feeling from growing in intensity, with the aim of not feeling anything at all. Turn away from them as if you don't want to feel them.

(pause)

Take a moment in your mind and describe to yourself what the emotions are and what that experience is like.

You might feel anger or frustration.

You might feel sadness or disappointment.

You might feel overwhelmed.

(pause)

Holding this situation in mind, now try and push these feelings away. Think to yourself:

***I can't feel these things.***

***I'm going to push them away.***

***I'll keep myself from feeling this.***

(pause)

***I can't feel these things.***

***I'm going to push them away.***

***I'll keep myself from feeling this.***



(pause)

Try to push away your feelings and not let them show. In other words, as you listen to this recording and recall the difficult situation in your mind, try to behave in a way that if a person was watching you, they would not know that you were feeling anything.

***I can't feel these things.***

***I'm going to push them away.***

***I'll keep myself from feeling this.***

(pause)

***I can't feel these things.***

***I'm going to push them away.***

***I'll keep myself from feeling this.***

(pause)

If you notice your mind has wandered, or that your emotions are still strong, imagine your emotions are a ball and you are pushing them away, or putting them away in a locked box.

(pause)

Keep bringing that difficult situation into your mind and return your focus to imagine locking up your emotions, pushing them into a box and putting this box away.

(pause)

***I can't feel these things.***

***I'm going to push them away.***

***I'll keep myself from feeling this.***

(pause)

If you notice your body becoming tense, use the tenseness to focus your efforts on pushing those feeling down and locking them away. Hide all the emotions so no one can see what you are feeling.

Think to yourself:

***I can't feel these things.***

***I'm going to push them away.***

***I'll keep myself from feeling this.***

Keep bringing the situation to mind and picture it as clearly as you can. Let it replay in your head over and over again. Keep pushing those emotions down, imagine turning away from them and locking them in a box.

As you replay the situation in your mind, remember, whatever the emotions try and push them away.

Think to yourself:

***I can't feel these things.***

***I need to push them down.***

***I'll keep myself from feeling this.***

Try to stop yourself from feeling these emotions and block them from entering your body.

***I can't feel these things.***

***I'm going to push them away.***

***I'll keep myself from feeling this.***

(pause)

Now to allow your mind to go blank and allow yourself to come back into the present moment.

(pause for 15 secs)

(pause then end) Now, in your own time, slowly open your eyes and come back into the room. The exercise is over.

**Appendix L: Challenging Stress-Inducing Still Face Procedure Instructions****Mildly challenging task instructions**

For this task we ask that you try your best to follow the instructions.

After a few minutes of playing with your infant, you will hear a soft bell. When you hear this bell we ask that you stop playing with your infant and turn your face away from them. We ask that you then turn to look back at them, but this time with a blank or expressionless face. Try not to touch or talk to your infant either. This might cause your infant to get a little upset – please keep going if this happens and try your best to remain expressionless, as if you are not interested in them. We know that this might feel a little uncomfortable for you.

A second bell noise will indicate that this challenging task is over and you can re-engage and play with your baby as you usually would. This might involve smiling, talking and playing with them again. This might also involve comforting your infant if they were upset by the task.

You will continue to be filmed interacting with your infant for a few more minutes.

The researcher will tell you when the play session has finished.

## Appendix M: Mind-Mindedness Coding Information

### *Coding information taken from the Mind-Mindedness Coding Manual (Meins & Fernyhough, 2015)*

#### 3.1. Identifying Mind-Related Comments

The transcript can then be used to identify all comments which focus on the child's internal states. We have defined mind-related comments as any comment that (a) uses an explicit internal state term to comment on what *the infant* may be thinking, experiencing, or feeling; or (b) 'puts words into the infant's mouth' with the caregiver talking on the infant's behalf. Comments in the latter category do not necessarily have to contain an internal state term (although they often do), but should clearly be dialogue intended to be spoken by the infant (e.g., "That's a teddy bear, Mummy"). Although sometimes one feels that other types of comment produced by the caregiver may indicate treating the infant as an individual with a mind, in order to obtain the most valid and reliable coding scheme, only comments falling into categories (a) and (b) above are classified as mind-related.

