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Attachment Based Early Interventions: An Examination of the Impact on the Attachment
Related Behaviour of Parents and Caregivers.

Study 1: The impact of the “Attachment and Biobehavioural Catch-Up” programme on
attachment related parent behaviour - *A Systematic Review*.

Study 2: Does Infant Massage Confer Benefits for the Mother - Infant dyad? Findings From
a 4 Year Longitudinal Study.

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Thesis submitted in partial fulfilment of the requirements for the degree of Doctor of Clinical

Psychology

School of Applied Psychology

University College Cork

Supervisors: Dr. Christopher McCusker and Professor Deirdre Murray

May 2022

Declaration

This is to certify that the work I am submitting is my own and has not been submitted for another degree, either at University College Cork or elsewhere. All external references and sources are clearly acknowledged and identified within the contents. I have read and understood the regulations of University College Cork concerning plagiarism.

Signed: Emma O'Byrne .

Date: 04/05/2022 & 27/07/2022

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Chapter One: Introduction

Context and Overview of Chapters

Attachment theory has been a dominant theory in psychological discourse for decades (Bowlby, 1958). Despite its theoretical strength the evidence base supporting practical interventions grounded in attachment theory that aim to improve infant and perinatal mental health have been slower to develop.

In this thesis, Chapter Two: Extended Literature Review, provides a critical review of attachment theory, both its formative work and consequent developments, as well as a discussion of early attachment interventions, in particular infant massage. The significant role of relationships between infants and their primary caregivers on the consequent physical, social and emotional health of the child into their adolescent and adult years has been well documented (Zeanah, 2018). Furthermore, caregivers' behaviours and responses to infants, as well as their ability to regulate and manage their own emotions, has been shown to be predictive of mother and infant outcomes (Ainsworth, 1979), infant mental health (Schorre, 2001), and perinatal mental health (Tichelman et al., 2019). Thereafter, attachment theory, and associated literature, suggests that supporting parents to engage in behaviours that nurture the attachment relationship and dyadic bond, are of high importance in psychological research and practice.

It is postulated that some caregivers are more likely to experience significant benefits from taking part in early interventions (Underdown et al., 2013). Parents and caregivers, experiencing multiple psychosocial risk factors, have been a focus of early intervention research due to associated dyadic and infant risks. In Chapter Three: Systematic Review one such sample and intervention will be reviewed and discussed in detail. The *Attachment and Biobehavioural Catch-Up* (ABC) programme is a 10-week home based early intervention typically delivered to caregivers of infants who have experienced, or are at risk of, neglect and

adversity. ABC aims to improve parents / caregivers attachment promoting behaviours while also encouraging parental reflective functioning capacity and mentalisation, all of which are associated with better attachment outcomes (Ainsworth, 1979; Dozier et al., 2006). A systematic review of ABC's influence on attachment-related parent behaviours was completed to ascertain the efficacy of this intervention amongst "at-risk" groups. Systematically evaluating the quality of the research available and study characteristics was another aim of the review, which is prepared as a journal article in line with the guidelines for the *Infant Mental Health Journal*. All appendices referenced in this chapter will be found in Chapter Eight: Appendices.

In Chapter Four: Systematic Review – Extended Methodology, additional and relevant information pertaining to the systematic review are discussed. Specifically, supplementary information associated with the development and rationale for the review question, designing the search strategy, and the process of data management and extraction, are presented.

The long term benefits of another early intervention, infant massage – with potential attachment promoting effects – is evaluated in an original study, with a non-clinical community based sample in Chapter Five: The Major Research Project (MRP). The study "Does infant massage confer benefits for the mother - infant dyad? Findings from a 4 year longitudinal study" is prepared as a journal article in line the with the guidelines for authors submitting to the *Infant Mental Health Journal*.

Infant massage is a dyadic intervention that has been used by eastern cultures for centuries. Almost 40 years ago, the *International Association of Infant Massage* (IAIM) was established by McClure (1988). This allowed for empirical study of the intervention as the IAIM set out clear guidelines on how massage should be delivered by trained IAIM therapists. The intervention encompasses aspects of physical touch, as well as psychoeducation on engaging with infants' cues sensitively, responsively and using reciprocity. The evidence base

related to the influence of infant massage on community and “at risk” samples is mixed, with a paucity of longitudinal and qualitative research available. Therefore, the empirical study presented in Chapter Five utilised a mixed-methods longitudinal approach to explore the influence of infant massage on a non-clinical community sample of mother-infant dyads. This study also aimed to address the aforementioned gaps and limitations of the existing evidence (Bennett et al., 2013).

Thereafter, Chapter Six: Extended MRP Methodology, provides more detailed information pertaining to the research design, rationale, and procedures, as well as the measures used. Detail on the development of a unique vignette to assess parent sensitivity and the associated data analysis processes is provided here. A summary and discussion of strengths and limitations of the methodology conclude this chapter. Supplementary information on participant recruitment and participant information and consent forms, as well as, detailed protocols on the qualitative content analysis process associated with this chapter, can be found in the Appendices.

Finally, Chapter Seven: Discussion and Conclusion, aims to summarise and synthesise the overall findings of the included studies as they relate to the theoretical and applied evidence base that informed the research question i.e. attachment based early interventions and parent behaviour. Chapter Seven discusses these findings with respect to clinical implications and their contribution to existing and future research in the area of infant massage and early attachment and dyadic interventions.

All appendices are referenced in order of appearance (Appendix A – O) in Chapter Eight.

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Chapter Two: Extended Literature Review

Background

The current thesis is grounded in attachment theory. It investigates the factors that influence the formation of attachment, how we can intervene to support attachment formation, and the impact attachment related factors can have on parents and their developing children. Therefore, the following text will provide a summary and analysis of the literature and theory that provided a framework and informed the design of my research. Both the systematic review and major research project focused on the impact of early interventions on attachment-related behaviours, specifically sensitivity and physical touch, consequently these two mechanisms will be discussed in more detail below.

Bowlby (1969) conceptualises attachment as an infant's evolutionary need to seek comfort, nurturance and safety from a small number, usually just one, caregivers in their life. According to Bowlby (1969) a safe, affectionate and attuned relationship in an infant's early life where their physical, social and emotional needs are typically met is essential for good developmental, as well as, physical and mental health outcomes in later life. It is also suggested that this initial reciprocal relationship between infant and caregiver forms an "Internal Working Model" (IWM) which guides the infant's future interactions, relationships and perceptions of themselves, others and the world. This suggests that early attachment can have a life lasting impact.

The formation of attachment, and the constructs that underpin its development have been widely investigated since Bowlby's formative work. The theoretical constructs of attachment are better understood when considered alongside the influential work of Harlow and Zimmermann (1959), Ainsworth (1978), Main et al. (1985), and Brazelton et al. (1975) who have all verified and expanded on Bowlby's initial theory. Presently, attachment theory is

being integrated into the clinical practice of many mental health, social work and perinatal professionals, both to formulate clinical presentations and to intervene through manualised programmes and therapeutic interventions (Mountain et al., 2017). The strength of the theoretical literature on attachment theory has supported its growing practical evidence base and application into mainstream clinical practice.

Mechanisms of Attachment Formation

Attachment Styles

Ainsworth (1979) built on Bowlby's theory by seeking to understand how attachments are formed, and how they differ between infants. Ainsworth used the now famous "Strange Situation" to investigate her research questions. This separation – reunion observational study was vital in advancing attachment research and theory. Based on observations of mother-infant dyads Ainsworth et al. (2015) proposed the existence of three primary attachment styles: *secure*, *avoidant* and *ambivalent/anxious*. Infants in the avoidant and ambivalent group were described as less capable of using their mother as a source of emotion regulation, security and comfort during the reunion phase of the experiment. In contrast, securely attached infants sought comfort from, and were soothed by their mother on her return. Main and Solomon (1986) proposed a fourth attachment style, classified as "*disorganised*" typically referring to children who are very dysregulated, difficult to soothe and are more likely to have experienced neglect or trauma. The "Strange Situation" characterised a secure attachment by a sequence of infant behaviours: 1. The infant becomes upset when separated from their caregiver, 2. They seek comfort on the caregiver's return, and 3. They are comforted by them when they are reunited. This categorisation of child patterns of behaviour into distinct attachment styles allowed for research amongst this population that could inform differences in child, relational and caregiver trajectories, that were associated with having a particular attachment.

Mechanisms of Attachment – Parent Behaviours

Maternal behaviour patterns associated with attachment styles were also identified during Ainsworth (1979) longitudinal study of dyads. Engagement in more sensitive responding to infant cues, in affectionate and comforting physical contact with the infant, as well as more face-to-face interaction time, were all noted to be behaviours positively associated with secure attachment, as well as better outcomes amongst children. The literature overwhelmingly proposes that specific parental behaviours, predict attachment style and the future social and emotional development of the infant (Cassidy et al., 2013; Cassidy et al., 1996; Stacks, 2007; Van Der Voort et al., 2014; van IJzendoorn et al., 2022). Although Bowlby (1958) first noted that the function of the relationship between caregiver and infant is to fulfil more than just physiological needs, and described the role of the parent in emotion regulation of the infant, Ainsworth (1979); Ainsworth et al. (2015) helped to further clarify and operationalise the caregiving behaviours that influence attachment formation.

Thereafter, Ainsworth (1979) findings have been replicated by attachment researchers and a number of mechanisms of parent behaviour associated with the development of a secure attachment have been validated. De Wolff and van IJzendoorn (1997) conducted a meta-analysis of studies examining parental antecedents to secure attachment. The results found that a wider variety of mechanisms than initially proposed influence attachment formation. The authors grouped these mechanisms into eight overarching domains including: contiguity of response (i.e. frequency and promptness of response to infant), physical contact, cooperation (i.e. the presence or absence of interfering maternal behaviour), mutuality, synchrony, support, attitude and stimulation (De Wolff & van IJzendoorn, 1997). The first grouping “contiguity of response” refers to parental sensitivity. The concept of sensitivity is based on Bowlby (1958) original explanation regarding the utility of a newborn’s signals, babbles and movements in

accessing the attention of those they rely on for survival. If a caregiver is sensitive to the infant's cues and can read them correctly, the infant's physical and emotional needs are more likely to be sufficiently met, thereby creating a safe, secure and consistent, relationship, and environment for the infant. De Wolff and van Ijzendoorn (1997) found this was the most researched and validated mechanism underpinning attachment theory with a small combined effect size calculated from 30 included studies of $r(1,664) = .22$.

They concluded that although parental sensitivity appeared to be the most researched and predictive mechanism for secure attachment formation, it is not exclusive. They highlighted that the literature also points to the role of other relational factors in the development of attachment, as suggested more recently by Zeanah et al. (2011) who noted parent factors such as trauma history (Galbally et al., 2022), psychopathology (Erickson et al., 2019), and parent's own attachment style (Möhler et al., 2001), may impact their ability to respond sensitively and engage in attachment promoting interactions with their child. Thereafter, investigating the role of sensitivity alongside other attachment constructs and related parent factors appears warranted.

Physical Touch

Physical touch is also thought to be involved in infant attachment formation as mentioned by De Wolff and van Ijzendoorn (1997). However, overall findings are mixed. Bowlby's theoretical model of attachment provides some detail on the influence of physical touch but lacks an in-depth discussion of the role of touch in attachment. A large portion of evidence regarding the association of physical touch with attachment comes from research with parents of infants who spend time in the neonatal intensive care unit (NICU). Both the objective quantitative findings, and parents' subjective reports, suggest that increased physical touch significantly supports parent-infant bonding with premature infants (Fleck, 2016).

Amongst healthy infants the findings are similar but scant. Anisfeld et al. (1990) found that increasing physical proximity and touch between mothers and infants via the use of a body baby carrier predicted more secure attachment. Increased physical touch was also associated with an increase in other attachment promoting behaviours such as reciprocity, responsiveness and infant directed vocalisations, when compared to a control group in their study. These differences remained significant even when other extraneous variables were controlled for.

The frequency of affectionate touch during the first six months of life has also been shown to predict reciprocal communication between the mother-infant dyad during the second six months, despite affectionate touch also decreasing significantly during this time (Ferber et al., 2008). Ferber et al. (2008) postulate that the mechanism of touch may be most important during early infancy, as it is a child's primary means of communication at this time, and consequently has a longitudinal impact on the child and dyadic relationship.

In addition, a recent narrative review of the literature on physical touch and attachment amongst healthy full-term infants by Norholt (2020) concluded that the overall evidence is in favour of the original theory, i.e. affectionate physical touch in infancy does influence attachment style. However, Norholt (2020) acknowledge the paucity of empirical research on physical touch and attachment related outcomes in recent decades, and highlight a need for more longitudinal research that accounts for potential infant and mother moderating factors such as social status, psychopathology and infant temperament, as well as other attachment constructs, to strengthen and update the evidence on physical touch and attachment.

Attachment and Development

Early Interventions

Infants with a secure attachment are less likely to have internalising and externalising problems in childhood and adolescence (Madigan et al., 2013; Madigan et al., 2016; Roskam,

2019). The impact of an early insecure attachment style can permeate an individual's life in many ways. Research into understanding the constructs and parent factors that influence attachment formation – such as those discussed above – is important to allow for the design and evaluation of effective and appropriate clinical early interventions.

A number of interventions have been shown to support attachment formation indirectly via changes to the constructs discussed i.e. *sensitivity to infant cues, responsiveness based on these cues and physical touch and proximity between infant and caregiver*. This thesis will examine two specific early interventions focused on a number of attachment related factors. The first is The *Attachment and Biobehavioural Catch-up* (ABC) programme which is the focus of the systematic review in Chapter Three (Dozier et al., 2006). ABC is a home visiting intervention that focuses on increasing parental sensitivity, as well as mutual delight, and decreasing intrusiveness and negative affect towards the infant, via a home delivered dyadic method. ABC has primarily been trialled with infants who are at risk of, or have a history of neglect and adversity/abuse. Research on ABC has mainly focused on infant development and wellbeing despite ABC explicitly targeting parent behaviour as the putative mechanism of change. A systematic review by Grube and Liming (2018) highlighted the benefits of ABC to infant emotional and social development. However, they noted the exclusion of parent related outcomes as a major shortcoming of their review. A need for a synthesis of the research and outcomes in relation to ABC's effect on attachment-related parent behaviour was highlighted, and consequently informed the systematic review in Chapter Three, where ABC is described in detail.

The second attachment based intervention of interest was infant massage. Infant massage was the topic of investigation for the major research project included in this thesis. Like ABC, infant massage is a dyadic early intervention, however, it has a greater focus on the construct of physical touch, has been used for centuries, and has been trialled more widely

amongst non-clinical, community samples than the ABC programme. Despite their differences, both converge on their aim of promoting attachment-related parent behaviours, to mediate improvements in overall attachment, in a bid to improve infant and maternal outcomes.

Infant Massage: A critical review

Overview

Infant massage is a medium of physical touch between infants and caregivers that has been used traditionally in eastern cultures for centuries (Reissland & Burghart, 1987). It is conceptualised as a form of communication between the parent and infant that typically takes the form of skin-to-skin contact, steady eye contact, soothing vocalisations from the parent, and sensitive dyadic interactions.

The International Association of Infant Massage (IAIM) was established by McClure in 1984, and she consequently set out the IAIM guidelines (McClure, 1988). Today IAIM is still the organization (based in over 70 countries) that represents infant massage on the global stage. The organisation states that it is grounded in medical and scientific research and that their mission is “*to promote nurturing touch and communication through training, education and research so that parents, caregivers and children are loved, valued and respected throughout the world community*” (www.iaim.net). All IAIM certified massage therapists complete a standardised training that includes both theory and practical skills. The existence of this governing body and its principles and guidelines for delivering interventions offers a source of homogeneity, standards, and reliability for research into infant massage interventions in the 21st century.

The literature suggests infant massage can improve the function of a baby’s internal systems such as the circulatory system, endocrine system and gastrointestinal system (Field,

2019). Therefore, over the past almost four decades Western science has begun to explore the potential benefits of infant massage amongst mother-infant dyads in a variety of cohorts, particularly with infants who are born with physical vulnerabilities including; preterm infants (Cody, 1995), or infants with disabilities (Cullen-Powell et al., 2005).

At risk groups.

The literature on infant massage also proposes that the intervention improves mother-infant attachment by engaging the dyad in a set of reciprocal interactions during the massage process. These interactions provide opportunities for the parent to become more sensitive and attuned to their infant's behaviours and cues thereby indirectly improving the attachment bond between them (Underdown & Barlow, 2011). Evidence of improvements in attachment amongst a variety of "at risk" populations has been documented in the literature including amongst samples such as: maternal substance misuse (Clausen et al., 2012), teenage mothers (Field et al., 1996), and mothers with perinatal depression (PND) (Onozawa et al., 2001).

Studies investigating the efficacy of infant massage in improving attachment-related parenting behaviours amongst samples with maternal psychopathology, are based on Bowlby (1958) original attachment theory of "Internal Working Models" (De Wolff & van Ijzendoorn, 1997). Findings from Cohn et al. (1990) suggested that parental depression is likely to significantly disrupt secure attachment formation due to increased negative affect expression towards the infant, increased hostility, restrained physical touch and decreased sensitivity and responsiveness. This assumption was supported in a meta-analysis by Barnes and Theule (2019) who found infants of mothers' with depression were nearly twice as likely to have a insecure attachment compared to infants of non-depressed mothers. Thereafter, infant massage has been reasonably trialled as an intervention to promote bonding with mothers who have perinatal depression (PND).

O'Higgins et al. (2008) found infant massage was an effective intervention for improving attachment and attunement in mother-infant dyads where the mother was experiencing mild to moderate symptoms of PND, measured using the *Edinburgh Postnatal Depression Scale (EPDS)*. The massage intervention was delivered during one hour sessions over six weeks by an IAIM trained massage therapist. Significant improvements in sensitivity to infant cues were found in the massage group when compared to the control. A difference nearing significance in infant interaction performance was found post intervention. In addition, significantly more of the massage (87%) than the support (63%) group experienced a clinically significant reduction in PND symptoms post intervention.

In a similar study, Onozawa et al. (2001) highlighted the benefits of infant massage as an intervention for mothers' with a clinical diagnosis of depression using an RCT design. Symptoms of depression decreased for both the massage and control group. However, sensitivity in interactions improved significantly in the massage group only. Despite the significant effects found, Onozawa et al. (2001) reported a small sample size ($N=25$) and large attrition rates, reducing the generalisability and reliability of the findings. Dehkordi et al. (2019) attempted to address these shortcomings in their RCT with a clinical sample of 120 mothers. Those in the infant massage group reported significantly lower mean scores on the *EPDS* following six weeks of massage with their infant. However, this study offered one 15 minute massage video, and one set of massage instructions, as the training for parents, and did not refer to the IAIM guidelines, nor were any adherence or fidelity measures referenced. Furthermore, this study was completed in the middle east, similar to a significant amount of the infant massage literature, reducing the generalisability of the findings. Finally, there was no follow-up of participants beyond six weeks post intervention and hence no longitudinal conclusions can be drawn from this study.