The comments listed below are not intended to be an exhaustive list of all possible mind-related comments, but rather reflect the comments that have been observed in our research. The comments below should, however, give sufficient guidance on how different types of comment should be coded if researchers encounter different mind-related comments in their own observations.

##### 3.1.1. Mind-Related Comments

###### *Desires and Preferences*

Like, dislike, don't like, love, want, prefer, favourite, hate, can't stand, "are you after the ball?" (in the sense of wanting to get the ball).

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###### *Cognitions*

Think (but see *Non-Specific References to Infant's Internal States* in Section

3.1.3 below for "what do you think?"), decide, making a decision, know, recognise, remember, recall, realise, interested, not interested, notice, focused, intent, expect, working it out, fascinated, obsessed, curious, nosy (in the sense of being interested in or curious about something).

###### *Emotions*

Had enough, fed up, shy, solemn, self-conscious, happy, sad, scared, afraid, joyful, gleeful, full of the joys of Spring, serious, grumpy, stressed, moody, in a good/bad mood, stroppy, being difficult, worried, anxious, dazed, confused, excited, cross, not feeling yourself, startled, make you jump, surprised, disgusted, bored, angry, bad

tempered.

#### *Epistemic States*

Teasing, playing games with me, joking, having a joke, playing a joke.

#### *Talking on the Infant's Behalf*

Any utterance that is obviously meant to be dialogue said/thought by the infant.

### **3.1.2. Comments That May or May Not be Mind-Related**

#### *Physical States*

If the caregiver comments on the infant's physical state (e.g., tired, hungry, thirsty, hot, cold, etc.) in response to a behaviour from the child indicating that such a reading of their physical state is warranted (e.g., yawning or rubbing eyes to indicate tiredness, rooting or chewing hands to indicate hunger), then these comments should **not** be coded as mind-related. The caregiver may also talk about being tired or hungry

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in the context of pretending to eat or sleep, and these should **not** be coded as mind-related. However, if the caregiver states that the child is tired, hungry, etc. *in the absence of any accompanying signs of such a state from the infant*, then these comments should be coded as mind-related (and will always be coded as **non-attuned** – see 3.2.2 below).

#### *Funny/Amusing*

Fun, funny, and amusing should be coded as mind-related comments if the caregiver uses these terms in response to the infant finding something fun/funny/amusing or doing something funny/amusing (as indicated by positive affect in the infant). Comments such as “that’s funny/fun/amusing” that refer to other events and which impute no positive affective response to the child should **not** be coded as mind-related.

#### *Clever*

If *clever* (“you’re clever”, “that’s clever” “clever girl/boy”) is used in response to the child performing some skilful behaviour (e.g., manipulating a toy, performing a behaviour in response to a request from the caregiver) it should be coded as a mind-related comment. If *clever* is used merely to give positive feedback for generally behaving well (“clever girl/boy”), where a purely non-mentalistic interpretation is possible, it should **not** be coded as mind-related.

#### *Cheeky*

*Cheeky* (“you’re cheeky”, “that’s so cheeky”, “you’re a cheeky boy/girl”) may be mind-related if it is used in response to the child doing something that can be construed as teasing, playful, or against the instructions of the caregiver (e.g.,

repeatedly putting a toy in their mouth when the caregiver has moved it away and/or asked them not to, repeatedly looking at or for something when the caregiver is trying to focus their attention elsewhere, knocking over a block tower). Note that **the child's emotional tone should be positive** in order for *cheeky* to be mind-related (e.g., the child smiling, making eye contact with the caregiver). If *cheeky* is used more generally (e.g., "cheeky boy/girl") and is not in response to any clear teasing or playful behaviour, it should **not** be coded as mind-related.

#### *Intentions*

*Going to* (e.g. "Are you going to play with the car?", "What are you going to

do?") should **not** be coded as mind-related. *Trying to* should be classified as mind-related if the caregiver also specifies the precise goal that the child is trying to achieve (e.g., "Are you trying to get the block through the hole?"), but general uses of *trying to* (e.g., "What are you trying to do?") should **not** be coded as mind-related.

### 3.1.3. Comments That Are Not Mind-Related

#### *Perception*

Comments about seeing, watching, looking, listening, touching, tasting should **not** be classified as mind-related.

#### *Saying/talking*

Comments about the infant saying something or talking (made in response to vocalisations from the infant) should **not** be classified as mind-related (e.g., "Are you talking to me?", "What are you saying?"). However, if the caregiver goes on to talk on the infant's behalf and conjecture what the child might be saying, then this is coded as mind-related (see 3.1.1 above).

#### *Non-Specific References to Infant's Internal States*

Comments which indicate that the caregiver has noted a change in the infant's internal state, but do not reflect the specific state being experienced (e.g. "What's the

matter/wrong/up?", "Are you all right/OK?", "Is that better?") should **not** be classified as mind-related. Comments such as "Is that nice/good?" or "That's nice/good" should **not** be classified as mind-related. The non-specific use of *think* in the phrase "What do you think?" should **not** be coded as mind-related.

### 3.2. Classifying Mind-Related Comments as Appropriate/Non-Attuned

Once all mind-related comments have been identified on the verbatim transcript, they can be coded dichotomously as appropriate/non-attuned by viewing the recorded infant-caregiver interaction. We recommend that researchers coding appropriateness watch the whole of the observation session rather than fast-forwarding to each of the specific mind-related comments. It is important to have a sense of the infant's emotional state and the types of play engaged in throughout the session to aid one's judgement of the appropriateness of any specific mind-related comments produced.

Repetitions of specific internal states are counted as separate mind-related comments unless a term is repeated in rapid succession. For example, if a caregiver was observing her child playing with a toy and said, “You like that. (1s pause) Yes, you like that”, this would be two mind-related comments. However, if the caregiver had said, “You love, love, love that”, this would be one mind-related comment.

### 3.2.1. Criteria For Appropriate Mind-Related Comments

Mind-related comments should be coded as appropriate if any of the following criteria are met:

(a) the researcher agrees with the caregiver’s reading of the infant’s current internal state. For example:

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(b)

1. *You want the frog* (said while infant is reaching towards the frog)
2. *The ball is your favourite thing, isn’t it?* (after the infant has demonstrated a repeated preference for playing with the ball)
3. *Are you thinking?* (said while the infant has a pensive expression)
4. *You don’t like that one* (after the infant has rejected a toy by pushing it away)
5. *You’re fascinated by those animals* (after infant has been focused intently on playing with the animals for several minutes)
6. *You’re such a happy boy* (said while infant is laughing or smiling)
7. *Are you going all shy?* (after infant coyly turns away)
8. *Did that scare you?* (after infant was startled by a noisy toy)
9. *Are you playing games with me?* (after infant has repeatedly disobeyed the caregiver’s request not to put a toy in his mouth, smiling at her each time he raises the toy to his mouth) the comment links current activity with similar events in the past or future.

For example:

1. *Do you remember seeing a camel at the zoo?* (while the child plays with a toy camel)
2. *You liked going in the car today, didn’t you?* (while playing with a car)
3. *Do you want to go on the train tomorrow?* (while playing with a train)
4. *You recognise this because you’ve got the same one at home*
5. *You like red, don’t you?* (Note that comments such as these where the caregiver is drawing on the child’s previous preferences over an extended period of time should be coded as appropriate even if the child hasn’t obviously demonstrated a liking of red in the play session.)

These are deemed appropriate because the caregiver is assumed to have previously observed such a preference in the infant and is therefore predicting that he or she will continue to like or dislike new items on this basis. However, if the infant’s behaviour is obviously at odds with such a comment, then it should **not** be coded as appropriate.)

(c) the comment serves to clarify how to proceed after a lull in the interaction. For example, if the infant has been gazing around for several seconds, not focused on any particular object or event, then a comment such as *Do you want to play with the farm?* would be appropriate. Note that such a comment would be **non-attuned** if the caregiver asked this while the child was already actively engaged in attending to or playing with something else (see 3.2.2 below).