A systematic review of interventions that support mother-infant attachment for mothers' with postpartum mood disturbance concluded that compared to psychotherapy and pharmacological interventions infant massage was associated with greater improvements in the mother-infant relationship amongst mothers with PND (Lindensmith, 2018). However, the overall evidence on PND interventions targeting the mother-infant relationship was limited, only 21% of the 19 included studies assessed infant massage, compared to 42% of the included studies discussing psychotherapy. Although the literature suggests infant massage may support attachment formation and mental health amongst mothers with PND, limitations of the research make it difficult to draw conclusions. In particular, small samples, lack of follow-up and massage interventions that are not uniform with the IAIM guidelines, limit the power of the significant findings.

Community Samples

Despite a large portion of the infant massage evidence being published amongst “at risk” groups, its benefits amongst community samples has also been investigated in peer-reviewed journals (Bennett et al., 2013; Vicente & Pereira, 2021).

Bennett et al. (2013) completed a Cochrane review of infant massage literature, including randomised controlled trials (RCT) using a sample of “typical” mother-infant dyads only (excluding preterm infants, those at risk of disability, mothers with mental health difficulties). A number of included studies reported infant massage had a significant effect on infants' physical health with respect to increased weight, length, sleep duration and time spent crying (Field et al., 1996; Narenji & Rosbahany, 2008). Cognitive and social outcomes were also noted to significantly improve in the infant massage group in some studies with respect to psychomotor skills (Jing et al., 2007; Koniak-griffin, 1988) and personal and social behaviour (Koniak-griffin, 1988). However, no significant effect was reported in any of the 34 included

studies in relation to changes in attachment amongst this population (Jump, 1998; O'Higgins et al., 2008). The conclusion drawn by Bennett et al., (2013) was that despite some positive and significant results, their findings did not support the use of infant massage with low risk groups. They advised more high quality research investigating infant massages' utility with healthy samples, as well as examination of the mediating effects, was required to determine its overall efficacy with this population.

Since the publication of their review, studies with healthy samples have found contradictory evidence. Hanifarizani et al. (2020) reported that four weeks of infant massage was found to have a small effect on infant growth amongst a community sample, with Juwitasari and Harista (2017) reporting similar findings regarding increases in the baby's weight following intervention. Hartanti et al. (2019) noted infant massage had a significant effect on sleep duration and night time awakenings amongst a healthy sample also.

Thereafter, some recent studies have also shown infant massage has a positive effect on attachment related constructs amongst healthy dyads (Moussa et al., 2021; Vicente et al., 2017). Vicente et al. (2017) found amongst a healthy sample of Portuguese dyads, that an eight week massage programme had a significant positive effect on mothers' childbearing attitudes up to 12-months post intervention. In addition, infant massage was significantly associated with increased confidence in their role as a mother, increased pleasure in parenting, and better perceived social support. These findings suggest infant massage may have a broad range of benefits for non-clinical samples related to indirect attachment and psychological constructs such as maternal/parental attitudes, beliefs and perceptions.

An exploration of these discrepant findings related to infant massages' influence on non-clinical and more "at risk" groups was completed by Underdown et al. (2013). They divided 39 mother-infant dyads into three groups based on risk: low, medium and high risk mothers. Risk was calculated based on factors such as: PND, socio economic status, single

parenthood and maternal age. Interestingly, they found that participants who had been categorised as medium risk benefited most from the intervention. Low risk mothers showed no outcome changes following infant massage with the authors suggesting this was indicative of ‘ceiling effects’ related to the measures used. No change in outcome scores post-intervention were found for the high-risk group either. It was proposed by Underdown et al. (2013) that this group may even experience adverse effects if there was not adequate support from facilitators during the implementation of the infant massage.

Overall, the conclusions and mixed results of studies such as Bennett et al. (2013), Underdown et al. (2013) and Lindensmith (2018) remain accurate. Recent literature continues to diverge on who infant massage is most effective for, how infant massage is delivered, and what constructs and outcomes should be measured. Overall, published research with healthy, community based dyads remains sparse, with many of these studies describing an eastern population, weak methodologies, small samples and limited longitudinal findings. Furthermore, the focus continues to be on infants physical health and development with attachment and relational based studies amongst community samples limited in the literature.

Finally, qualitative research on mothers’, and/or fathers’, experience of infant massage is very limited. Midtsund et al. (2019) published one of the few qualitative studies investigating same. They explored 12 mothers’ experience of a standardised six week massage intervention using content analysis. Interviews were conducted 2 weeks – 6 months post intervention and mothers’ included were identified in the community perinatally as experiencing “psychological distress.” Themes that emerged included: (1) A relief and an opportunity for emotional and physical connection with the baby, (2) Appreciating the structure, (3) Increasing self-esteem (4) Connecting with their infant, and (5) Discovering the baby’s presence. Midtsund et al. (2019) concluded that the structure and protected time for the infant massage class, appeared to provide opportunities for mothers to interact with their child under guidance and with

instruction, increasing their familiarity and confidence with their baby. These themes appear to relate to many of the underlying mechanisms of attachment such as; sensitivity, physical touch and/or responsiveness. Qualitative findings such as these are limited in the evidence on infant massage. In future, qualitative findings may complement and guide quantitative study of the constructs that underpin the effect of infant massage on maternal and relational outcomes.

Limitations of the Research

A number of significant limitations exist within the infant massage literature as referenced throughout this chapter. Bennett et al. (2013) Cochrane review highlights these issues. They included 34 studies in their review, outlining that 20 of these studies were “high risk for bias” thereby reducing confidence that the results of these studies represent a true effect of infant massage, suggesting there is an increased chance other factors influenced the findings.

Another important limitation in the literature is the lack of homogeneity with respect to the delivery of infant massage interventions. Amongst the 34 studies in Bennett et al. (2013) review there was variation in intervention delivery, i.e. in four studies the massage intervention was carried out by researchers, in seven studies it was carried out by parents following instruction, in seven studies it was carried out by a nurse and in 12 studies it was unclear who completed the massage. Similar disparity was seen with respect to intervention duration and frequency, with one study classifying a once off 8-minute massage as the intervention (Cigales et al., 1997) and another study classifying the intervention as 15-minute massages performed twice daily for 6 months (Jing et al., 2007). These differences make it difficult to interpret the overall infant massage evidence due to the risk of bias, lack of homogeneity and replication amongst studies. Greater emphasis on RCTs using standardised massage interventions based

on the IAIM guidelines is needed to better understand the mechanisms that link infant massage to mother and infant outcomes.

The significant lack of qualitative research on parental experience and self-reported impact of infant massage also limits our overall understanding of infant massage and its impact on attachment related outcomes. To the best of our knowledge, existing research has also failed to examine the long-term outcomes of infant massage into early childhood.

Summary and Conclusions

Infant massage is an intervention delivered in early infancy that draws on physical touch as well as many mechanisms derived from attachment theory such as, sensitive responding, reciprocal interactions, and attunement. To date the evidence regarding its efficacy with healthy, and at risk groups, is limited due to poor methodological quality, small sample sizes and cultural biases. The literature points to a need for future research that utilises rigorous, transparent methodologies with targeted populations over a longer time frame, to allow for stronger conclusions to be drawn regarding the interventions utility in clinical and non-clinical settings. Therefore, these shortcomings and gaps in the current evidence informed the major research project's question and methodology, which aimed to aid future clinical understanding and application of infant massage.

In conclusion, a number of early interventions to support mother and infant mental health draw on attachment theory. *Attachment and Biobehavioural Catch-Up* (ABC) and infant massage are two such interventions. The evidence to support both is mixed, and there is a lack of clarity regarding the mechanisms of change, the influence on parent behaviours, the longitudinal impact, as well as the nuances regarding which populations they are most effective

for. The included systematic review and major research project aims to add, and provide novel evidence, to the literature on these topics.

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Chapter Three: Systematic Review

The impact of the “Attachment and Biobehavioural Catch-Up” programme on attachment-related parent behaviour – *A Systematic Review*.

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Title

The impact of the “Attachment and Biobehavioural Catch-Up” programme on attachment related parent behaviour – *A Systematic Review*.

Abstract

“Attachment and Biobehavioural Catch-Up” (ABC) is a 10 session home visiting programme, grounded in attachment theory. It aims to improve child emotion regulation, attachment and behavioural outcomes through changing caregivers’ attachment related behaviours. There is increasing evidence with respect to the efficacy of ABC, but the interventions direct effect on parent behaviour remains unclear. This review examined ABC’s association with parent behaviour (the putative mechanism of change). The *PubMed*, *EMBASE*, *PyscINFO* and *SCOPUS* databases were searched for relevant studies in August 2021, and again in April 2022. The eligibility criteria for included studies were (1) infants aged 0-27 months at time of the ABC intervention, (2) “at-risk” parents, (3) controlled trials published in peer-reviewed journals, and (4) measure of attachment related parent behaviour included. Eleven eligible studies were included, nine of which were rated as having good methodological quality. The findings showed ABC had a significant small to medium effect on a variety of attachment-related parent behaviours amongst parents’ with multiple psychosocial risk factors. “Sensitivity” was measured most frequently, with small to medium main effect sizes recorded at follow-up compared to controls. Implications for the clinical effectiveness of the ABC programme in community settings are discussed. Future research should clarify whom ABC is most effective for, and how it compares to similar attachment based interventions. .

Key words: ABC; attachment intervention; sensitivity; parenting; infant mental health.

Three Key Findings

1. ABC has a small-to-medium effect on improving a range of attachment-related parent behaviours in at risk groups, and compared to control interventions.
2. ABC exerted the most influence on parental sensitivity although benefits to other attachment-related parent behaviours were also observed.
3. ABC has not been compared to other attachment interventions or with varied social groups, reducing the generalisability and health economic value of these results.

Statement of Relevance

To date no review has systematically examined the literature on ABC, an attachment based early intervention, and parent behaviour. This review provides synthesised evidence that ABC has a direct and significant effect on the parenting behaviours of parents who are “at risk” due to psychosocial factors. Attachment style is known to be intergenerationally transmitted. Findings suggest ABC is effective in changing parents behaviour and potentially intersecting the intergenerational cycle of relational trauma. These findings may support further use of ABC in communities and clinical practice.

Diversity and Anti-Racism Statement

All studies were conducted in the USA. African/American and Hispanic participants accounted for the largest proportion of participants in most samples. ABCs home delivery reduces power discrepancies that may arise in clinic settings. The representation of minority parent coaches in some studies and the delivery of the intervention in Spanish when appropriate is an inclusive step. The principles of attachment theory are universal. However, the social and cultural challenges of implementing attachment promoting processes in the context of being in a racial or ethnic minority group are not explored in the included studies, and may be an avenue of future research.

Introduction

Attachment theory proposes that the early interactions between an infant and their primary caregiver are fundamental in the formation of the infant's attachment style (Bowlby, 1969). Attachment style consequently impacts infants' cognitive, social and emotion regulation skills, as well as their overall future wellbeing (Groh et al., 2017). According to attachment theory some parent behaviours and relational processes have greater influence on infant attachment than others (Ainsworth, 1978). Sensitivity, reciprocity, reflective functioning and mutual delight are some of the mechanisms that are reported to lead to better social and emotional outcomes for children (Groh et al., 2017).

In recent years attention has turned to the question of whether dyadic psychological interventions with parents and their infants can promote these attachment related capacities. A variety of attachment-based interventions have been trialled during infancy with dyads considered "at-risk" (e.g. child protective services involvement, psychopathology, substance misuse, below poverty line, one parent family, teenage parent, low educational attainment), over the last twenty years (Mountain et al., 2017). These interventions vary in duration from the 10-week Attachment and Biobehavioural Catch-up (ABC) programme (Bernard et al., 2017) to the two year "Minding the Baby" intervention (Sadler et al., 2013). Many of these interventions are delivered in clinical settings, such as "The Circle of Security" and "Mom Power" (Cicchetti et al., 2006; Rosenblum et al., 2017), and others home visiting programmes (Dozier et al., 2011; Sadler et al., 2013). The commonality between all interventions is a focus on improving child emotion, social and cognitive outcomes via the child-parent attachment relationship. They all draw on attachment principles, but the model and method of delivery varies.

Erickson et al. (2019) provided a scoping review on attachment-based interventions with “at risk” samples including evidence based interventions such as “Child-Parent Psychotherapy” (CPP) (Cicchetti et al., 2006) and “The Circle of Security”(COS) (Cassidy et al., 2017). Erickson et al. (2019) defined “at-risk” based on parent and infant factors such as perinatal mood disturbance, maternal history of childhood maltreatment, lack of social support, lower socioeconomic status, infant exposure to abuse or neglect, and infant illness (Cohn et al., 1990; Crockenberg, 1981; Tichelman et al., 2019; Zeanah Jr & Zeanah, 2019). A number of interventions reported positive results with respect to improving child developmental and relational outcomes with these dyads. However, effect sizes were not reliably reported (Erickson et al., 2019). The COS groups were associated with a move from disorganised to secure attachment classification, as well as significantly improved infant inhibitory control. Similarly, CPP was significantly associated with decreases in child behaviour problems and increases in secure attachment styles. However, the methodological quality and effect sizes, as well as the study and intervention characteristics included in this review, varied extensively. Erickson et al. (2019) suggested more research is required to determine each early interventions’ individual efficacy.

ABC is one such specific attachment based intervention developed by Dozier et al. (2006) and included in the Erickson et al. (2019) review. ABC aims to develop positive parenting behaviours and is currently intended for use with adoptive parents, foster carers or parents of infants that may have been exposed to adverse experiences in early life (Dozier et al., 2011). It is a brief, structured and manualised home visiting intervention for infants aged 6-24 months and their primary caregiver.

ABC is grounded in the principles of attachment theory and targets three core parenting processes as described by Zeanah (2018) and Dozier and Bernard (2019): (1) nurturing the distressed child, e.g. providing nurturance to a child even when the child does not elicit

nurturance or it does not come naturally to the parent, (2) following the child's lead with delight e.g. becoming more positively responsive to child's actions and interactions, and (3) avoiding intrusive or frightening behaviour e.g. helping parents increase their awareness of their own frightening behaviours. ABC was initially trialled with infants who had experienced early adversity and showed attachment disorganisation, therefore presenting as difficult to soothe. Thereafter, most of the initial research by the interventions founders has trialled ABC with parents involved with Child Protective Services (CPS) due to reports of neglect, or risk of neglect (Bernard et al., 2012; Dozier et al., 2006). This initial research has resulted in the ABC intervention being identified as Level 1 evidence-based practice by the California Evidence-Based Clearinghouse (CEBC) for Child Welfare (2020). Level-1 evidence is the highest rating that can be given following evaluation of the scientific evidence for an intervention by the CEBC. Therefore, it may be assumed the evidence for ABC's efficacy on improving child outcomes such as, attachment style and emotion regulation, is strong. However, it appears this evidence is strong amongst children and families directly involved with CPS, and is less clear amongst other cohorts. Furthermore, most of the evidence on the CEBC relates to child outcomes only, and cannot be used to draw explicit conclusions regarding mediating parent behaviours.

Advantages of ABC as an intervention include its brevity, being manualised with protocols in place to promote fidelity, moment to moment parent coaching, delivery by parent coaches, as well as being home based. This combination of strengths is unique to ABC, and to the best of the author's knowledge is not reported by other attachment based interventions with similar aims (Cassidy et al., 2017; Gerdtz-Andresen, 2021; Sadler et al., 2013). This contrasts with CPP, which involves weekly 1-1.5 hour sessions for 12 months and does not follow a protocol for delivery. The delivery of the COS intervention varies but the majority of COS protocols are not delivered in a home setting, require extensive training and can be up to 20

weeks in duration. The individual differences and limitations of these well-established interventions appear to be avoided in ABC.

Grube and Liming (2018) synthesised the evidence of 10 randomised controlled trials (RCTs) in a systematic review evaluating ABC with respect to its relationship with child outcomes. The review stated that compared to dyads in control groups, ABC was associated with better outcomes such as, child secure attachment (Bernard et al., 2012), cognitive flexibility (Lewis-Morrarty et al., 2012) and child waking cortisol levels (Bernard et al., 2015), however they failed to report effect sizes. Grube and Liming (2018) did not examine the impact of the intervention on parent behaviour, identifying this as a primary limitation.

Despite the exclusion of parent outcomes by Grube and Liming (2018) other studies evaluating ABC have recorded parent behaviour as primary and secondary outcomes (Berlin et al., 2014; Bick & Dozier, 2013; Lind et al., 2017). In their study of 78 participants Caron et al. (2016) reported large effect sizes of ABC compared to a control group on attachment related parent behaviours including “parental sensitivity” and “intrusiveness”, and small effect sizes on “mutual delight” post intervention. Yarger, et al. (2020) trialled ABC with 120 adoptive parents finding small to medium effect sizes for parental sensitivity and intrusiveness compared to a control at follow-up. Similarly, amongst 200 caregivers the ABC group had increased scores for parental sensitivity at follow-up, however small and non-significant effect sizes were reported. More recently, Schein et al. (2022) found that when facilitated via telehealth, both exclusively and mixed with face-to-face session, ABC was associated with increased parental sensitivity post-intervention, highlighting its potential efficacy in today’s changing model of healthcare delivery. ABC states its main objective is to enhance parenting behaviour (Dozier & Bernard, 2019). Therefore, the impact of this intervention on parent outcomes is of salience to understanding the overall benefits of ABC.

The literature suggests ABC may have a positive impact on attachment-related parent behaviours. However, heterogeneity amongst studies' samples, methodologies and outcomes make an overall assessment of ABC and attachment – related parent behaviour unclear. We proposed that by applying a systematic review protocol to the relevant evidence a more accurate and meaningful synthesis of ABCs association with attachment-related parent behaviours would result. The application of a systematic review protocol to the literature would also allow for examination of which parent attachment behaviours are most optimally impacted by ABC.

In summary, the purpose of this study was to systematically review the literature to evaluate ABC's association with attachment-related parent behaviours. Additionally, we proposed that clearer evidence on study characteristics and parent related outcomes may also encourage wider use of ABC in community, health and social care settings, and guide future ABC research.

Methodology

A systematic review was performed in accordance with the *Preferred Reporting Items for Systematic Reviews and Meta-Analysis* (PRISMA) (Moher et al., 2015).

Study inclusion criteria

Inclusion criteria comprised of the following: (1) peer reviewed, (2) evaluated the 10-week manualised ABC intervention using a controlled trial design, (3) established measures of parent behaviour utilised i.e. some psychometric properties or previous use in peer-reviewed research, (4) sample infant age range 0-27 months when ABC was implemented, and (5) parent sample of “at-risk” parents, with “at risk” defined as the existence of one or more psychosocial

risk factors, including, child protective services involvement, psychopathology, substance misuse, below poverty line, one parent family, teenage parent, low educational attainment. The exclusion criteria included; (1) review papers, (2) case studies, (3) studies which do not use the ABC intervention, (4) studies that do not report parent behaviour outcomes, and (5) studies not in the English language

The specific age range of 0-27 months was agreed following discussion amongst all authors. ABC typically targets 6-24 month old infants. However, our scoping review suggested that it was common for some infants in a proportion of studies to be just beyond the typical 24 month ceiling, and for some to be below the 6 month baseline. Therefore, it was decided that these studies which met all other eligibility criteria, and for which the mean age of their sample was within the specified age range, would be included.