### 3.2.2. Criteria For Non-Attuned Mind-Related Comments

Mind-related comments should be coded as non-attuned if any of the following criteria are met:

(a) the researcher disagrees with the caregiver's reading of the infant's current internal state. For example:

1. *You're bored with that one* (referring to a toy with which the infant is still actively playing)
2. *You really like the duck* (after the infant has shown no interest in or positive affect towards the duck)
3. *Are you tired?* (after the infant has shown no overt signs of tiredness)
4. *Grumpy boy* (when the infant appears to be in a good mood)

(b) the comment refers to a past or future event that is unrelated to the infant's current activity. For example:

1. *Would you like Granny to come and see you tomorrow?* (having not previously mentioned Granny)
2. *Do you want custard for dinner?* (after no previous play or discussion focused on food)
3. *Do you want to go swimming when we go on holiday?* (after no previous play or discussion about holidays or swimming)

(c) the caregiver asks what the infant wants to do or suggests that the infant wants to become involved in a new activity when the infant is already actively engaged in playing with or attending to something else.

(d) the caregiver seems to be attributing internal states (epistemic states, emotions or desires) that are not implied by the infant's behaviour and which appear to be projections of the adult's own internal states onto the child. For example:

a. *Are you thinking about Daddy who you love so much?*

(e) the referent of the caregiver's comment is not clear. For example:

a. *You like that* (when the infant is not playing with or attending to any particular object or event)



**Appendix N: Participant Feedback Questions****Feasibility and Acceptability Questions****Experience of the induction:**

How did you find listening to the tape?

**Experience of the video interaction:**

How did you find being filmed playing with your baby?

How did you find completing the challenging task?

**Experience of the questionnaires:**

How did you find filling out the questionnaires?

Was it easy or difficult to complete them?

**Experiences generally:**

Was there anything you particularly liked or found helpful about the study?

Was there anything you particularly did not like or found unhelpful about the study?

Are there any aspects of the study you would change?

Did you feel you had enough information to make your decision to give consent to participate in the study? Yes / No

Was the consent form straight forward and easy to complete? Yes / No

Would you recommend participating in the study to your friends or family? Yes / No

**Appendix O: Participant Consent Form**



**PARTICIPANT CONSENT FORM**

Title of Project: Growing together: does self-compassion help mothers and babies?

Name of Researcher: Rachel Stone

Participant Identification

Number:

Please Initial Box

1. I confirm that I have read the information sheet dated..... (version no.....) for the above project. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason and without my legal rights being affected.
3. I understand that relevant sections of the data collected during the study may be looked at by members of the wider research team including the researcher’s two supervisors. I give permission for these individuals to have access to my records.
4. I understand that if the researcher has any concerns about my mental wellbeing they encourage me to contact the Perinatal Mental Health Service and / or GP.
5. I understand that if the researcher has any concerns about the safety of myself or my child then they will be duty bound to break confidentiality and contact the relevant services.
6. I understand that taking part involves providing pseudonymised responses to questionnaires.
7. I understand that taking part will involve video recording being made of myself and my child.
8. I understand that my participation will be used for the purposes of a doctoral thesis and report published for academic publication .
9. I agree that my contact details can be kept securely and used by researchers from the University of Exeter to contact me about future research projects
10. I agree to take part in the above project.

\_\_\_\_\_  
Name of Participant

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

**Appendix P: Participant Debrief Sheet****DEBRIEF FORM**

***Title of Project: Growing together: does self-compassion help mothers and babies?***

***Name of Researcher: Rachel Stone  
Number:***

***Participant Identification***

**Thank you very much for taking part in this important research.**

The purpose of this research was to explore the relationship between a mother's mental wellbeing and how she manages her emotions on her interactions with her infant. We wanted to see if by using the emotion regulation strategy of self-compassion and asking mothers to think about their emotions in a certain way affected how mind-minded they were in their interactions with their infants. This means how much the mothers were able to think about their infant as a separate being with their own thoughts, wishes and communication needs.

We know that sometimes mothers who experience difficulties with their mental health in the perinatal period can find it hard to interact and communicate with their infants. We hope that this research will add to a growing evidence base supporting the use of certain adaptive emotion regulation strategies that can help improve mother – infant interaction and outcomes for the infant.

It is hoped that your participation in this research will support evidence for supporting mothers who experience difficulties with their mental health in the perinatal period and support the development of effective interventions.

If you feel at all distressed by your participation in this study, we would encourage you to seek support from your GP and / or by contacting the Community Perinatal Mental Health Service. The Community Perinatal Mental Health team's phone number is 01392 674964.

Should you have any questions about the study please contact the researcher or the research supervisor using the following contact details:

**Researcher:** Rachel Stone  
Trainee Clinical Psychologist  
University of Exeter  
[Rs694@exeter.ac.uk](mailto:Rs694@exeter.ac.uk)  
07881 375 855

**Research Supervisor:** Professor Heather O'Mahen  
Research Clinical Psychologist  
University of Exeter  
[H.OMahen@exeter.ac.uk](mailto:H.OMahen@exeter.ac.uk)  
01392 724 651

## Appendix Q: Mental health Signposting Information

### Devon:



### Participant Signposting Information

Thank you very much for participating in the research study. This information sheet lists details of who you might contact to support you and your mental wellbeing.

If you would like to access support for your mental wellbeing you could;

- Contact your health visitor.
- Make an emergency appointment with your GP. If you need support at night or on a weekend call your GP surgery out-of-hours service to discuss your concerns.
- Visit out-of-hours support at The Moorings in Exeter, Barnstable or Torquay. Full details of each site are available at <https://www.mhm.org.uk/the-moorings-devon>
- Go to the A&E department at your local hospital.
- Contact your mental health worker if you have one.
- If you feel that a talking therapy may be helpful to you in managing your emotions, you can refer yourself to Talkworks. Visit <https://www.talkworks.dpt.nhs.uk/> for further information or to fill in an online self-referral, or call 0300 555 3344 to self-refer over the phone.

If you would like to talk to someone immediately, The Samaritans are available 24 hours per day, 365 days per year.

- Telephone free of charge from landline or mobile: 116 123
- Email: [jo@samaritans.org](mailto:jo@samaritans.org)
- Write: Freepost RSRB-KKBY-CYJK, Chris, PO Box 90 90, Stirling, FK8 2SA.

**Cornwall:****Participant Signposting Information**

Thank you very much for participating in the research study. This information sheet lists details of who you might contact to support you and your mental wellbeing.

If you would like to access support for your mental wellbeing you could;

- Contact your health visitor.
- Make an emergency appointment with your GP. If you need support at night or on a weekend call your GP surgery out-of-hours service to discuss your concerns.
- Go to the A&E department at your local hospital.
- To speak to someone about how you are feeling you can ring Mental Health Matters out of hours telephone support service on 0800 001 4330, which operates from 5pm-9am on weekdays and 24 hours a day at weekends and bank holidays.
- Contact your mental health worker if you have one.
- If you feel that a talking therapy may be helpful to you in managing your emotions, you can refer yourself to Outlook South West. Visit <https://www.outlooksw.co.uk/> for further information or to fill in an online self-referral, or call 01208 871905 to self-refer over the phone.

If you would like to talk to someone immediately, The Samaritans are available 24 hours per day, 365 days per year.

- Telephone free of charge from landline or mobile: 116 123
- Email: [jo@samaritans.org](mailto:jo@samaritans.org)
- Write: Freepost RSRB-KKBY-CYJK, Chris, PO Box 90 90, Stirling, FK8 2SA.

**Somerset:****Participant Signposting Information**

Thank you very much for participating in the research study. This information sheet lists details of who you might contact to support you and your mental wellbeing.

If you would like to access support for your mental wellbeing you could;

- Contact your health visitor.
- Make an emergency appointment with your GP. If you need support at night or on a weekend call your GP surgery out-of-hours service to discuss your concerns.
- Go to the A&E department at your local hospital.
- To speak to someone about how you are feeling you can ring [Mindline](tel:01823276892) on 01823 276892. They will listen, support, understand and talk to you through your options. This line is open between 8pm and 11pm on Tuesday, Wednesday, Friday, Saturday and Sunday.
- Contact your mental health worker if you have one.
- If you feel that a talking therapy may be helpful to you in managing your emotions, you can refer yourself to Talking Therapies Somerset Partnership. Visit <https://www.somersetalkingtherapies.nhs.uk/> for further information or to fill in an online self-referral, or call 0300 323 0033 to self-refer over the phone.

If you would like to talk to someone immediately, The Samaritans are available 24 hours per day, 365 days per year.