Search Strategy

The *PubMed*, *Scopus*, *EMBASE* and *PsycINFO* databases were searched from their conception to August 2021 using the following search terms; (“early” or “parent” or “mother”) and (“intervention”) and (“attachment and biobehavioural catchup” or “attachment and biobehavioural catch-up” or “attachment and biobehavioural catch up” or “ABC”) (Appendix B). The search was repeated on all databases in April 2022, inclusive of studies published between 2021 – 2022. No new studies meeting our eligibility criteria were found.

The search terms were derived from examination of keywords from relevant peer-reviewed literature, and the databases were chosen based on their relevance to the proposed topic and the guidance of Bramer et al. (2017) research on systematic reviews. The Infantcaregiverproject.com via the University of Delaware and California Evidence Based Clearinghouse for Child Welfare (2020) were also hand searched for any relevant literature due to their relevance to the ABC intervention. Finally, the reference lists of the included studies

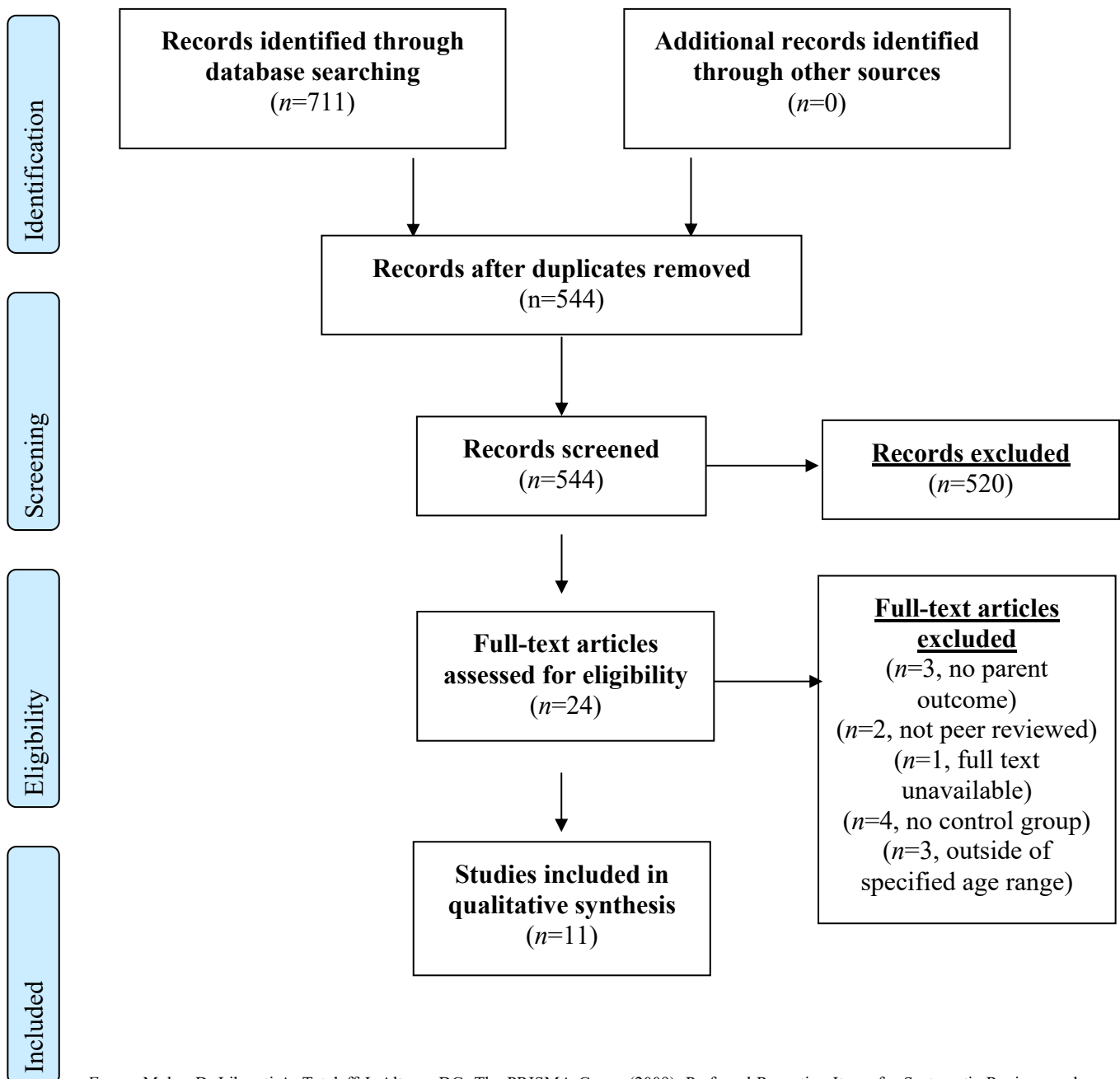
were examined to identify any additional literature that met the eligibility criteria but that was not returned by the initial search.

Data Collection

Following the identification of all returned search items 744 studies were downloaded to a data management file. After removing duplicates, 544 studies remained for further review. The titles and abstracts of these remaining studies were screened by one independent reviewer (EOB) according to the previously described exclusion criteria. Following this, 24 potential studies remained. The second and third authors (CMC and SMM) screened a selected sample of titles and abstracts for quality assurance at this stage with no disagreements regarding exclusion.

Next, the pre-determined inclusion criteria were applied to the full text of the remaining studies by all three authors. Following discussion amongst authors regarding ambiguous studies consensus was reached and 11 studies remained. A review of the reference lists of the included studies returned 11 potentially eligible studies, of which zero were included following the review of their full texts.

The final review consisted of 11 studies, one study (Lind et al., 2020) reported outcomes at two follow-up time points. The outcomes at each time point are reported separately but counted as one study in this review. The full screening and selection process can be seen in the PRISMA flow chart in *Figure 1*.

Figure 1: Prisma Flow Diagram

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed100009

Data Extraction

After selection of included studies quality assurance was completed by three independent reviewers using the Cochrane Tool for Assessing Bias (Higgins et al., 2011) (Appendix C). EOB reviewed all studies with the two independent reviewers SMS and CMC each reviewing six studies using the quality assurance tool. Ratings were compared with minimal divergence between authors. Differences on one study was discussed and consensus reached.

One reviewer (EOB) extracted data from the studies using a pre-determined data collection form. A second reviewer (SMS) extracted a sample of the data for quality assurance purposes. Data extracted included study characteristics e.g. design, type of control, study location, and participant demographics e.g. race, gender, mean infant age, as well as data related to the primary research question, including: (1) measures of parent behaviour used and, (2) the effect size of ABC on “attachment related parent behaviour” at follow-up. Specifically, examination of whether parents assigned to the ABC group showed statistically significant changes in attachment - related parent behaviour at follow-up compared to a control group, was carried out.

Data Analysis

A narrative synthesis was conducted, and effect sizes on the difference of parent behaviour outcomes between the ABC and control group at follow-up were reported when available in included studies. Due to heterogeneity between studies with respect to types of control groups, follow-up duration, and outcome measures used, the assumptions of meta-analysis were not met.

Results

Eleven studies published from 2006 to 2021, with a total sample of *1701 participants*, were included. The results are categorised into study and sample characteristics, and outcomes.

Quality Assessment and Risk of bias

Overall nine of the studies were deemed low, one deemed high and one unclear for risk of bias (Table 3.1). Rates of attrition and missing data, as well as unclear details regarding selection and detection bias in Bernard et al. (2015) lead to this study being deemed at higher risk of bias. Yarger et al. (2020) provided limited detail on selection bias making it difficult to categorise these sections as high or low, therefore it's overall rating was considered "Unclear." All other studies were considered to have good methodological quality.

Table 3.1:
Quality Assessment

Author	Selection Bias		Performance Bias	Detection Bias	Attrition Bias	Reporting bias	Other Bias	Total Bias	Measured fidelity to the model	ICC/IRR of Outcome Measures
	Random Sequence Generation	Allocation Concealment	Blinding of participants and personnel	Blinding outcome assessment	Incomplete outcome data	Selective Reporting				
Berlin et al., (2014)	Low	Unclear	Unclear	Low	Low	Low	High* <i>Small sample size, lack of pre-treatment measure of sensitivity.</i>	Low	No	ICC =0.8.
Berlin et al., (2018)	Low	Unclear	High	Low	Low	Low	Low	Low	Yes	ORCE: ICC >0.7
Bick et al., (2013)	Low	Unclear	High	Low	Low	Low	Low	Low	Yes	Sensitivity: ICC=0.85
Bernard et al., (2015)	Unclear	High	High	Low	High	Low	Low	High	Yes	Sensitivity: ICC=0.81
Hepworth et al.,(2020)	Low	Unclear	High	Low	High	Low	Low	Low	Yes	ORCE: ICC=0.81
Lind et al., (2020) (18 Mo)	Low	High	High	Low	Low	Low	Low	Low	No	Sensitivity: ICC=0.69

Lind et al., (2020) (38 mo)										IRR/k=0.79
Perrone et al., (2020)	Low	Low	High	Low	Low	Low	Low	Low	Yes	Sensitivity: ICC=.62 (baseline) and .79 (F/U). Intrusiveness: ICC =.79 (baseline) and .84 (F/U) Pos. Regard: ICC=.75(baseline) and .74 (F/U)
Raby et al., (2021)	Low	Unclear	High	Low	Unclear	Low	Low	Low	No	AAS: ICC=0.92 (baseline) and 0.96 (F/U). Sensitivity: ICC=0.9
Thorpe et al., (2021)	Low	Low	High	High	Low	Low	Low	Low	Yes	Cronbach's alpha 0.83 (baseline) and 0.78 (F/U).
Yarger et al., (2016)	Low	Unclear	High	Low	Low	Low	Low	Low	Yes	Sensitivity: ICC=0.61

									Intrusiveness: ICC=0.77
Yarger et al., (2020)	Unclear	Unclear	High	Low	High	Low	Low	Unclear	No Withdrawal: ICC=0.74

Abbreviations: F/ U; Follow-up, IRR; Inter-rater reliability, ICC; Intra-class correlation, ORCE; Observational Record of the Caregiving Environment.

Study Characteristics

The study and sample characteristics of all 11 included studies are detailed in Table 3.2. All 11 studies were controlled trials; including pilot RCTs, RCTs, and follow-up RCT studies. “Developmental Education for Families” (DEF) was utilised as the control group for the majority of RCTs (6 studies). DEF is a 10-session intervention program designed to enhance infants' cognitive and linguistic development without a focus on attachment-related parent behaviours. Other control groups included “Book of the Week (BoW)” which was described as a light control protocol where mothers were sent developmentally appropriate books for 10 weeks and received a weekly phone call. Two studies used a waitlist control group (Perrone et al., 2020; Thorpe et al., 2021).

All studies were completed in the USA. Five studies were recruited through Child Protective Services (CPS) due to concerns regarding neglect or parental risk factors. Four studies recruited through community programmes for disadvantaged families and one study recruited at a residential substance misuse facility (Berlin et al., 2014). Sample size ranged from $N=21$ (Berlin et al., 2014) to $N=208$ (Berlin et al., 2018) with seven studies having a sample greater than 100. The length of follow-up between ABC completion and measuring parent behaviour varied extensively from two weeks (Berlin et al., 2014) to seven years in Raby et al. (2021). Two studies were follow-up investigations of original RCTs where the original RCTs did not meet eligibility criteria due to the lack of a measure of parent behaviour reported in the original study. All studies reported ABC was implemented over 10 sessions, with Raby et al. (2021) and Bernard et al. (2015) stating participants received one and two booster sessions respectively as part of their follow-up studies. All studies used trained parent coaches to implement the ABC intervention with limited information on the professional background of parent coaches provided overall.

Fidelity to the ABC model is emphasised as a key factor by the creators of the programme. Seven studies reported using fidelity checks (Table 3.1). Peer coding of “moment-to-moment commenting” of video clips from other parent coaches’ ABC sessions was the main fidelity measure reported.

Table 3.2:*Study and Sample Characteristics.*

Authors	Design	Attrition	Total Sample Size N	Type of Mothers	Length of F/U (Months)	Recruitment	Type of Control	Child Eth (%)	M (SD) Inf Age @ ABC/Ctrl	M (SD) Parent Age	Fem Carers (%)	Income <20,000 (%)	Less than H Sc education (%)	Lone Parent (%)
Berlin et al., (2014)	Pilot RCT	5	21	BP	0.5	Residential substance abuse treatment facility	BoW	NR	9.6 (6.8)	33 (7)	100%	92%	14%	NR
Berlin et al., (2018)	RCT	6	208	BP	1	Comm Org EI Program	BoW	NR	13 (4)	31 (6.5)	100%	NR	45%	20%
Bernard et al., (2015)	F/U RCT	16	86	BP	48-60	CPS	DEF	72.9% AF/AM 17% White 6% Hisp 3% Bi-rac	< 24 months	30.63 (7.5)	100%	NR	42.5%	NR
Bick et al., (2013)	RCT	NR	96	FP	1 & 12/24	NR	DEF	59% AF/AM 28% White 6% Hisp 6% Bi-rac	9.9 (6.05)	45 (10.7)	100%	NR	19%	21%
Hepworth et al., (2020)	RCT	5	161	BP	1	Comm Org EI Program	BoW	NR	12.6 (4.0)	31.1 (6.6)	100%	Unclear	44%	21%
Lind et al., (2020) (1 Mo)	RCT	6	101	BP	1	CPS	DEF	69% AF/AM 6% White 10% Hisp 15% Bi-rac	9.4 (6.1)	26.1 (7.4)	100%	74%	58%	61%
**Lind et al., (2020)	RCT	6	101	BP	19.5 (7.3)	CPS	DEF	69% AF/AM	9.4 (6.1)	26.1 (7.4)	100%	74%	58%	61%

(36 Mo old)								6% White 10% Hisp 15% Bi-rac						
Perrone et al., (2020)	RCT	42	200	Mixed group: 91.5% BP (n=183)	3.6	Comm Org EI Program; CPS & low income areas.	Waitlist	61.5% Af/AM 0.5% White 14% Hisp 16% Bi-rac	11.82 (4.36)	29.85 (7.32)	96%	83%	NR	NR
Raby et al., (2021)	F/U RCT	0	173	BP	96	CPS	DEF	NR	9.7	34.2	98%	62.5%	20%	NR
Thorpe et al., (2021)	RCT (data leveraged from Perrone et al., 2021)	49	200	Mixed group: 96% BP (n= 191)	1.4(1.33)	Community EI Program; CPS & low income areas.	Waitlist	65.5% AF/AM 0.5% White 14.5% Hisp 16% Bi-rac	0.98 (0.35)	29.85 (7.3)	96%	79.5%	31%	48%
Yarger et al., (2016)	RCT	0	24	BP	Unclear	CPS	DEF	54% AF/AM 38% White 4% Bi-rac	14 (4.1)	26.6 (5.95)	100%	100%	25%	NR
Yarger et al. (2020)	RCT	0	105	BP	7(5.8)	CPS	DEF	62% AF/AM 19% White 19% Bi-rac	20.7 (6.3)	26.7 (7.8)	100%	70%	59%	86%

Abbreviations: ABC; Attachment & Biobehavioural Catchup, Af/Am; African American, Bi-rac; Bi-racial, BoW; Book of the Week, BP; Biological Parent, Eth; Ethnicity, CPS; Child Protective Services, Comm Org; Community organization, DEF; Developmental Education for Families, EI; Early Intervention, Fem; Female, FP; Foster Parent, F/U; Follow-Up, H Sc; High School, Hisp; Hispanic, M Inf Age @ ABC/Ctrl; Mean Infant Age at time of ABC or Control Intervention, M; Mean, NR; Not Reported, RCT; Randomized Control Trial, SD; Standard Deviation.

Sample Characteristics

The mean age of parents ranged from 26.1 years (7.4) – 45 years (10.7). Of the 10 studies reporting on parental education six noted that 58% or less of the participants had completed high school. All studies reported psychosocial risks pertaining to social and financial risk factors. Only four studies reported the percentage of parents who met diagnostic criteria for mental health difficulties and / or substance misuse. The percentages ranged from 10% to 67% for depression. Three studies reported on parental adverse childhood experiences (ACEs). Five studies collected data to compute participants' cumulative risk score. No significant demographic differences between the ABC and control group at baseline or after randomisation were reported in any of the included studies. Table 3.2 provides further details on participant demographic information.

Effects and Outcomes

Eight studies used sensitivity as the primary measure of parent behaviour. The majority of studies used similar methods and measures to assess parental sensitivity. Other attachment related parent behaviours recorded included: intrusiveness, positive regard, parental sensitivity to distress, parents' beliefs about infant crying, disrupted parenting, withdrawal, knowledge of secure base scripts and the Event Related Potential (ERP) of mothers following exposure to emotional faces.

Seven studies used a play assessment which was video recorded followed by blind coding using an adapted 5 point Likert scale from the *Observational Record of the Caregiving Environment* (ORCE) from the *National Institute of Child Health and Human Development* (Nader et al., 2006; Network, 1996). This coding protocol included scales for the core constructs of attachment i.e. sensitivity, intrusiveness and, positive regard. The structure and length of play assessments varied (7 minutes – 20 minutes). Eight included studies provided

sufficient detail on how the assessment was conducted, this is noted as a strength of the research.

Of the seven studies who reported using an adapted ORCE coding scale none referenced a peer reviewed paper on its psychometric properties. A few studies referenced Mills-Koonce (2013) in relation to the coding protocol, however this study remains unpublished. Despite this psychometric shortcoming inter-rater reliability (IRR) or intra-class correlation (ICC) was reported in all studies (Table 3.1).

Other measures utilised to measure attachment - related parent behaviours are detailed in Table 3.3 and include: The *Strange Situation* (Ainsworth, 1979), the *Atypical Maternal Behaviour Instrument for Assessment and Classification* (AMBIANCE), the *Maternal Q Sort* to code dyadic observations (Pederson et al., 1999), Electroencephalogram (EEG), *The Infant Crying Questionnaire* (ICQ) (Haltigan et al., 2012), and the *Disruptive Behaviour Diagnostic Observation Schedule* (Wakschlag et al., 2008).

Impact of ABC on Parent Behaviour

Overall, ABC was reported to have a small-to-medium main effect on parental sensitivity and related attachment behaviours compared to a control intervention, with Cohen's d ranging from small 0.21 (Bernard et al., 2015) to large 0.7 (Bernard et al., 2015) amongst studies reporting this statistic. Some studies reported beta coefficients derived from multiple hierarchical regressions and described a small to moderate effect between ABC participation and improved attachment-related parent behaviours even when controlling for factors such as baseline attachment behaviours, psychosocial risk and child gender (Bick & Dozier, 2013; Thorpe et al., 2021).

In seven of the eight studies that examined sensitivity as an outcome, participation in the ABC group was associated with significant increases in this attachment – related capacity

compared to a control group. Five of the eight studies reported effects sizes in the moderate range, with Perrone et al. (2020) noting a small effect size for the total ABC group but a moderate effect for those who completed all 10 sessions. Similarly, Lind et al. (2020) noted a moderate effect at 1-month post intervention, but reported an insignificant difference between groups at 36-months follow-up. Overall the evidence suggests ABC significantly improved parental sensitivity compared to a time matched control, with a small to moderate main effect reported across studies, both post intervention and at longitudinal follow-up points.

Of the two studies examining positive regard as a construct, one found positive changes. The effect size reported by Berlin et al. (2018) was small in comparison to those reported for sensitivity. The evidence for decreases in behaviours related to “intrusiveness” was more convincing, with two of four studies reporting on this construct finding positive change with large and significant effects sizes described (Table 3.3).

Evidence for ABC’s association with indirect measures of attachment - related behaviours was mixed. Thorpe et al. (2021) found ABC significantly decreased a variety of parental maladaptive beliefs related to infant crying, spoiling and minimisation compared to a control group. Multivariate analysis by Thorpe et al. (2021) revealed ABC had a small to moderate main effect with respect to infant beliefs about crying, as well as small to moderate effect sizes reported for individual scales (Table 3.3). Similarly, the ABC intervention was found to significantly improve secure base script knowledge at follow-up compared to a control group. Raby et al. (2021) noted that parents secure base script knowledge had a moderate effect on their parental sensitivity and consequently using multiple regression analysis revealed that ABC had a small indirect effect ($B=0.16$) on sensitivity via improvements in secure base script knowledge. No significant main effect of ABC on sensitivity was reported by Raby et al. (2021).

Finally, Bernard et al. (2015) found mothers in the ABC group had significantly greater brain activity (measured using ERP) in response to infants emotive faces compared to brain activity in response to neutral faces. This significant difference in response to emotive versus neutral faces was not found in the control condition. The ABC intervention had a moderate main effect on response to crying and laughing faces compared to neutral faces according to Bernard et al. (2015).

Overall this combination of findings suggest that the effect of ABC on sensitivity and related attachment constructs ranges from small to medium when compared to a control group.

Table 3.3:*Parent Behaviour Measures and Outcomes.*

Authors	Measure of PB	Protocol Review	Overall Findings	Standardised Beta Coefficient (B) or Cohen's d (d) or Partial Eta Square of Main Effect of ABC at F/U:
Berlin et al., (2014)	Observation of dyad: Maternal Behaviour Q-sort (Pederson et al., 1990).	Ax protocol: no detail. Coding: Poor detail.	ABC group compared to controls at F/U reported: Non signif. difference on Maternal Behaviour Q-sort ($p=.096$).	Sensitivity $d=0.67$
Berlin et al., (2018)	15 minute "Three Bag" assessment. Adapted ORCE	Ax protocol: Fair detail. Coding: Poor detail.	ABC group compared to controls at F/U were: - Signif. more sensitive ($p<.05$) - Signif. less intrusive ($p<.001$) - Signif. more pos.regard ($p<.05$) - Signif. more overall sensitivity ($p<.001$)	- Sensitivity $d=0.27^*$ - Intrusiveness $d=0.77^{**}$ - Pos. regard $d=0.23^*$ - Overall sensitivity $d=0.47^{**}$
Bernard et al., (2015)	20 minute structured play assessment, EEG during Emotional Face Task. Adapted ORCE.	Ax protocol: Fair detail. EEG process & exposure to emotional faces protocol: Good detail. Coding: Good detail.	ABC group compared to control at F/U reported: - Signif. higher scores for sensitivity ($p<.001$). ABC compared to low-risk mothers at F/U reported: - Non-signif. difference in sensitivity ($p=.8$). LPP amplitude was signif. modulated by emotion type in the ABC group ($p <.01$). LPP amplitude was not signif. modulated by emotion type in the control group ($p >.05$)	- Sensitivity $d = \text{NR/NC}$ - Intervention Group Diff. in modulation of LPP: <i>Partial Eta Squared</i> = 0.16 for neutral vs. crying (large effect) <i>Partial Eta Squared</i> = 0.19 for neutral vs. laughing (large effect)

Bick et al., (2013)	10 minute unstructured play assessment.	Ax protocol: Good detail.	• ABC significantly predicted increases in sensitivity from pre-post-intervention, ($p<.05$).	• Sensitivity $B= .08^*$
	5 point likert scale unspecified.	Coding: Good detail (no protocol or reference for coding).		
Hepworth et al., (2020)	15 minute “Three Bag” assessment; Mask Task.	Ax protocol: Good detail.	ABC group compared to controls at F/U reported: • Signif. More sensitive to infant distress ($p=.043$)	• Sensitivity to distress $d=0.32^*$
	Adapted ORCE.	Coding: Good detail.		
Lind et al. (2020) (1 Mo)	9 minute play assessment.	Ax protocol: Good detail.	ABC group compared to controls at F/U: • Signif. greater sensitivity (1-mo post: $p=.03$)	• Sensitivity $d= 0.47^*$
	Adapted ORCE.	Coding: Good detail.		
Lind et al. (2020) (36 Mo)	Disruptive Behavior Diagnostic Observation Schedule	Ax protocol: Good detail.	ABC group compared to controls at F/U reported: • No signif. difference in sensitivity (36-mo post: $p=.051$).	• Sensitivity $d= 0.4$
	Adapted ORCE.	Coding: Good detail (at the 36 month F/U).		
Perrone et al., (2020)	9 minute semi structured play assessment.	Ax protocol: Good detail.	The ABC group compared to controls at F/U reported: • Signif. greater increases in sensitivity ($p=.035$) • Non-signif. changes to intrusiveness and pos. regard ($p >.05$).	• Sensitivity • Total ABC Group $d=0.21^*$ • ABC Completers $d=0.43^*$
	Adapted ORCE.	Coding: Fair detail - referred to ORCE adapted version used by other studies.		

ABC completion associated with:

			• Signif. higher sensitivity scores than non-completers at baseline ($p=.047$). • Signif. greater sensitivity at F/U compared to control group ($p=.007$). • Non-signif. difference in intrusiveness and pos.regard compared to controls at F/U. ABC completers and non-completers did not differ signif. at baseline for intrusiveness or pos. regard.	
Raby et al., (2021)	AAS 6 attachment related stories scored on 1-7 likert scale. 5 minute play assessment "<i>planning a birthday party together.</i>" Adapted ORCE.	Ax protocol: Good detail. Coding: Good detail (secure base script & sensitivity).	ABC group compared to control at F/U reported: • Signif. more secure base script knowledge ($F=2.3; p=.012$) • Secure base script knowledge was signif. associated with parental sensitivity ($r=.36, p<.001$) • Signif. indirect effect on sensitivity via secure base script knowledge in ABC group only ($B=.09; p=.042$). • The direct effect of ABC on sensitivity was not signif.	• Secure base script $d=0.41^{**}$
Thorpe et al., (2021)	ICQ	Good detail provided on subscales of questionnaire.	ABC group associated with: • Signif. decrease in maladaptive beliefs about infant crying at F/U ($p<.001$). • Signif. decrease in beliefs about spoiling ($p=.006$) and minimization ($p=.001$) at F/U. • Non-signif. change in beliefs about direct control ($p=.85$) at F/U.	• Maladaptive beliefs about infant crying $B= -.242$ • Maladaptive beliefs about spoiling $B= -.204$. • Maladaptive beliefs about minimisation $B= -.248$.

				Maladaptive beliefs about direct control $B=.015$.
Yarger et al., (2016)	7 minute play assessment.	Ax protocol: Good detail.	ABC group compared to controls at F/U reported: - Signif. more sensitivity ($p=.04$) - Signif. less intrusiveness ($p=.02$).	- Sensitivity $d=.7^*$ - Intrusiveness $d= -.81^*$
	Adapted ORCE.	Coding: Good detail.		
Yarger et al., (2020)	“Strange Situation” protocol.	Ax protocol: Good detail.	ABC group compared to control at F/U reported: Signif. less withdrawal ($p <.05$).	Withdrawal $d=0.41^*$
	Coded w/AMBIANCE 5 dimensions, 7-point scales: affective communication errors, role/boundary confusion, fearful/disoriented behaviours, intrusiveness/negativity, withdrawal.	Coding: Good detail.		
			No signif. difference on: - disrupted parenting at F/U ($p=.31$). - levels of affective communication errors ($p=.33$) - role/boundary confusion ($p=.11$) - fearful/disoriented behaviour ($p=.52$) - intrusive/negativity behaviour ($p=.6$)	

Abbreviations: ABC; Attachment and Biobehavioural Catch-U, AMBIANCE; Atypical Maternal Behaviour Instrument for Assessment and Classification, AAS; Attachment Script Assessment, Ax; Assessment, B; Beta Coefficient, Diff; Difference, d; Cohen’s d, EEG; Electroencephalogram, F/U; Follow-up, ICQ; Infant Crying Questionnaire, LPP; Late Positive Potential, M; Mean, NR; Not reported, NC; Not Calculated, ORCE; Observational Record of the Caregiving Environment (Mills & Konce, 2013).PB; Parent behaviours, Pos.; Positive, Signif.; significant(ly).
 $p < .05^*$, $p < .01^{**}$

Discussion

In this review we posed the question – does participation in the ABC intervention program improve attachment – related parenting behaviours? Overall, our findings would suggest that it does.

This review has several strengths. It is the first review looking at ABC's impact on attachment - related parent behaviour amongst "at risk" parents using a systematic review methodology. Through doing this, we have highlighted the weaknesses and strengths of the studies presently in the literature, and allowed for a critical evaluation and interpretation of ABC's effectiveness on improving parent behaviour amongst a targeted group. Based on our synthesis of the literature we found 11 generally high quality randomised controlled trials (including one pilot RCT) examining the effect of ABC on attachment-related parent behaviours across four databases. All studies were conducted in the United States, with seven studies being recruited via the Child Protective Services (CPS). The samples included by the studies in this review were "at risk" dyads experiencing psychosocial and environmental risk factors such as financial insecurity, parental psychopathology, substance misuse, CPS involvement due to neglect or risk of neglect/adversity and social disadvantage. Of the studies which measured adversity, all reported the majority of participants endorsed at least one adverse experience on the ACE questionnaire (Dube et al., 2003). For example, Perrone et al. (2021) calculated a cumulative risk score for each participant based on psychopathology and ACEs. Neither ACE score nor cumulative risk moderated the effect of ABC on parental sensitivity, suggesting ABC has a positive effect on parenting behaviour in the presence of parental history of trauma and psychopathology. Of the included studies, three reported on parent ACEs and five on parental psychopathology.

The findings of the review suggest that within these “at risk” populations the ABC programme is effective in improving attachment-related parenting behaviours. Of the parent behaviours measured, ABC was found to have the most consistently positive effect on sensitivity, with most studies reporting that ABC had a small to medium main effect on sensitive parenting. Similar effect sizes have been found amongst comparable interventions. A meta-analysis by Yahlkoski et al. (2016) found similar effect sizes with respect to improvements in attachment quality associated with the “Circle of Security” (COS) (Hedges $g=0.65$, $p=.003$). However, unlike the present study they did not limit their search to controlled trials, and failed to provide details on the type of controls utilised where relevant. Thereby, suggesting the effect sizes presented in the current review are robust and reliable in comparison to reviews of similar studies.

ABCs effect on other attachment related constructs is an important finding of the review and benefit of the ABC programme. Significant indirect effects were reported for attachment constructs such as, improving parental beliefs about infant crying and improving secure base script knowledge, which in turn were found to mediate a relationship between ABC and sensitivity. Reduced withdrawal type behaviours and increased brain activity in response to their infants emotive faces compared to neutral faces were other indirect ways ABC affected attachment-related behaviours. Findings were mixed with respect to the effect of ABC on increasing positive regard and decreasing intrusiveness. Overall, these findings suggest ABC both directly and indirectly impacts parents behaviour via a variety of constructs that may promote secure attachment (Perrone et al., 2020; Thorpe et al., 2021)

Despite the strong methodological qualities of the studies included, we noted some fundamental problems in the literature which may be important for future research. Firstly, despite the use of controlled trial designs, it is important to note many of the control conditions

were low intensity timed matched interventions e.g. Book of the Week, Developmental Education for Families, and there was a lack of a similar comparison groups used.

Shortcomings in measuring psychosocial risk-factors such as psychopathology and adverse experiences, were noted during the review process. It is considered an overall limitation of the literature that reporting on parental psychopathology and history of adversity were limited. Both are known to impact a parent's ability to engage in attachment promoting and positive parenting behaviours, and therefore may have been important covariates to attachment related parent outcomes (Hayes et al., 2013). Furthermore, of the studies which did report on these associated factors, meaningful results were found. Measuring and consequently controlling for these risk variables could have provided meaningful data that would inform targeted intervention in clinical practice.

Finally, the majority of studies used an adapted 5 point Likert scale of the ORCE to code a video recorded play assessment to measure attachment – related parent behaviour. All studies using this scale reported blind coding and good IRR. However, a peer reviewed paper reporting the psychometric properties of this frequently used “adapted” coding protocol remains unpublished (Mills-Koonce, 2013). Overall the included studies reported good individual validity and reliability statistics which may imply that this coding tool has good internal consistency, and is in fact accurately measuring sensitive parenting. However, without stronger combined and peer reviewed evidence on this tool this remains speculative. Alternative established coding protocols such as, *The Child-Adult Relationship Experimental (CARE) Index* or the *Coding Interactive Behaviour (CIB)* manual to measure sensitivity, may have been worthy of consideration by authors (Crittenden et al., 2005; Feldman, 1998).

Limitations

Limitations also exist within the review. Firstly, our eligibility criteria excluded studies which implemented the intervention with infants older than 27 months, and therefore were not strictly adherent to the original ABC recommendation regarding the intervention age group suitability (6 – 24 months). This may reduce the validity of the overall findings of the review as it deviates slightly from the prescribed guidelines. However, it also highlights the robustness of the effects of ABC beyond the specific age range suggested. The decision to widen this age bracket was based on the range reported in the literature during our scoping review. A number of relevant studies that did not include a control group were also excluded from the review. This decision to prioritise study quality may have led to the loss of relevant data, however study quality was prioritised in this instance.

The specificity of the eligibility criteria to “at risk” groups only also led to the exclusion of studies examining the impact of ABC amongst adoptive parents as these cohorts reported less social disadvantage and adversity (Lind et al., 2020; Yarger et al., 2020). Therefore, results should be considered socio-culturally specific. Furthermore, a number of relevant unpublished studies were found during the review of included studies references lists and were also excluded as they were not peer reviewed. Publication bias is the main drawback in any systematic review and was likely a limitation in the present study due to the eligibility criteria imposed as detailed above.

Conclusion

The findings of this review suggests that ABC has a significant positive impact on a range of parent behaviours amongst “at-risk” parents, compared to time matched psychoeducational interventions. Moreover, these changes in parent behaviour remain significant at follow-up, including into middle childhood (up to 8 years old). Winnicott’s

controversial quotation “there is no such thing as a baby” essentially highlights the importance of parental influence and behaviour on infants and children (Winnicott, 1960). In this context, ABC may be considered a valuable intervention for improving attachment-related parent behaviour and consequently child related outcomes amongst the most vulnerable groups, with Schein et al. (2022) recently highlighting ABCs potential as a telehealth or hybrid model of intervention, that can adapt to today’s changing model of healthcare delivery. Although variability in which constructs are significantly affected by ABC was noted, it is apparent that all the included 11 studies in this review reach consensus that ABC positively impacts attachment-related parent behaviour. This review found ABC exerted the most influence on changing parental sensitivity, with less evidence for reducing intrusive behaviour and increasing positive regard. Future research into ABC and parenting may reveal other behaviours which are not reported here as significantly affected by ABC.

Future Research

The limitations and specificities of this review considered, it is beyond our scope to state the efficacy of ABC amongst varying groups, cultural contexts and services. However, as stated above this may be the next step for future research. Two studies of note were excluded during the screening process, which examined the community implementation of ABC amongst more general cohorts in a different cultural context. Both reported significant results concerning improvements in parental sensitivity and low attrition rates. More RCT designed studies within early intervention, maternity, post-natal and public health services would significantly add to the evidence. Research showing ABC’s effectiveness as an efficient and acceptable attachment promoting intervention that has value beyond the most vulnerable dyads is now required. Furthermore, taking the intervention beyond North America into other

continents such as Europe and Asia, where health and social structures, cultural values and the needs of new parents may differ, would further substantiate the results of this review and the wider ABC evidence base. The publication of the protocol and psychometric properties of the adapted ORCE coding scale used by the majority of studies would strengthen the studies' results regarding the validity and reliability of their primary outcome. Finally, the use of evidenced based attachment interventions as control groups in future RCTs could indicate the value of ABC as an effective early intervention, of shorter duration and less resources, than comparators.

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Chapter Four: Systematic Review – Extended Methodology

Systematic Reviews

Literature reviews provide a synthesis of information on a general topic and are useful in presenting alternative arguments or discussion points in relation to that topic. Authors often draw on subjective interpretation and opinion when presenting and critiquing the literature to present an argument (Uman, 2011). However, when a researcher wishes to answer a specific research question, by producing non-biased and replicable evidence using existing literature, a systematic review is required (Uman, 2011).

The Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) are the guidelines most often used when conducting a systematic review. Hence, these guidelines were followed for the systematic review included as part of this thesis. Systematic reviews, alongside meta-analysis, are placed top of the evidence hierarchy with respect to study design. They are often used to inform clinical practice amongst the medical and social sciences, therefore it is important the methodology is rigorous and the reporting of the results objective. Thereafter, it is assumed a systematic review conducted correctly will provide non-biased and synthesised evidence that reliably and objectively answers a specific research question (Uman, 2011).

Developing the Research Question

The systematic review completed as part of this doctoral thesis aimed to answer the following question, “Does ABC impact attachment-related parent behaviour?” This question was developed following reading and exploring the literature on areas related to early intervention for infant and maternal mental health. Following the completion of a general scoping review the ABC intervention was identified as a relevant programme which appeared

to have a sufficiently large and strong overall evidence base. Specifically, evidence with respect to its use and efficacy in improving child outcomes was prevalent in the literature.

However, the findings related to its efficacy in improving constructs associated with attachment, or other parent behaviours was unclear. The literature showed discrepancies in findings between methods and types of samples included. In particular, the type of parent behaviour or outcomes recorded, if included at all, was mixed. This was a challenge with respect to the research question's definition of "attachment-related parent behaviour" which was defined by drawing on attachment theory and the results of the scoping review. The term was defined as any parent related behaviour, cognition, perception, or attitude, that may affect a caregivers response to, and parenting of, their infant. Following the scoping review and identification of ABC as a relevant topic that appeared appropriate to systematically review, the Participant, Intervention, Comparison and Outcome (PICO) guidelines were used to develop a specific and clinical research question as suggested by Scells et al. (2017) (Table 4.1).