- Telephone free of charge from landline or mobile: 116 123
- Email: [jo@samaritans.org](mailto:jo@samaritans.org)
- Write: Freepost RSRB-KKBY-CYJK, Chris, PO Box 90 90, Stirling, FK8 2SA.

**Appendix R: Ethical Approval Letter**

**CLES – Psychology**  
Psychology  
College of Life and Environmental Sciences  
University of Exeter  
Washington Singer Building  
Perry Road  
Exeter  
EX4 4QG  
Web: [www.exeter.ac.uk](http://www.exeter.ac.uk)

**CLES – Psychology Ethics Committee**

Dear Rachel Stone

**Ethics application - eCLESPsy000855**

The effects of maternal emotion regulation on mind-mindedness during mother-infant interactions in a perinatal population.

Your project has been reviewed by the CLES – Psychology Ethics Committee and has received a Favourable opinion.

The Committee has made the following comments about your application:

**Amendment (still face and CORE-10 release of cutoff) approved via Chair's action.**

- Please view your application at <https://eethics.exeter.ac.uk/CLESPsy/> to see comments in full.

If you have received a Favourable with conditions, Provisional or unfavourable outcome you are required to re-submit for full review and/or confirm that committee comments have been addressed before you begin your research.

If you have any further queries, please contact your Ethics Officer.

Yours sincerely

Date: 03/03/2020

CLES – Psychology Ethics Committee

**Appendix S: Participant Feedback Summary*****Comments on the tasks:***

Most participants commented they found completing the questionnaires easy and straight forward. A mixed response was provided for how participants found completing the induction listening task with some responding they found it relaxing, whilst others found it was hard to concentrate fully. In terms of being filmed it appears most people found this a little awkward at first but that they eased into it and then forgot the camera was there. A number of participants commented that they noticed the baby was aware of the camera and that they felt this hindered the interaction slightly. A mixed response was also gathered for how participants found completing the challenging stress-inducing task with some reporting it was easy and no problem for them; whilst others stated it was difficult, felt unnatural and some found it amusing and subsequently hard to keep a straight face.

***Aspects of the study people enjoyed and found helpful:***

Participants commented that they found the nature of researcher friendly, approachable and that this made them feel comfortable. Some participants enjoyed seeing how they recognised baby cues and found it helpful to see how their emotions changed following the induction. Others found it enjoyable to have time to play with their infant and the reminder of how useful mindfulness practice can be.

***Aspects of the study people did not enjoy or found unhelpful:***

In terms of anything the participants did not like or found unhelpful there were limited responses. One participant mentioned the distraction of the camera for the



baby and two participants mentioned the challenging task. When analysing what participants thought they might change about the study, two suggestions were provided – completing the listening task further away from the baby and the baby being less aware of the camera.

***Closed questions relating to taking part:***

One hundred percent of participants said they would recommend the study to friends and family; felt they had enough information prior to taking part and felt the consent form was easy to understand and complete.

## **Appendix T: Journal of Child Psychology and Psychiatry- Dissemination of Finding and Instructions for Authors**

The aim is for this systematic literature review to be disseminated via publication in the Journal of Child Psychology and Psychiatry.

### **Instructions for Authors**

#### **Manuscript preparation and submission**

Papers should be submitted online. For detailed instructions please go to: [http://mc.manuscriptcentral.com/jcpp\\_journal](http://mc.manuscriptcentral.com/jcpp_journal). Previous users can check for an existing account. New users should create a new account. Help with submitting online can be obtained from the Editorial Office at [publications@acamh.org](mailto:publications@acamh.org)

4. The manuscript should be double spaced throughout, including references and tables. Pages should be numbered consecutively. The preferred file formats are MS Word or WordPerfect, and should be PC compatible. If using other packages the file should be saved as Rich Text Format or Text only.

5. Papers should be concise and written in English in a readily understandable style. Care should be taken to avoid racist or sexist language, and statistical presentation should be clear and unambiguous. The Journal follows the style recommendations given in the *Publication manual of the American Psychological Association* (5th edn., 2001).

6. The Journal is not able to offer a translation service, but, authors for whom English is a second language may choose to have their manuscript professionally edited before submission to improve the English. A list of independent suppliers of editing services can be found [here](#). All services are paid for and arranged by the author, and use of one of these services does not guarantee acceptance or preference for publication.