Table 4.1:

PICO guidelines.

<u>P</u>articipants/Patients	Parents and caregivers of infants who had completed the ABC 10-week programme.
<u>I</u>ntervention	The ABC 10-week manualised programme.
<u>C</u>omparison	Controlled trials comparing ABC to a control/comparable group only.
<u>O</u>utcomes	Measures of attachment related parent behaviours.

Identifying Studies for Inclusion

Search strategy

Choosing the appropriate search string is described as an iterative process by Perestelo-Pérez (2013), that often requires adaptation to balance sensitivity with specificity. The search string of the included systematic review was first formed by using the PICO table to derive key words. This led to an extensive literature search across a number of databases. This search led to the identification of relevant key words described in published literature on ABC generally, as well as literature related to infant mental health, sensitivity, mother-infant attachment, and parent behaviour. The search string of Grube and Liming's (2017) systematic review of ABC and child related outcomes, was also examined and considered during this process.

Following the selection of initial search terms consultation with a librarian from the School of Medicine and Health Sciences was sought. Discussion with supervisors also aided the selection of the final search string of (“early” or “parent” or “mother”) and (“intervention”) and (“attachment and biobehavioural catchup” or “attachment and biobehavioural catch-up” or “attachment and biobehavioural catch up” or “ABC”). The following search string was preliminary trialled and it appeared that a good balance of sensitivity and specificity was achieved. The specificity and unique nature of the terms pertaining to ABC resulted in smaller returns across all trialled databases during the search string formation. Therefore, to increase the rate of return and reduce the risk of missing potentially relevant research the other search terms included were broad. Narrow terms such as “RCT” or “parent AND behaviour” were considered however to balance the specificity of the ABC terms this was not considered the most effective search strategy to answer the proposed research question (Aromataris & Riitano, 2014)

Thereafter, the formal search was completed using carefully selected databases. The process of choosing databases as well as the number to include was guided by the literature.

Perestelo-Pérez (2013) suggest a minimum of two databases, and that for psychological research, *PsycINFO* is an essential database to include. Bramer et al. (2017) research on optimal return of references for systematic reviews reported specific databases (*MEDLINE*, *EMBASE*, *Google Scholar*, *Web of Science*, *PsycINFO* and *Cinahl*) should be included to get a reliable return of literature. The databases utilised for this systematic review included *PubMed*, *Scopus*, *EMBASE* and *PsycINFO*. The decision to exclude a limited time frame on the search was based on the relative recency of ABC in peer reviewed literature. This measure insured a maximum return during database searches.

Following the screening of titles and abstracts, the reference lists of all remaining studies were reviewed for any relevant studies that had not been returned in the initial search, as outlined by the PRISMA guidelines and Cochrane Handbook for Systematic Reviews (Higgins & Green, 2011). Of the 11 relevant titles identified during this process seven did not meet eligibility criteria. Of the four remaining studies, all appeared relevant based on their titles. However, they were not included as one was under peer review, and three utilised unpublished data, hence full texts were not available. This pertains to publication bias which is often a limitation of systematic reviews as mentioned in Chapter Three. Typically significant and extreme findings are published in high quality journals, with insignificant or contradictory findings being less available (Torgerson, 2006). It is possible that relevant data was lost amongst these four unpublished studies.

Development of exclusion and inclusion criteria

For the purpose of this review parent behaviour was inclusive of all parent related outcomes related to attachment. The age range was agreed amongst authors as 0-27 months following review and discussion of the literature. The original ABC programme is targeted at 6-24 month old infants (Dozier et al., 2006). However, the specificity of this range was not

reflected in the literature. The Cochrane Handbook for Systematic Reviews suggests using a protocol when some but not all participants in a study meet reviewers criteria (Higgins et al., 2019). The range of ages reported in the relevant literature that met all other inclusion criteria in this review was between 0-27 months. However, of the 11 included studies 10 reported mean infant ages within the 6-24 month range. Only one included study did not report the infants' mean age at the time of ABC implementation (Bernard et al., 2015). Despite this reference to their inclusion criteria stated that infants had to be less than 24 months to participate. The data on ages and consideration of the sensitivity of the inclusion criteria resulted in the decision to expand the age range to reduce loss of otherwise eligible and relevant studies and their findings. It was agreed studies which used a range of 0-27 months during the implementation of the original ABC intervention was for inclusion in the review. Some studies such as the most recent study by Schein et al., (2022), referred to implementing ABC for Toddlers (ABC-T), which is a version of the original ABC programmes designed to support older infants aged 24-36 months (Bernard et al., 2017). Although the age range of 0-27 months overlaps with the ABC-T criteria, the present study was explicit that the version of ABC implemented had to be the original ABC programme for inclusion in this review.

Quality Assurance

The Cochrane Risk of Bias Tool was used to assess the methodological quality of the included studies (Higgins et al., 2011)(Appendix C). The tool is suitable for use with controlled trials and assesses; selection bias, performance bias, detection bias, attrition bias, reporting bias and other biases not specified, as well as overall risk of bias. The tool outlines three potential categories “High Risk of Bias”, “Low Risk of Bias” and “Unclear Risk of Bias.” All included studies were appraised by two independent researchers (EOB and SMS), and a subsample were

appraised by the research supervisor (CMC). Consensus regarding studies overall categorisation was reached between researchers following discussion of any discrepancies, of which there were few. Studies which were coded to have a greater proportion of categories at “High Risk of Bias” were given an overall rating of “High”, and those with a greater proportion of categories rated as “Low Risk of Bias” were considered overall to have a low risk of bias. In some cases if the degree of bias in a particular section was considered extreme or significant it may influence the overall categorisation of the study. Overall, one of the 11 studies was considered to have a high risk of bias and one deemed unclear as described in Chapter Three.

Data Management and Extraction

The PRISMA guidelines’ instruction pertaining to “Study Records” includes guidance on correct data management and extraction (Appendix D). For the present study data was managed using an Microsoft Excel file. This may be considered a limitation as the literature highlights the benefits to utilising data management tools such as Rayyan and Covidence (Kellermeyer et al., 2018). Both of these tools were trialled and considered during the initial phases of the systematic review process. However, due to the primary researcher’s familiarity in data management using excel, and the increased cost of using these online platforms when there are more than two reviewers, a systematic and organised excel file was chosen as the most suitable data management and extraction tool. Efforts to ensure all stages of the methodology were clear and visible were made by documenting each new step of the review on a new excel sheet within one master excel file. Overall, this method was effective for a study with a small number of included papers. However, as mentioned by Kellermeyer et al. (2018) when conducting larger complex systematic reviews a data management tool reduces risk of error and bias at all stages.

As stated, all data was managed in excel which included the data extraction process. A number of data extraction forms were piloted and trialled as per the PRISMA guidelines. Data extraction forms were devised by referring to PICO to clearly define the sample and intervention characteristics, as well as consulting systematic reviews on similar topics such as Grube and Liming (2018). The final data extraction form aimed to synthesise the study characteristics, sample characteristics, outcomes measured and statistical significance of the outcomes of interest.

Data Synthesis and Reporting Results

A narrative synthesis was employed to collate and summarise the findings of the 11 included studies. The assumptions underlying specialist synthesise such as a meta-analysis require included studies to meet strict criteria related to homogeneity in methodology and measurement of outcomes. The studies included in this review differed with respect to type of outcome measures used, type of control group and follow-up duration. These slight differences violated the assumptions of meta-analysis (Kriston, 2013). Despite this shortcoming of the present study the narrative synthesis facilitated the knowledge and evidence on ABC, to be summarised in context, as argued by Popay et al. (2006). Furthermore, the inclusion and reporting of the individual and range of effect sizes allowed for specific conclusions to be drawn in relation to the research question i.e. the effect of ABC on a range of attachment-related parent behaviours amongst at-risk groups.

Summary

To conclude, the systematic review completed followed the PRISMA guidelines. Ensuing the application of the eligibility criteria 11 RCT studies were included, nine of which had good methodological quality. A narrative synthesis was used to summarise and draw

conclusions from the evidence as heterogeneity between control groups, samples and outcome measures violated the assumptions for meta-analysis

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Chapter Five: Major Research Project

Does infant massage confer benefits for the mother - infant dyad? Findings from a 4 year longitudinal study.

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Title

Does infant massage confer benefits for the mother - infant dyad? Findings from a 4 year longitudinal study.

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This research has been completed as part of a Doctoral Thesis, and hence data will not be placed in an open repository until one year after the completion of the author's Doctoral studies in September 2023.

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All material or sources of evidence used are appropriately referenced in this review.

All listed authors contributed substantially at every stage.

Abstract

Infant massage has been shown to positively influence maternal wellbeing and the mother-child attachment in clinical samples and up to a 1 year follow-up period. The present study examined, in a longitudinal randomised controlled trial (RCT), whether such benefits may be accrued in non-clinical, community samples and across a 4 year period. Participants were recruited from a maternity hospital in Ireland. They were mostly educated to third level (93%), in employment (88%) and identified as Irish (88%). At baseline participants were randomised to an infant massage or control condition ($N=269$). Qualitatively mothers from the intervention group recalled their experience of infant massage from almost 4 years earlier in surprising detail. Four main themes emerged describing the infant massage experience as a positive opportunity for bonding and relaxing with a newborn. Quantitative data pertaining to maternal wellbeing and dyads attachment were collected at baseline, 4-months, 18-months and 48-months post-intervention. Overall, analyses showed no significant difference between groups with respect to maternal mental health or parent-child relationship factors at 4, 18 or 48-months. We concluded that, in a non-clinical sample, infant massage is (a) subjectively experienced in a positive way with personal and infant relationship benefits, yet (b) this did not translate into objective benefits on clinical scales related to maternal or relational outcomes in the short or long-term. Clinical implications and suggestions for research adaptations in this area are outlined.

Key Words: infant massage, attachment, early intervention, community sample, infant mental health.

Three Key Findings

1. Infant massage is described as a positive experience with many memorable moments that can be recalled in rich detail despite the passing of 4 years.
2. Subjectively mothers noted that infant massage created an opportunity for them to bond and connect with their infant in a mindful and relaxed way.
3. The benefits of infant massage amongst a non-clinical sample did not translate to statistically significant improvements in factors related to maternal mental health and the parent-child relationship via standardised measures at 4-months, or 4 years post-intervention.

Statement of Relevance

Empirical studies and reviews investigating the benefits of infant massage have shown promising but mixed results to date. The effect of infant massage amongst healthy community dyads in particular remains unclear, yet many women appear to access same in their local community post-partum. The present study provides valid and reliable longitudinal findings about the efficacy of infant massage amongst healthy sample. These findings provide evidence to support the use of infant massage amongst healthy dyads, and provide useful guidance for future research in the area.

Diversity and Anti-Racism Statement

This research recruited from a large hospital in the south of Ireland and therefore is representative of the country's population norms. All mothers who gave birth in the hospital between 2017 and 2019 and who met inclusion criteria (related to child/mother health) were invited to participate. The researchers acknowledge difficulties with the English language may have been a barrier to accessing participation in the research for some groups. Unfortunately due to limitations of the researchers skills and resources we were unable to offer translation during the research. Despite this potential bias the nationalities represented in this sample are mostly in line with population norms as per the Irish census statistics from 2016.

Introduction

Infant massage is a medium of physical touch between infants and caregivers that has been used traditionally in eastern cultures for centuries (Reissland & Burghart, 1987). It has been increasingly adopted as an alternative and complementary therapy in Western society in recent decades due to the many benefits reported (Zeanah, 2018). The positive effects of infant massage have been reported in the literature for newborns, including weight gain, sleep, physical growth and reduced cortisol levels (Field et al., 1996; Gultom et al., 2019; Narenji & Rosbahany, 2008), as well as for mothers (Ohiggins, 2018; Onozawa et al., 2001) and the attachment relationship between mothers and infants (Shoghi et al., 2018; Underdown et al., 2013).

Infant massage provides the opportunity for a set of reciprocal interactions between parent and infant to take place, as a result, the parent may become more sensitive and attuned to their infant's behaviours and cues (Underdown et al., 2013). Infant massage also offers greater opportunities for affectionate touch as it employs gentle stroking, comforting and caressing movements. These actions, and interactions are heavily associated with many of the mechanisms of attachment formation (Bowlby, 2005). Therefore, it is proposed that infant massage may be associated with attachment promoting behaviours, and thereby may mediate attachment development (Gürol & Polat, 2012; Tronick, 2007). Studies have demonstrated the positive impact of infant massage on maternal attachment and the dyadic relationship amongst a variety of populations such as pre-term infants, mothers experiencing depression, normative populations, and mothers with several psychosocial risk factors (Ohiggins, 2018; Oswalt, 2009; Shoghi et al., 2018; Sohrabi et al., 2014; Underdown et al., 2013). Overall, the literature suggests there are positive associations between infant massage and parent and relational outcomes amongst varying populations.

However, there is an emerging dichotomy in the literature on infant massage. The evidence appears divided between the impact of infant massage on the general population and clinical samples or those considered to be more vulnerable due to infant, maternal health, and / or other psychosocial risk factors, as suggested by Underdown et al. (2013). This dichotomy postulates that infant massage is effective for those who are more vulnerable due to the factors listed, but that the impact of infant massage on a non-clinical population of mother-infant dyads may be minimal (Bennett et al., 2013; Underdown et al., 2013). This has implications for infant massage as a population based early intervention. Understanding who this intervention can help and how, will aid targeted service provision and better use of clinical and research resources. This discrepancy in the literature as well as the limited availability of longitudinal findings on the topic informed the present study.

Bennett et al. (2013) completed a Cochrane review of infant massage literature, including randomised controlled trials (RCT) that utilised a community sample of healthy mother-infant dyads only (excluding preterm infants, those at risk of disability, mothers with mental health difficulties). They included 34 studies in their review, focusing on infant outcomes. Although 20 of the included studies were described as “high risk for bias” a number of studies reported a positive association between infant development (physical and mental) and infant massage. Bennett et al. (2013) including few studies focused on the association between infant massage and mothers wellbeing or the mother-child relationship. Furthermore, it was noted that very few of the included studies collected data at more than 4 weeks follow-up, with only three studies collecting data at 12-months or more (Jing et al., 2007; Koniak-griffin, 1988; O'Higgins et al., 2008). This omission of maternal and relational studies, as well as minimal follow-up research, is a limitation of both the review, and overall infant massage literature.

Further limitations of the infant massage literature were outlined by Bennett et al., (2013). The lack of homogeneity with respect to the delivery of infant massage interventions (dose and duration) is a significant limitation, with studies prescribing varying models of delivery regarding duration, psychoeducation provision and who delivers the massage to the infant (Cheung & Song, 2009; Jing et al., 2007; White-Traut et al., 2009). This lack of homogeneity adds to the difficulty of drawing reliable and valid conclusions about the intervention's benefits, as well as any specific mechanisms or mediators. Thereafter, there is a lack of high quality RCT methodology amongst the evidence with many of the methodologies utilised in the infant massage literature at high risk of bias (Bennett et al., 2013). To the best of our knowledge, the existing research has failed to report any long-term implications of infant massage into early childhood also.

Finally, qualitative research into experiential and subjective benefits of infant massage amongst parents is not well represented in the infant massage published literature. In spite of the sparse literature on the topic, positive outcomes have been reported. Midtsund et al. (2019) qualitatively investigated participant experience of taking part in postnatal intervention that included infant massage. The sample consisted of Norwegian mothers, who were described to "struggle postpartum." The main theme that emerged pertained to time for physical and emotional connection with their infant. Chan et al. (2018) similarly explored experiences of infant massage amongst a non-clinical sample of Malaysian mothers reporting themes that pertained to increased knowledge, new routines and spousal support. These thematic differences may be indicative of cultural, sample or intervention factors. More qualitative research may help to better understand participants' subjective experience of infant massage.

In the present study we had a primary research question examined in a mixed-methods design:

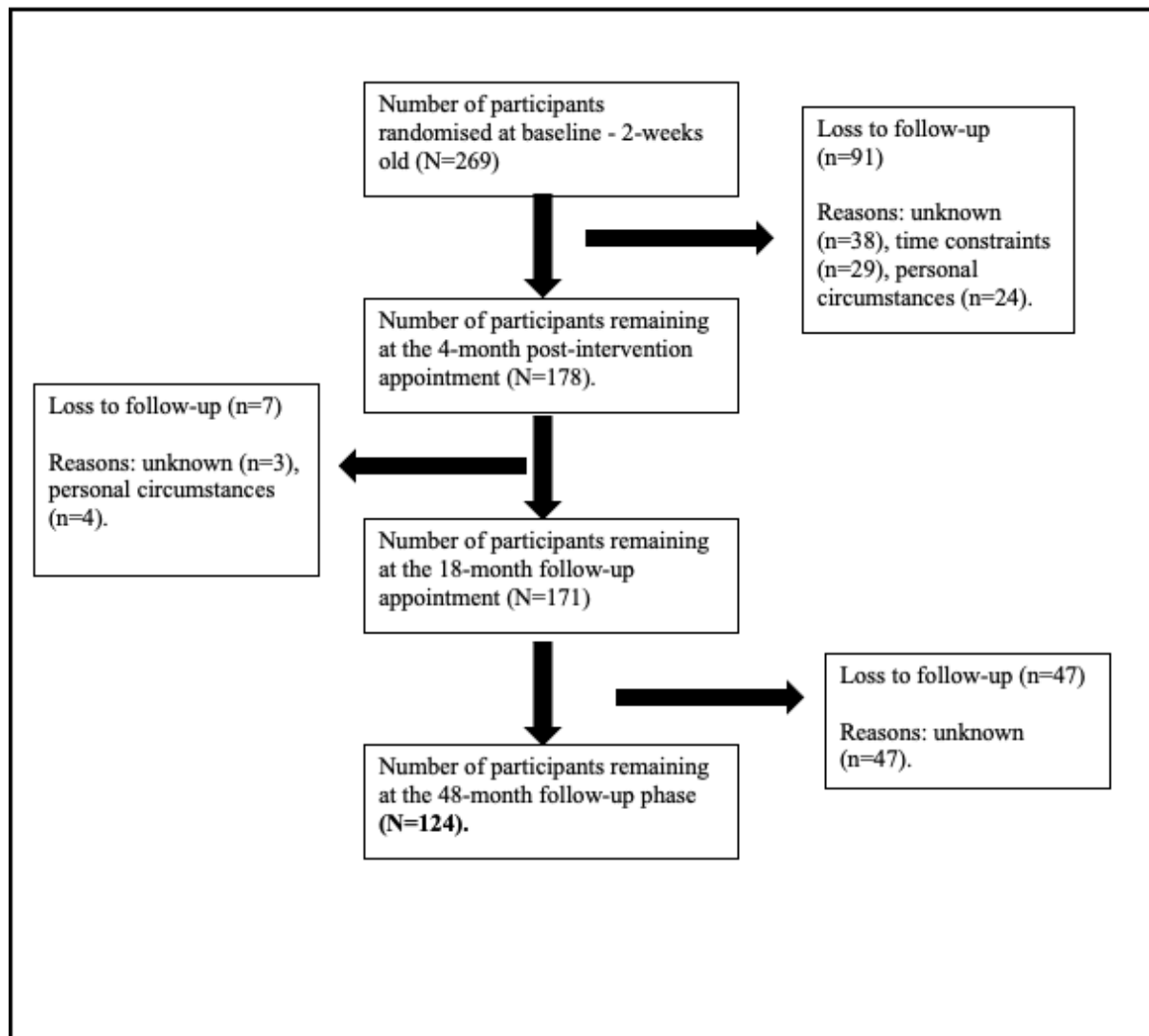
1. Does a healthy sample of mother-infant dyads benefit from infant massage post-intervention, and at 4 years follow-up, based on:
 - a. Clinical measures of maternal health and relational factors.
 - b. Parental subjective experience of infant massage and its benefits.

Methodology

Participants and Recruitment

This was an RCT longitudinal study examining the influence of infant massage on maternal health and mother-infant relationship factors. A mixed-methods design was utilised. Participants were originally recruited from the maternity ward of a large hospital in Ireland postnatally. Mothers were eligible for the study if they had given birth to a single healthy term baby (i.e. at minimum 37-weeks gestation). A total of 407 mothers consented to participate and were randomised using 1:1 stratification to the control or infant massage group.

Baseline demographics were collected at 2-weeks post-partum, at which point a sample of $N=269$ dyads remained. Participants were followed-up and invited to participate at 4 months ($N=178$) and 18-months ($N=171$) (Figure 5.1). In the current 48-month phase of follow-up parents who completed the 4-month appointment were invited to take part via text and email in October 2021. The email included a link to an online survey platform where participants were asked to read an information form and provide consent before commencing the questionnaire. Ethics was obtained from the Clinical Research Ethics Committee (CREC) at a university in the south of Ireland.

Figure 2: Flow chart of participant attrition between baseline and follow-up.

Demographic details for the baseline sample, responders and non-responders (at the current 48 months wave) are summarised in Table 5.1. Overall the baseline sample represented well-educated predominantly Irish mothers, most of whom were in employment, had a mean age of 34 years, and who were primarily not lone parents. Of the two thirds of participants who reported their household income nearly 75% described income greater than €48,000/annum. This baseline sample is partially representative of the Irish 2016 Census statistics (CentralStatisticsOffice, 2016) (Table 5.1). However, a greater proportion of our sample had

third level education, were in employment, had household income greater than €48,000/annum, and parenting in a two parent family, than the typical Irish mother according to the 2016 Census reports (Table 5.1).

As well as considering sample representativeness with respect to demographic factors, we considered our samples with respect to profiles on the outcome measures utilised in the current study. Effect size deviations were calculated to compare the total samples mean scores to population norms on all outcome measures using interval data (Appendix F, Table 5.6). The sample reported large effect size deviations pertaining to measures of child-parent relationships at 4 and 48-months with our sample reporting they had a better relationship on all scales of the *Maternal Postnatal Attachment Scale (MPAS)* at 4-months, and a slightly poorer relationship on both scales on the *Child Parent Relationship Scale-SF (CPRS-SF)* at 48-months compared to population norms, with the largest deviation found on the closeness scale (-1.38).

Differences between responders and non-responders, on categorical demographic measures, were calculated using Pearson's Chi-Square. The nationality of mothers was the only demographic variable found to differ between those retained and those lost to 48 - month follow-up, with significantly fewer non-Irish mothers completing the follow-up study. Differences between Irish and non-Irish mothers on a number of sample characteristics were found to be statistically significant on a number of baseline demographic characteristics. The proportion of non-Irish mothers in employment ($p=.03$), with third level education ($p=.046$) and living in a household with an income greater than €48k/year ($p=.048$), was significantly less than their Irish counterparts. However, each cross tabulation table had one cell with a count less than five, suggesting a violation of assumptions, and therefore these differences were considered with caution. This current study utilised the responder sample only for all further analysis.

Table 5.1:

Demographic sample characteristics of population norms, baseline sample and responders / non responders at 48 month follow-up.

Variable	Population Norms as Percentage of Population ¹	Total Sample N=269 n (%)	Responders N=124 n (%)	Non- Responders N=145 n (%)	P Value
Infant Gender					
- Male	51.5%	147 (55%)	73 (59%)	74 (51%)	
- Female	48.5%	122 (45%)	51 (41%)	71 (49%)	
Mother's Ethnicity					
- White	NA	262 (97%)	121 (98%)	141 (97%)	
- Other	NA	7 (3%)	3 (2%)	4 (3%)	
Mother's Nationality					
- Irish	77.7%	236 (88%)	115 (93%)	121 (83%)	p=.021*
- Other	32.3%	33 (12%)	9 (7%)	24 (17%)	
Education					
- Less than third level	58%	18 (7%)	8 (6%)	10 (7%)	
- Third level +	42%	251 (93%)	116 (94%)	135 (93%)	
Maternal Employment					
- Employed	76%	236 (88%)	110 (89%)	126 (87%)	
- Unemployed	24%	33 (12%)	14 (11%)	19 (13%)	
Lone parent					
- Living alone	12.1%	4 (2%)	1 (1%)	3 (2%)	
- Living w/others	87.9%	265 (98%)	123 (99%)	142 (98%)	
Household Income					
- Below 48K/year	45%	46 (17%)	15 (12%)	31 (21%)	
- Above 48K/year	55%	137 (51%)	68 (55%)	69 (48%)	
- Not reported		86 (32%)	41 (33%)	45 (31%)	
Group Randomisation					
- Massage	NA	152 (57%)	55 (44%)	97 (67%)	
- Control	NA	117 (43%)	69 (56%)	48 (33%)	
Mother's Age at baseline					
M (SD)	32.4	34 (4.5)	35 (4)	34 (4.8)	
Min – Max	NA	21-49	24-44	21-49	

Note: NA: Not Available

Home - CSO - Central Statistics Office, 2016¹

Intervention

Those who were randomised to the massage condition attended infant massage training in a small group setting with a neonatal physiotherapist trained with the *International Association of Infant Massage* (IAIM). A relaxed setting with ambient music and lighting was provided for the training which lasted one hour. The training offered guidance on massage techniques as well as reading and responding to infant cues, relaxation during massage and evidence based discussion about infant development facilitated by the neonatal physiotherapist. The intervention group were asked to complete massage with their infant three times per day between the 2 week and 4 month post intervention appointment. Optional massage review classes were offered monthly to all of the massage group to support fidelity to the intervention and provide encouragement for continued engagement. Researchers monitored massage adherence of the intervention group via the unique *BabySmart* mobile application. They sent messages of encouragement and support to those parents participating. The control group were asked to record sleep and bathing patterns only via the *BabySmart* application. The use of informal massage techniques by the control group could not be explicitly controlled for. However, at 4 months all participants were asked how often they massaged their babies skin as a means of providing context to the control group's massage related behaviour. Within the control group approximately 55% reported they informally massaged their babies skin on a frequent basis. This is acknowledged as an unavoidable limitation in controlling for the independent variable i.e. infant massage. However, the evidence based, protocol driven infant massage training provided to the intervention group, along with the continued support and monitoring of same by a trained massage therapist, stands alone as exclusively different from what parents may engage in informally in the home, or via community groups. Despite this limitation the aim of the present study, to examine differences between an evidence based IAIM intervention and a control group, is fulfilled by the methodology employed.

Measures

Outcome measures at 2 weeks, 4 months and 18 months

Measures varied somewhat at baseline, 4-months, 18-months and 48-month follow-up due to reasons outside the authors' control i.e. follow-up research design. Most measures are widely reported on in the literature and have demonstrated good psychometric properties generally. Table 5.2 outlines the measures used at each time point to address the study question. Data on child development was also collected at each phase as per Table 5.2. This data is not included in the present study but is referenced by MacSweeney et al., (2022, under review).

For the 48-month follow-up phase of the current study participants were asked to complete several self-report measures and answer some qualitative questions about their experience of the infant massage intervention if relevant. Finally participants were presented with a short novel parenting vignette and asked to provide details on how they would respond to this situation with their child.

After completing the questionnaire, participants scoring above the severe range on maternal mental health measures were followed up by phone or email. Mothers' were signposted towards community supports if required.

Table 5.2:

Measures used in the present study at each time point.

Type of measure	Baseline (2-weeks)	4-months	18-months	48-months
Demographics	- Demographics	NR	NR	NR
Maternal Health	- EQ5D-3L ¹	- EQ5D-3L ¹	- EQ5D-3L ¹	- EQ5D-3L ¹

		-	Edinburgh Postnatal Depression and Anxiety Scales ²	-	Beck Depression Inventory-II ³ Beck Anxiety Inventory ⁶	-	Depression, Anxiety and Stress Scale - 21 ⁴
Mother- Infant Relationship	NR	-	Maternal Postnatal Attachment Scale ⁵	NR		-	The Child- Parent Relationship Scale-Short Form ⁷ Feeding Vignette and Emotional Sensitivity Ratings.
Child Outcomes	NR	-	The Griffiths- III Developmental Scales.	-	The Griffiths- III Developmental Scales.	-	The Strengths and Difficulties Questionnaire ⁸

Abbreviations: Not reported, NR.

TheEuroQoLGroup (1990)¹ Cox and Holden (2003)² Beck et al. (1987)³ Antony et al. (1998)⁴ Condon (2015)⁵ Beck et al. (1993)⁶ Driscoll and Pianta (2011)⁷ Muris et al. (2003)⁸

Measures of Maternal Health

EUROQoL EQ5D3L (TheEuroQoLGroup, 1990) is a standardised instrument of self-reported general health that also includes a visual analogue scale (VAS) and question asking respondents to rate their overall health functioning from 0-100. The *EQ-5D* has been validated

globally as a measure of health related quality of life with multiple patient groups (Janssen et al., 2013; Linde et al., 2008). For the present study the self-report VAS only was used to examine participants' overall subjective health function.

Edinburgh Postnatal Depression Scale and anxiety subsection (EPDS) is a 10-item self-report questionnaire using a 4 point likert scale, with strong Cronbach's alpha reported (0.8) (Kheirabadi et al., 2012). It contains a total depression and a 3-item postnatal anxiety subscale. Both have been validated in the literature (Cox & Holden, 2003). Cronbach's alphas were 0.8 for the depression scale and 0.8 for the anxiety scale in the present sample.

The Beck Depression Inventory-II (BDI-II) (Beck et al., 1987) is a 21 item self-report measure of depression. It has strong psychometric properties ranging from 0.87 to 0.92 (Campos & Gonçalves, 2011).

The Beck Anxiety Inventory (BAI) is a 21-item self-report measure of anxiety. The literature reports good reliability and a strong Cronbach's alpha scores (0.94) (Fydrich et al., 1992).

The Depression, Anxiety and Stress Scale - 21 Items (DASS-21) contains three self-report scales measuring depression, anxiety and stress. Cronbach's alpha values for the current sample were strong for depression (0.9), anxiety (0.7) and stress (0.8). Similarly, Coker et al. (2018) reported similar alphas' for depression (0.8), anxiety (0.9) and stress (0.8) on the *DASS-21*.

Measures of Parent-Child Relationship

Maternal Postnatal Attachment Scale (MPAS) is a 19-item self-report questionnaire using a 5 point likert scale. It consists of three subscales (*pleasure of interaction, absence of*

hostility and quality of attachment) and an overall score. It is suitable for use amongst mothers with infants aged 0-18 months. Validation studies have reported strong Cronbach's alpha for each of the subscales (Condon, 2015).

Child-Parent Relationship Scale-Short Form (CPRS-SF;) is a 15-item self-report scale that assesses two domains pertinent to parent-child relationships; closeness and conflict. The Cronbach's alpha was high for the *conflicts* scale (0.8) but low for the *closeness* scale (0.4) in the current sample. With respect to the *closeness* subscale, the alpha value of 0.4 reported in this study suggests the scale has poor internal consistency. Despite this weakness Driscoll and Pianta (2011) previously reported a stronger Cronbach's alpha value (0.8) for the *conflict* scale and weaker alpha value (0.7) for the *closeness* scale, suggesting a lower alpha value is not unique to this sample. The impact of this alpha value on the interpretation of results relating to the *closeness* scale is considered in the discussion.

Sensitivity Vignette

A short novel vignette based on a feeding scenario involving a distressed, tired child refusing to eat dinner, and a tired parent was presented to all participants. This scenario is a common situation that was considered appropriate for most parents to relate to. The researchers postulated it was likely most parents would be able to recall their own experience of a similar event in the home, and therefore the likelihood of an accurate response increased. The novel scenario aimed to elicit parents knowledge, or use, of attachment promoting behaviours e.g. empathy, sensitivity, reciprocity, attunement, physical affection and mentalisation, as the scene asked them to imagine the distress of the child and their own tiredness in their response (Appendix E).

Vignette construction was informed by structured interviews such as The *Working Model of the Child Interview* (WMCI). Bretherton et al. (1991) and Waters and Waters (2006) secure base scripts were also referred to for guidance on creating relevant scenarios that elicited participants' attachment related behaviours such as mentalisation, empathy, sensitivity and reciprocity with their child. The researchers' knowledge of child development, parenting and attachment theory was also operationalised to aid vignette development. The vignette was piloted and reviewed with five parents of toddlers to ensure attachment related constructs were elicited in parents' responses, and that the accompanying questions were unambiguous to increase response validity. Thereafter, further piloting, inter-rater reliability testing with experts in the area, and factor analysis is required to consider the results of the vignette as valid, reliable and psychometrically robust. Future study may utilise a similar process to the recent work of Spruit et al., (2021) on the validation of Attachment Relationship Inventory - Caregiver Perception 2 – 5 year olds (ARI-CP 2-5). Despite the infancy of this vignette and sensitivity coding protocol initial findings are promising with detailed and relevant answers provided by most of the sample.

Questions posed regarding the vignette

Following the vignette participants were asked to answer three questions: Question 1, *What strategies do you use in this situation?* Question 2, *What do you usually say to your child when this happens?* Question 3, *How does the situation end?* The overall responses were categorised based on their perceived evidence of sensitivity. The analysis process used a novel coding protocol that was developed and informed by deductive content analysis and attachment theory.

Recollections of Infant Massage Experience.

Participants randomised to the infant massage group were asked two questions about their experience of infant massage. Question 1). *What are your memories of the infant massage experience?*, and Question 2). *Do you think it impacted your parenting, and if so how?* These questions were designed using theory on questionnaire and survey design (Rattray & Jones, 2007). These questions aimed to provide open and non-leading prompts that would support mother's in recalling their experience without bias. Furthermore, the use of online, rather than face-to-face methods likely further reduced the risk of social desirability bias in responses.

Data Analysis

Quantitative Analysis

Data was analysed using an intent to treat analysis approach on IBM SPSS Statistics for Mac V28. Descriptive and frequency statistics were used to assess the distribution of interval data, as well as to analyse participant demographics at baseline ($N=269$) and demographics of the responders ($n=124$) and non-responders at 48-months ($n=145$). Effect size deviations were calculated to compare our sample to the general population (Appendix F, Table 5.6). Pearson's Chi-square compared categorical data between responders and non-responders. Multivariate analysis of variance (MANOVA) was used to examine differences between the infant massage and control group across categories of similar variables (e.g. maternal mental health and parent-child relationship). When the overall MANOVA was significant, downward univariate analyses were used to examine the significance of specific factor differences. Effect size differences between groups were outlined, where there were statistically significant differences, using partial eta squared.

Qualitative Analysis

Vignette Responses

Deductive content analysis was used to categorise 117 parents' responses to the feeding vignette. Deductive content analysis allowed for the large body of existing attachment and feeding literature to inform and operationalise a structured categorisation matrix. In particular, the work of Black and Aboud (2011) and De Wolff and van Ijzendoorn (1997) informed the matrix. The systematic step-by-step protocol of how categories were developed and applied to participants responses is outlined in detail in Appendix G. The protocol involved considering the evidence of attachment related constructs in each response. In particular constructs related to empathic and sensitive responding, that showed consideration of the child's emotional state and needs, and attempts to soothe this using reciprocal interaction were drawn on and refined. A number of categories were considered before the overarching category of "Sensitivity" was chosen with the associated constructs listed in Table 5.3 and Appendix H. Responses that demonstrated evidence of these constructs e.g. empathy, reciprocal interaction, soothing/physical affection, and more, were categorised as "Sensitivity Evidenced." Participant responses in which these constructs were not clearly operationalised, or where there was evidence of intrusive, punitive, avoidant or harsh reactions to the child's distress, were categorised as "Sensitivity Not Evidenced." This novel protocol was quality assured via coding by the first author (EOB) and then validated by two blinded raters (CMC and SMS). An initial concordance of 92% was found between raters by following the protocol. Discrepancies were discussed amongst all raters until consensus was reached.

Table 5.3:
Structured Categorisation Matrix.

Sensitivity Evidenced	Sensitivity Not Evidenced
Sensitive to child's needs.	Focus only on food/feeding.
Reciprocal interactions.	Intrusive/One sided response.
Empathic to emotion.	Avoidance of child's emotion/distress.

Physical affection shown.	Physical Control.
Non-controlling/demanding.	Controlling/Demanding/Punitive.
- Offering choices.	- Bribery.
- Use of distraction/soothing.	- Coaxing.
- Appropriate rewards.	- Inappropriate rewards.

Infant Massage Experience

Responses regarding mothers experience of taking part in the infant massage intervention were also analysed using deductive content analysis, however an unstructured approach was used (Elo & Kyngäs, 2008; Hsieh & Shannon, 2005). Participants' responses were coded within an attachment theory framework, with a focus on data pertaining to categories related broadly to the infant massage literature e.g. maternal well-being, mental health, the mother-infant relationship, and constructs related to attachment such as sensitivity, bonding and attunement. The researchers own biases and assumptions about the data were managed via supervision and reflexivity. Consequently, initial codes were grouped with relevant categories in mind, informed by the framework and the research question. Quality assurance was completed by co-authors who reviewed the transcripts, codes, categories and themes applied by the first author. Discrepancies were discussed, and the final codes, themes and transcripts were reviewed by EOB and CMC (Appendix I).

Results

This longitudinal study utilised the 48-month follow-up responder sample only ($N=124$). As outlined above, Pearson's Chi-Square analysis was used to examine associations between demographic categories and the randomised massage and control group. No

significant differences between the control and intervention groups were found for any demographic variables.