#### *Layout*

*Title:* The first page of the manuscript should give the title, name(s) and short address(es) of author(s), and an abbreviated title (for use as a running head) of up to 60 characters.

#### *Abstract*

The abstract should not exceed 300 words and should be structured in the following way with bold marked headings: Background; Methods; Results; Conclusions; Keywords; Abbreviations. The abbreviations will apply where authors are using acronyms for tests or abbreviations not in common usage.

#### *Key points and relevance*

All papers should include a text box at the end of the manuscript outlining the four or five key (bullet) points of the paper. These should briefly (80-120 words) outline what's known, what's new, and what's relevant.

Under the 'what's relevant' section we ask authors to describe the relevance of their work in one or more of the following domains - policy, clinical practice, educational practice, service development/delivery or recommendations for further science.

### *Headings*

Articles and research reports should be set out in the conventional format: Methods, Results, Discussion and Conclusion. Descriptions of techniques and methods should only be given in detail when they are unfamiliar. There should be no more than three (clearly marked) levels of subheadings used in the text.

### *Acknowledgements*

These should appear at the end of the main text, before the References.

### *Correspondence to*

Full name, address, phone, fax and email details of the corresponding author should appear at the end of the main text, before the References.

### *References*

The *JCPP* follows the text referencing style and reference list style detailed in the *Publication manual of the American Psychological Association* (5th edn.)i.

### *References in text*

References in running text should be quoted as follows:

Smith and Brown (1990), or (Smith, 1990), or (Smith, 1980, 1981a, b), or (Smith & Brown, 1982), or (Brown & Green, 1983; Smith, 1982).

For up to five authors, all surnames should be cited in the first instance, with subsequent occurrences cited as et al., e.g. Smith et al. (1981) or (Smith et al., 1981). For six or more authors, cite only the surname of the first author followed by et al. However, all authors should be listed in the Reference List. Join the names in a multiple author citation in running text by the word 'and'. In parenthetical material, in tables, and in the References List, join the names by an ampersand (&). References to unpublished material should be avoided.

### *Reference list*

Full references should be given at the end of the article in alphabetical order, and not in footnotes. Double spacing must be used.

References to journals should include the authors' surnames and initials, the year of publication, the full title of the paper, the full name of the journal, the volume number, and inclusive page numbers. Titles of journals must not be abbreviated and should be italicised.

References to books should include the authors' surnames and initials, the year of publication, the full title of the book, the place of publication, and the publisher's name.

References to articles, chapters and symposia contributions should be cited as per the examples below:

Kiernan, C. (1981). Sign language in autistic children. *Journal of Child Psychology and Psychiatry*, 22, 215-220.

Thompson, A. (1981). *Early experience: The new evidence*. Oxford: Pergamon Press.

Jones, C.C., & Brown, A. (1981). Disorders of perception. In K. Thompson (Ed.), *Problems in early childhood* (pp. 23-84). Oxford: Pergamon Press.

Use Ed.(s) for Editor(s); edn. for edition; p.(pp.) for page(s); Vol. 2 for Volume 2.

### *Tables and Figures*

All Tables and Figures should appear at the end of main text and references, but have their intended position clearly indicated in the manuscript. They should be constructed so as to be intelligible without reference to the text. Any lettering or line work should be able to sustain reduction to the final size of reproduction. Tints and complex shading should be avoided and colour should not be used unless essential. Authors are encouraged to use patterns as opposed to tints in graphs. In case of essential colour figures, authors are reminded that there is a small printing charge. Authors will be contacted during the proofing stage of their accepted paper. Figures should be originated in a drawing package and saved as TIFF, EPS, or PDF files. Further information about supplying electronic artwork can be found in the Wiley electronic artwork guidelines [here](#).

### *Nomenclature and symbols*

Each paper should be consistent within itself as to nomenclature, symbols and units. When referring to drugs, give generic names, not trade names. Greek characters should be clearly indicated.

### *Supporting Information*

Examples of possible supporting material include intervention manuals, statistical analysis syntax, and experimental materials and qualitative transcripts.

3. If uploading with your manuscript please call the file 'supporting information' and reference it in the manuscript.
4. Include only those items - figures, images, tables etc that are relevant and referenced