Data Management

Exploratory statistics were used to check for errors and outliers during the data screening process. The large sample size and infrequency of outliers influenced the decision to retain most of the data. Trimming was used for two data points, where outliers were likely due to inputting errors (Fidell & Tabachnick, 2003). Descriptive statistics showed that a number of variables of interest were skewed, with a greater proportion of our sample reporting better mental health, and close relationships with their infant at 4 months. The large sample size meant this was not a significant violation of the normal distribution assumption for the use of parametric statistics (Fidell & Tabachnick, 2003). An intent to treat analysis was used to allow for the inclusion of participants with some missing data across time.

Some continuous dependent variables were transformed into new variables in SPSS to account for any potential regression towards the mean. The dichotomising of interval data ensured participants who scored within the clinical ranges, as defined by the measures used, were accurately represented in the results. This transformation provided a profile of the overall samples' "caseness" for clinical problems i.e. caseness for depression, anxiety or stress or "not caseness" as per the scales cut off guidelines. For the *EPDS* any participant scoring greater than 13 was categorised as "caseness" (Levis et al., 2020). Similarly, the *BDI-II* and *BAI* informed the categorisation of these variables with those scoring in the moderate range, i.e. beyond 20 and 16, being deemed "caseness" on the depression and anxiety scales respectively. Finally, the *DASS-21*'s scoring hierarchy was used and anyone scoring above the severe range was categorised as "caseness" on the *DASS-21* with respect to being anxious (<8), stressed

(<13), or depressed (<11) on each subscale respectively. All those scoring below these cut-offs were categorised as “not-caseness” on that scale.

Massage and Maternal and Relational Outcomes.

The total sample’s mean scores for measures of maternal health and the parent-child relationship were mostly comparable to norms reported in the literature (Appendix F, Table 5.6). Effect size deviations for measures of maternal health were mostly very small ($d=0.02$). The *DASS-21* and the *EQ5D-3L* at 48-months showed small-moderate deviations compared to the population, with our sample reporting slightly lower depression levels ($d=-0.26$) and better self-reported health ($d=0.27$). The largest effect size deviations between our sample and population norms were found on the measures of child-parent relationships. The effect size deviation on the *MPAS* subscales ranged from moderate to large ($d=0.37 - 0.73$) with our sample reporting better overall attachment than the normative means at 4-months. Interestingly, these findings were not sustained by the *CPRS-SF* with the closeness subscale at 48-months noting a large effect size deviation in favour of the population norms ($d=-1.38$). This may be due to the scales weaker psychometric properties.

Multivariate Analysis of Variances (MANOVAs) were performed to assess if the infant massage group reported better psychological health compared to the control group across the range of measures outlined above. Associated dependent variables at each time point were added to the MANOVA e.g. the *EPDS anxiety and depression subscales* at 4- months, the *BDI* and *BAI* at 18-months, and the *DASS-21 depression, anxiety and stress subscales* at 48-months. For examination of differences pertaining to the child-parent relationship the *MPAS subscales (absence of hostility, pleasure of interaction, quality of attachment and overall score)* were included in one MANOVA, and the *CPRS-SF subscales (closeness and conflict)* tested in

another. Main effects were interpreted at $p < 0.05$ as the level of significance. Univariate effects were interpreted only when a significant effect was found for the overall MANOVA.

The assumptions for MANOVA were checked during data management and exploratory analysis. Some violations to Box's M were noted, however due to the large sample size these are not considered problematic. Mahalanobis distance was used to assess the number of outliers and the multivariate distribution of the dependent variables using the associated critical values (Pallant, 2020). Very few outliers were detected using this method (ranged 1-3 outliers per Mahalanobis statistic), and due to MANOVA's robust nature all data was retained.

Maternal Health 4-months

A MANOVA to compare maternal health at 4-months between the infant massage and control group was performed. Two dependent variables were used: the *EPDS* depression and anxiety subscales. No statistically significant difference between the massage and control group on maternal mental health at 4-months was found, ($F(2, 117) = 1.3; p = .29$). Examination of the mean scores and standard deviations on the *EPDS* subscales for both groups revealed little difference, and the effect size using partial eta squared was small (Table 5.4). With respect to the *EQ5D-3L* measure of overall health functioning at 4 months, an independent two tailed t-test found no statistically significant difference between the massage and control group (Table 5.4).

With respect to categorical data there was 4% and 14% of the total sample scoring in the "caseness" range for the *EPDS depression and anxiety subscales* respectively at 4-months. No significant difference was found between the intervention or control group with respect to "caseness" on the *EPDS* depression subscale ($\chi^2(1, 121) = .03, p = .86$), or the *EPDS* anxiety subscale ($\chi^2(1, 121) = .09, p = .77$) using Pearson's Chi Square.

Mother-child relationship at 4-months.

Multivariate analysis was performed to examine differences in the mother-child relationship between the control and massage group at 4-months post intervention, using the *MPAS overall score, quality of attachment, absence of hostility and pleasure of interaction*. Mothers in the massage group did not score significantly higher for overall attachment at 4-months compared to the control group ($F(3, 116) = .24; p = .87$). The overall effect, using partial eta squared was small. Univariate statistics can be found in Table 5.4.

Maternal Health 18-months

Similarly, at 18-months there was no statistically significant difference between groups' for maternal mental health ($F(2, 113) = .8; p = .45$) and the effect size recorded was small (see Table 5.4). Examination of the mean scores and standard deviations on the *BDI-II* and *BAI* for both groups revealed little difference (Table 5.4). With respect to the *EQ5D-3L* at 18 months, an independent two tailed t-test found a significant mean difference, favouring the intervention group ($t(2, 118) = -2.13, p = .036$) (Table 5.4). Caseness on the *BDI-II* scale (4.3%), and *BAI* (6.8%) was limited, with no significant difference regarding the proportion of "caseness" on the *BDI-II* ($\chi^2(1, 117) = 1.18, p = .28$) or the *BAI* ($\chi^2(1, 117) = 1.2, p = .27$) between groups.

No measure of parent-child relationship was used at 18-months.

Maternal Health at 48-months

Finally, three dependent variables (*DASS-21 depression, anxiety and stress subscale*) were entered into the MANOVA to compare maternal mental health between groups at 48-months. No significant difference was found between the massage and control groups with respect to maternal mental health at 48-months ($F(3, 109) = 1.73; p = .17$). The overall effect

size measured using Partial Eta Squared, was small (Table 5.4). An independent two tailed t-test found there was no significant difference between the massage and control group on the *EQ5D-3L* at 48-months (Table 5.4).

In addition, “caseness” in the total sample on the *DASS-21* subscales was 6.1%, 2.6% and 5.2% for depression, anxiety and stress subscales respectively. Pearson’s Chi Square revealed no significant difference with respect to the proportion of “caseness” in the massage or control group for the depression ($\chi^2 (1, 115) = 3.0, p = .08$) and anxiety subscales ($\chi^2 (1, 115) = 2.6, p = .11$). However, a significantly greater proportion of mothers in the control group reported “caseness” levels on the stress subscale at 48-months ($\chi^2 (1, 114) = 5.5, p = .02$).

Parent-child relationship at 48-months

At 48-months, mothers in the intervention group did not differ from the control with respect to scores on the *CPRS-SF*, ($F (2, 111) = .4; p = .67$), i.e. there was no main effect on overall parent-child relationship from the massage intervention.

As outlined above, participants’ responses to the novel feeding vignette were categorised based on whether sensitivity was “evidenced” or “not evidenced.” Overall, the sample was evenly split with respect to those who evidenced (49%) or did not evidence (51%) sensitivity in response to the vignette. The dichotomised responses were analysed using Pearson’s Chi Square to compare any differences in the proportion of “Sensitivity Evidenced” or “Sensitivity Not Evidenced” between the massage and control group. The proportion of mothers who evidenced or did not evidence sensitivity in their response did not differ significantly between the infant massage and control groups ($\chi^2 (1, 117) = 1.13; p = .29$ (Table 5.4).

Table 5.4:

Multivariate and Univariate Analysis Between Massage and Control Group for Primary Outcomes.

Variable	Total M (SD)	Massage M(SD)	Control M(SD)	MANOVA/Univariate F/T Value	Partial Eta Squared	P Value
<u>4 months (N=121)</u>		<u>n=53</u>	<u>n=66</u>			
MANOVA Maternal Health	-	-	-	1.2	.021	<i>p</i> =.29
<i>EPDS - depression</i>	5 (4.0)	5.3 (3.9)	5 (4.5)	.12	.001	<i>p</i> = .73
<i>EPDS - anxiety</i>	2.9 (2.3)	3.2 (2.1)	2.7 (2.4)	1.15	.01	<i>p</i> = .29
EQ5D	-	85.5 (12.4)	87.4 (11.3)	.89	NA	<i>p</i> =.4
MANOVA Mother-Child Relationship	-	-	-	.24	.006	<i>p</i> =.87
- <i>Quality of attachment</i>	42.2 (3)	42 (3.3)	42.3 (2.8)	.38	.003	<i>p</i> =.54
- <i>Absence of Hostility</i>	21.5 (2.4)	21.4 (2.3)	21.6 (2.4)	.42	.004	<i>p</i> =.52
- <i>Pleasure of Interaction</i>	22.1 (2.2)	22.1 (2.1)	22 (2.3)	.04	.00	<i>p</i> =.84
- <i>Overall Score</i>	85.8 (5.6)	85.4 (5.6)	86 (5.7)	.27	.002	<i>p</i> =.61
<u>18-mths N= 117</u>		<u>n=51</u>	<u>n=66</u>			

MAONVA Maternal Health	-	-	-	.8	.014	$p=.45$
<i>BDI-II</i>	6.2 (6.5)	5.8 (5.2)	6.5 (7.3)	.31	.003	$p=.58$
<i>BAI</i>	3.98 (6.3)	3.2 (4.4)	4.6 (7.3)	1.37	.012	$p=.24$
EQ5D	-	87.6 (11.7)	82 (15.8)	-2.13	NA	$p=.04^*$
<u>48 mths (N=115)</u>		<u>n=53</u>	<u>n=62</u>			
MANOVA Maternal Health	-	-	-	1.1	.045	$p=.17$
<i>DASS-21 - Anxiety</i>	1.1 (1.8)	0.74 (1)	1.4 (2.2)	4.17	.03	$p=.04$
<i>DASS-21 - Depression</i>	1.6 (2.4)	1.1 (1.5)	2 (3.0)	3.86	.033	$p=.052$
<i>DASS-21 - Stress</i>	4.6 (3.1)	4.1 (2.2)	4.9 (3.7)	1.98	.017	$p=.16$
EQ5D	-	85 (11.9)	84.9 (9)	-.07	-	$p=.9$
MANOVA Mother-Child Relationship	-	-	-	.4	.007	$p=.67$
- <i>CPRS-SF Conflicts</i>	15.5 (5.5)	15 (5.4)	15.8 (5.7)	.45	.004	$p=.5$
- <i>CPRS-SF Closeness</i>	33.5 (1.6)	33.6 (1.7)	33.4 (1.4)	.51	.004	$p=.48$
Emotional Sensitivity (N=117)		N (%)	N (%)	1.13	-	$p=.29$

-	<i>Evidenced</i>	-	22 (43.1%)	35 (53%)	-	-	-
-	<i>Not Evidenced</i>	-	29 (56.9%)	31 (47%)	-	-	-

Abbreviations: M; Mean, SD; Standard Deviation, NA; Not Available. * $p < .05$

Qualitative recollections of participating in the infant massage intervention

Mothers randomised to the infant massage group were asked to recall, (1). Their experience of same, and (2). How, if at all, it had affected their parenting? Deductive content analysis was employed to explore the responses of the massage group ($n=59$).

Overall, the language and description that emerged from the mothers' responses depicted a vivid and meaningful narrative of their experience of infant massage, which was categorised into four major themes related to, 1). Enjoyable experience, 2). Space to be mindful, 3). Opportunity for mother-infant connection, and 4). Challenges of the research. These themes and the associated codes and categories derived from the text can be seen in Appendix I.

Examination of the semantics of responses suggested that despite the passage of almost four years, mothers recalled their experience with rich, experiential detail, providing specific examples of its impact on them, their infant and their parenting at that time. The consensus amongst the mothers was that they recalled their experience of infant massage as wholly positive, identifying time for relaxation, and opportunities to bond and be present with their infant as memorable influences the intervention had on them.

Infant massage as an aid to relax and be present was reported by many mothers, with some mothers using language related to the act of engaging in mindfulness during massage. Focusing on sensory elements such as music, and being “totally in the moment” in a way that differed from other time spent with the infant during feeding and changing, were memories that participants brought up in the data. Mothers also identified some individual challenges in implementing the intervention such as, implementing the intervention with infants who had reflux and colic, or mothers managing their time while caring for other children. The time demands of the intervention were noted as the primary challenge of taking part amongst the sample.

Overall, the maternal qualitative responses suggest that infant massage and the provision of an enriched environment and increased affectionate physical contact had a positive impact on mothers of newborn infants with respect to their relationship with their child and the management of their own stress. The main themes and a sample of corresponding quotations can be seen in Table 5.5.

Table 5.5:

Primary Themes and Quotations of Mothers' Infant Massage Experience.

<i>Positive memories of an enjoyable experience for mother and baby.</i>	<i>Space to be mindful and relax.</i>	<i>Supporting connection between mother and infant.</i>	<i>Research demands and the individual challenges.</i>
<i>“My child enjoyed the massages”</i>	<i>“It helped us forgot our worries and focus on the massage while listening to soothing music.”</i>	<i>“Spending lots of quality mindful time with my daughter.”</i>	<i>“John had silent reflux so at times it was challenging to do the massage.”</i>
<i>“It was enjoyable and my son seemed to really like it.”</i>	<i>“It definitely calmed me as I had to take the time to do it so I was more relaxed for sure.”</i>	<i>“Nice opportunity to bond.”</i>	<i>“But trying to fit all the sessions in & do them the length of time that we were suppose to, could be</i>

			<i>stressful at times, as I took it seriously."</i>
	<i>"It was relaxing to do for both me and my child."</i>	<i>"Nice activity, great 1 to 1 time."</i>	
<i>"Found it so helpful, I still use some of the massage techniques after bathtime etc."</i>			<i>"Only possible and feasible to carry out properly with one child in my opinion."</i>

Discussion

Our study indicated mixed results regarding the influence of infant massage on the mother-infant dyad amongst a non-clinical community sample in Ireland. The qualitative findings suggested thematic recollections related to the perceived benefits of infant massage to maternal wellbeing, elements of mindfulness, mother-child bonding and an overall positive experience of accessing and taking part in infant massage. The rich detail in which participants were able to recall their experience, and the positive language used suggested infant massage was a memorable and impactful personal experience. Contrary to these themes which described the benefits and effects of infant massage on the mother-infant dyad, we found little evidence for discernible benefits on the clinical outcome measures utilised. Both immediately post-intervention and at two further follow up time points (18 and 48-months) maternal mental health outcomes, as measured by the *EPDS*, *BDI*, *BAI* and *DASS-21*, and attachment related factors measured by the *MPAS*, *CPRS-SF* and novel vignette, did not differ significantly from a control group. A statistically significant difference between groups was only found with respect to health function at 18 months, and stress at 48-months, with significantly more of the control group reporting clinical levels of stress on the *DASS-21*.

The discrepancy between the quantitative and qualitative results may be supporting an opinion that has been expressed in the literature previously (Underdown et al., 2013). Within a healthy community sample infant massage appears to be a positive experience that can support mothers in dedicating time to use physical affection, to relax, use mindfulness and to connect with their baby. However, the utility of infant massage in improving mental health and attachment - related factors may not produce statistically significant findings amongst well-resourced groups who already have a high baseline level of wellbeing such as our sample. In addition, using outcome measures based on models of psychopathology may not be best placed to detect any changes on constructs related to well-being -v- distress.

Our results may support the opinion that infant massage, like many other early interventions, may produce the most discernible benefits when targeted at groups with psychosocial and clinical risk factors as indicated by O'Higgins et al. (2008) and Shoghi et al. (2018). Groups who are known to be more at risk, to have lower baseline mental health, limited knowledge of attachment, and difficulty in using mentalisation, empathy and sensitivity when interacting with their infant, may be more likely to exhibit significant changes following infant massage intervention compared to a control group.

Nevertheless, in addition to the qualitative benefits which emerged in this sample, there was some evidence for reduced levels of perceived stress at 48 months in our infant massage compared to control group. Qualitative themes suggest one possible mechanism of action here. These themes suggested a greater awareness of how to engage in mindfulness, and be present with their child. The use of measures based on models of wellbeing, for example the *Mental Health Continuum* (Machado & Bandeira, 2015) or measures pertaining to specific constructs of wellbeing such as mindfulness (Park et al., 2013), as well as measures related to maternal perceptions and pleasure of parenting such as in Vicente et al. (2017) study, may be more

appropriate when examining the influence of infant massage amongst non-clinical community samples in future.

Strengths and Limitations

There are distinct methodological strengths to this study. Firstly, it utilised a large sample and to the best of our knowledge it is the first longitudinal RCT examining the impact of infant massage on maternal and relational outcomes across multiple time points amongst a community sample. The use of 1:1 stratification randomisation as well as the statistical similarities of groups at baseline increases the reliability of our findings. Secondly, this study improves on the principle limitations of prior studies by utilising multiple measures of maternal mental health and an evidence based, structured massage training protocol, something which other studies have failed to do (Bennett et al., 2013; Ohiggins, 2018).

Additionally, the use of a novel vignette and coding procedure may be considered another strength as it added to the overall outcome of mother-infant relational factors providing complementary information on this construct. Furthermore, it acted as a proxy indicator of attachment related interactions that was at less risk to social desirability bias than the self-report psychometric measures included (*MPAS* and *CPRS-SF*). The inter-rater reliability of the coding procedure is promising, however, as this was a novel coding protocol the reliability and validity of the vignette should not be overstretched. The medium sample size, and use of only three raters limit the construct validity of the coding protocol and this was considered when interpreting findings. Future research should focus on specifying the relevant constructs included in the categorisation matrix, and devising clear examples of evidence - or – not, of each. Future study may also consider an approach similar to Spruit et al., (2021) with respect to piloting the vignette with a much larger sample, and employing factor analysis procedures to further determine this measures construct validity with a community sample of parents of

four year olds. Finally the novel vignette and associated questions may benefit from further piloting to insure the situation described and questions asked elicit responses from parents that are concurrent with the outcomes we wish to measure i.e. sensitive responding. Despite these limits, the initial piloting of a number of vignettes, the liaising with specialists in the field of paediatric psychology and the iterative process engaged in during this initial phase was also a strength of the vignette and coding.

The mixed-methods design allowed a holistic narrative regarding the impact and benefits of infant massage to be expressed despite the lack of statistical significance. These qualitative findings may inform future avenues of enquiry with respect to *how* infant massage benefits the mother-infant dyad. The categories derived highlight the general utility of infant massage for new mothers, while the quantitative findings suggest that its clinical utility may be more evident with at risk and vulnerable groups (Underdown et al., 2013).

Limitations included the fact that we did not have pre-intervention measurement of maternal mental health or attachment related constructs as these had not been included in the original phase of the BabySmart study. Therefore, it was not possible to conduct pre- post measures. Furthermore, the use of different standardised measures of maternal mental health and the parent-child relationship at each time point likely reduced the construct validity and the overall reliability of the MANOVA findings, as suggested by Donnellan and Conger (2007). This is a limitation seen in many longitudinal studies, as samples age out of measures only normed for a specified group e.g. MPAS up to 18 months only, and or the definition or nuances of psychological constructs change over time (Hammerstrom et al., 2016). Future research could focus on managing this by choosing measures which have been widely validated, and or comparing alternative measures to those well validated as a means to insure construct consistency over time. In analysis, converting all measures results to z scores may produce more reliable findings when working with longitudinal data.

In addition, the literature suggests play based observations and standardised coding may be the most valid and reliable way to assess attachment related factors amongst mothers and their infants and toddlers. Self-report measures are not without demand bias, but observational measures are resource intensive and were beyond the scope of current study protocols (Mesman & Emmen, 2013; Wittkowski et al., 2020). This specific limitation was managed via the combined use of psychometrics and behavioural descriptions from the vignette as detailed above. However, further research is required to fill this gap in the literature on measuring parent-child relationships.

The significant attrition between baseline and 48-months (54%) warrants consideration during the interpretation of findings also. However, there were little statistically significant differences between our responders and those lost to this follow-up wave which has been postulated as a more important marker of reliability in longitudinal studies (Saiepour et al., 2019)

Conclusions

Infant massage is a brief intervention that aims to promote attachment related behaviours and closeness between mothers and their infants. Although previous literature has suggested that infant massage significantly impacts maternal and relational outcomes in both community and at risk samples, the present study found mixed results. The content analysis of mother's recollections of participation and benefits of infant massage suggests there are positive outcomes in terms of mother-infant bonding, mindfulness, and relaxation following infant massage participation. Moreover stress related outcomes at 48-months suggest infant massage may be associated with some longitudinal clinical benefits to mothers wellbeing. However, our findings also suggest that infant massage doesn't have a statistically significant influence on maternal mental health or relational outcomes amongst a non-clinical sample

when measured using a psychopathology model. In conclusion, our findings postulate that non-clinical community samples do benefit from infant massage interventions, but that alternative and more sensitive measures of maternal wellbeing and attachment related behaviour and perceptions, may be necessary to observe these benefits statistically.

Future research

Infant massage for a community sample is a positive and enjoyable experience that encourages mothers to make time for relaxing, being present and bonding with their infant. However, in this study statistically significant differences were not found on outcomes related to mothers mental health and the attachment relationship in a non-clinical sample, between a massage and control group. Future research should take two lines of enquiry. Firstly, further focus on developing and evaluating early intervention enrichment programmes, including infant massage, with “at risk” groups may be of significant clinical benefit. These groups, as identified in the attachment literature include, mothers with PND (Behrendt et al., 2016), maternal trauma history (Galbally et al., 2022), premature infants (Davis et al., 2014; Korja et al., 2012) and socioeconomic disadvantage (Kim et al., 2017). Based on existing literature, and the present study’s findings, these groups may benefit proportionately more with respect to mental health and attachment outcomes. Secondly, the use of more sensitive and specific measures to evaluate the benefits to wellbeing and maternal attitudes and perceptions of their infant amongst non-clinical community samples should be prioritised in future studies. Increased qualitative studies may complement our understanding of how infant massage is perceived by, and benefits specific groups, and therefore should also be considered when conducting future infant massage research.

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Chapter Six: Major Research Project - Extended Methodology

Research Philosophy

The aim of this chapter is to discuss in more detail and provide rationale for the research methodology employed for this major research project. The majority of the study drew on quantitative methods and aligned with the positivist paradigm and hypothetico-deductive model of research. This paradigm relies on using theory from the literature to test hypotheses via objective measures consequently leading to results that further inform the theory the hypotheses were derived from (Park et al., 2020). This model was the basis for the design of this study, which is heavily grounded in attachment theory and sought to measure and analyse its operationalised constructs to further add to the evidence base.

However, this study did not meet all the assumptions of the positivist paradigm (Park et al., 2020). Therefore, the polarised constructivist paradigm was also drawn on. Constructivists assume that reality is created by human experience and refute the idea that there is a single method to generate knowledge. Constructivists consider the researcher's biases, experiences and interpretations of data as important parts of the methods and findings (Adom et al., 2016). Specific parts of this study relied on these assumptions to evaluate in more detail the value, benefits and experience of infant massage amongst a community sample of healthy mothers.

In the literature the two paradigms exist on opposite ends of a continuum. Pragmatism, allows for integration of the philosophies and typically underpins mixed - methods research. It draws on controlled, measurable methodologies, while also accounting for context, subjective experience and researcher knowledge (Johnson & Onwuegbuzie, 2004).

Pragmatist philosophy informed the design and analysis of the present study which utilised a mixed - methods longitudinal approach. The suitability of this pragmatic mixed-methods approach and research design are discussed further within this chapter.

Background

This was a follow-up study that involved working with an existing sample ($N=269$) of mother-infant dyads who had consented and participated in a Randomised Controlled Trial (RCT) - “*Enrich - BabySmart*” with the Irish Centre for Fetal and Neonatal Research at University College Cork (UCC) (www.infantcentre.ie). Initial ethical approval was granted by the Clinical Research Ethics Committee (CREC), and an amendment was approved in April 2021 by CREC for the 48-month follow-up phase (Appendix J). The Clinical Psychology Research Ethics Committee (CPREC) also granted ethical approval for this research activity (Appendix K).

Participants were recruited using probability sampling a few days postnatally at a maternity hospital in the south of Ireland. Following consent participants were randomised using 1:1 stratification to an infant massage or control condition. The intervention condition is described in detail in Chapter Five.

Baseline data on a variety of variables was collected at 2-weeks post-partum, at which point the intervention was delivered to the massage group. Follow-up data was collected at 4-months and 18-months post-intervention. The primary aim of the RCT was to investigate the effect of an infant massage intervention on a variety of infant and mother outcomes.

The present study aimed to recruit from this existing sample now that the infants were pre-schoolers (48-months follow-up) and examine any differences between the intervention and control group, as well as to explore the intervention groups’ experience of infant massage. Consent for further contact regarding participation in future studies was obtained at baseline.

Study Design

Mixed Methods

The use of a mixed-methods design was considered most appropriate given the aim of the research as explained above. A quantitative approach was required to test the hypothesis, does infant massage have a significant effect on maternal health and the mother-infant relationship post-intervention, and at 18- and 48-month follow-up compared to a control group. Exploring participants' *experience and interpretation* of infant massage was a secondary objective requiring the addition of a qualitative approach.

Quantitative Design

The use of similar quantitative procedures and measures as those employed by the previous data collection phases were agreed as the most effective method to increase internal consistency and test-retest reliability of the findings. The use of an online survey software was deemed the most effective method of data collection due to Covid-19. Qualtrics was chosen as a reputable and accessible software endorsed by UCC.

The *EuroQoL EQ5D-3L*, a measure of health related quality of life, was the only dependent variable that was consistently administered at every time point (TheEuroQoLGroup, 1990). The online replication of some measures used at 18-month follow-up (*Beck Depression Inventory-II (BDI-II)* and *Beck Anxiety Inventory (BAI)*) was investigated. Subsequently this was not possible due to high online reproduction costs. A measure of maternal mental health with similar psychometric properties, free online replication costs and an additional measure of mental health (stress), *The Depression Anxiety and Stress Scale (DASS-21)* was chosen instead. The original measure of parent-child relationships used at 4-months, *the Maternal Postnatal Attachment Scale (MPAS)* is validated for mothers of infants aged 0-24 months only. Therefore, an alternative self-report measure of parent-child relationships for 48-month old

children was required. *The Child-Parent Relationship Scale -Short Form (CPRS-SF)* was chosen. No measure of attachment was used at 18-months.

Overall, the use of different measures to assess the same constructs at different time points is a limitation of the study design and reduces construct validity and overall reliability as suggested by Donnellan and Conger (2007). Despite this general limitation, inter-correlation statistics suggested the different measures assessing the same constructs at each time point were appropriately correlated (e.g. the *Edinburgh Postnatal Depression Scale (EPDS)* at 4 – months, *Beck Depression Inventory-II (BDI-II)* at 18 – months, and the *DASS-21 depression subscale* at 48 – months). Some of the included measures of mental health have also been validated against each other in the literature further increasing overall construct validity within the study (Bener et al., 2016). Furthermore, the use of a variety of mental health measures may have increased the sensitivity of our findings with respect to measuring overall mental health and related constructs.

Qualitative Design

A number of qualitative theories were considered in the evolution of this research study, as was the rationale for including a qualitative element. Creswell et al. (2011) outlines that mixed methods research is becoming more prominent in a variety of areas of health research, including mental health (Palinkas, 2014). They outline convergence, complementary expansion, development and description as some of the reasons why mixed methods design adds value to research in the social sciences. For the present study, a qualitative component was chosen to fulfil two purposes; (1) Complement the psychometric measure of the child-parent relationship, the *CPRS-SF*, to provide a more detailed understanding of attachment - related parent behaviours in the sample, and (2) To expand understanding of mothers' experience and recollections of the infant massage intervention.

Measuring differences in factors pertaining to maternal attachment and related parenting behaviours between groups was a primary aim of this study. The best method for doing so required consideration of practical limitations, such as researcher resources, Covid-19 and a lack of literature on validated self-report measures, during the research design process. Research suggests that observations of parent-infant interactions that are systematically coded may have the greatest construct validity for attachment measurement amongst this age group (48-months+) (Tryphonopoulos et al., 2014). However, these methods typically require specialist training and are time intensive (Tryphonopoulos et al., 2014). Semi-structured interviews informed by attachment theory with a sub-sample of parents from both groups, followed by a comparison of themes related to parenting behaviour between the groups, was contemplated. Due to time constraints and concerns about potential participant burden and attrition neither the latter or former methods were viable options. Following consultation with supervisors, external research reviewers, and the literature, it was decided that a vignette and three associated open questions, followed by a deductive content analysis protocol would be used as a complementary measure of attachment related factors. Furthermore, two open-ended questions were developed for the infant massage group as a means to explore participants' recollections of their experience.

Procedure

All those who completed the intervention phase and took part in the 4-month follow-up appointment ($N=178$) were invited to participate in the present study. Participants were recruited via text and email using the “*BabySmart*” phone and email between 08/09/2021 and 10/10/2021. A text prompt was sent to all those who completed the intervention phase, followed by an email invitation to participate (Appendix L). The email included a link to an

online survey platform where an information and consent form preceded the questionnaire (Appendix M).

Participants were asked to complete several self-report measures and answer some qualitative questions as described. After completing the questionnaire, participants scoring within the severe range or above on maternal mental health measures at 48-months were followed up by phone or email. Mothers' were signposted towards community supports if required, and offered a follow-up call with the principal investigator of the *Enrich - BabySmart* study, and external supervisor of this thesis Professor Deirdre Murray.

Questionnaire Design

This study relied on a good response rate to the questionnaire, as well as the collection of data that was valid and reliable within the context of the existing "*BabySmart*" data. Therefore, ensuring the online questionnaire was well designed and included the right measures was of high importance for the overall validity and reliability of the findings. A number of factors were considered based on literature on longitudinal research and survey design, including; the existing sample, length, consistency, reliability, and validity of measures. These are discussed below.

Sample

Discussions with the original research team regarding the sample's previous response and engagement informed the survey creation. Good retention was reported historically amongst this sample despite the burden of participation at 4 and 18-months. The research centre's existing positive relationship with this sample was a significant aid to recruitment and

informed the survey creation regarding length, and the inclusion of sensitive questions such as those included in the *DASS-21*.

The attrition between post-intervention at 4-months and follow-up at 18-months was only 4% ($n=7$). This retention was predictive of a good response rate for the 48-month follow-up. However, the amount of time between stages of follow-up differed greatly between the initial 4 and 18-months, and the consequent 48-month follow-up. This was a recruitment concern that was managed by careful recruitment communication. Both the text and email used aimed to portray gratitude for the samples' participation to date, while operating in line with Good Clinical Practice Guidelines (Gill, 2004)(Appendix L).

Length

Research shows that length and statement of length of online surveys significantly impacts survey completion. Deutschens et al. (2004) compared a long (30–45 min) and a short (15–30 min) version of the same online survey and found that the response rate for the long version was significantly lower than the short version. Trouteaud (2004) compared the difference in completion rates when an identical online survey was stated to have a short duration (3–5 min) and a long duration (10–15 min) in the information preamble. Participants in the “short” survey group were more likely to complete it than those in the “longer” survey group despite the survey being the same length. This literature guided the survey development which aimed to retain the highest percentage of participants as possible. During the development and pilot phase of the questionnaire completion time reduced from 40-minutes to 15-minutes in duration, thereby increasing the probability of initial engagement and completion by study participants.

Consistency, Reliability and Validity

The present study aimed to maintain consistency regarding outcomes investigated and measures used. Shulruf et al. (2007) states that insofar as possible follow-up research should aim to include previously used and reliable assessment measures to produce good quality, reliable evidence in follow-up and longitudinal research. However, due to factors outside my control this was not feasible across all outcome measures.

Of the chosen measures only the *EQ5D-3L* was consistent across all phases. The *DASS-21* was chosen due to its length, no copyright concerns, strong internal validity and subscale validity, as well as the inclusion of a stress subscale. This provided an additional construct of mental health (stress) that is not as commonly examined in the infant massage literature. Despite the strengths of the *DASS-21*, it differs from the *EPDS* and the *BDI* and *BAI* measures used to examine mental health at 4 and 18 months respectively. This change in measures may result in slight differences with respect to construct validity of mental health outcomes, however psychometric analysis and comparison using inter-correlational statistics suggest this risk is minimal.

Similarly, the measures of parent-child relationship factors was not consistent due to the sample ageing out of the *MPAS*. Observational attachment assessments could not be practically utilised, and validated and reliable measures of attachment for the sample's age, 36-48 months, were sparse in the literature. This led to the inclusion of the *CPRS-SF* validated by Pianta (1992) and Driscoll and Pianta (2011).

Internal consistency and construct validity of assessment measures were also of central concern when choosing measurements of outcomes. Table 6.1 lists the Cronbach's alpha of all included psychometric measures. These psychometric properties also had to be considered within the constraints of measures' availability, questionnaire length, copyright barriers and the limitations of choosing self-report only measures due to the nature of the online format.

Overall the questionnaire design drew on guidance from previous waves of data collection, the sample, as well as relevant literature to inform the final version that would provide data that was best placed to answer the research question (Appendix N).

Table 6.1:*Cronbach alpha's of included measures.*

Measure	Cronbach Alpha Our sample	Cronbach Alpha Literature
<i>Edinburgh Postnatal Depression Scale</i>	<i>Depression scale (0.8) Anxiety (0.8)</i>	0.8 ¹
<i>Beck Depression Inventory – II</i>	NA	0.87 - 0.92 ²
<i>Beck Anxiety Inventory</i>	NA	0.94 ³
<i>Depression, Anxiety and Stress Scale – 21</i>	<i>Depression (0.9) Anxiety (0.7) Stress (0.8)</i>	<i>Depression (0.8)⁴ Anxiety (0.9)⁴ Stress (0.8)⁴</i>
<i>Maternal Postnatal Attachment Scale (MPAS)</i>	<i>Overall Attachment (0.7)</i>	<i>Overall Attachment (>0.7)^{5, 6}</i>
<i>Child-Parent Relationship Scale – Short Form (CPRS- SF)</i>	<i>Closeness (0.4) Conflicts (0.8)</i>	<i>Closeness (0.7)⁷ Conflicts (0.8)⁷</i>

Abbreviations: NA, Not available. (Kheirabadi et al., 2012)¹ (Campos & Gonçalves, 2011)² (Fydrich et al., 1992)³ (Coker et al., 2018)⁴ (Condon & Corkindale, 1998)⁵ (Dunn et al., 2022)⁶ and (Driscoll & Pianta, 2011).

Measures

The final online survey consisted of a brief demographic questionnaire, three psychometric measures, a vignette and two qualitative questions completed by the intervention group only (Appendix N). The quantitative measures utilised are described in Chapter Five. Most measures included showed strong psychometric properties as per Table 6.1. However, the *MPAS* and *CPRS-SF* subscales were an exception, with adequate to weak internal consistency shown. Therefore, these measures only will be discussed further below.

Maternal Postnatal Attachment Scale (MPAS)

The *MPAS* is a 19-item self-report questionnaire using a 5-point likert scale. It consists of three subscales (*pleasure of interaction, absence of hostility and quality of attachment*) and an overall attachment score. It is suitable for use amongst mothers with infants aged 0-24 months (Condon & Corkindale, 1998). Validation studies since the scale was first published by Condon and Corkindale (1998) are limited and have reported mixed results with respect to Cronbach's alpha for each of the subscales (Condon, 2015; Nunes et al., 2014). A recent study by Dunn et al. (2022) suggests there are some factor and internal validity problems within the subscales, and advised removing items which they found had weak inter-item correlation values.

The present study found the validity of the overall attachment score was good (0.7), however the Cronbach's alpha derived from scores on the subscale items may only be described as adequate; *Pleasure in Interaction* (0.5), *Absence of Hostility* (0.5), and *Quality of Attachment* (0.6).

Child-Parent Relationship Scale – Short Form (CPRS - SF)

The *CPRS-SF* 15-item self-report measure of two domains pertinent to parent-child relationships; *closeness and conflict* (Pianta, 1992). It has been assessed alongside the Strange Situation Paradigm (Holland & McElwain, 2013) and the Attachment Q-Sort (O'Connor et al., 2014), with studies demonstrating good concurrent validity, and that secure attachment is associated with lower scores for conflict and higher scores for closeness (Teague et al., 2018).

In the present study Cronbach's alpha was high for the conflicts (0.8) but low for the closeness scale (0.4). An alpha value of 0.4 as per the closeness scale in this study suggests the scale has poor internal consistency. Examination of the inter-item correlation matrix showed that some items on the closeness scale were negatively correlated with each other. The scoring of this scale was re-checked in SPSS but no reverse scoring rules apply as per the authors scoring guidelines (Driscoll & Pianta, 2011). The item-total statistics table presented item one of the scale with a negative corrected item-total correlation score (-.067) suggesting scores for item one "*I share an affectionate and warm relationship with my child*" were negatively correlated with the total scale scores. The item-total statistics table also revealed the scale would have a higher Cronbach's alpha value if this item was deleted (0.5). However, deleting this item offered a limited increase in internal consistency and therefore the scale remained in its original form with an alpha of 0.4. During the interpretation of results related to this subscale, the validity of findings were interpreted with caution.

Vignette

The development of the vignette and the associated questions involved a number of steps. First relevant literature on assessing attachment and parenting perceptions was reviewed. This included literature on the methodology of vignette construction when measuring parenting attitudes such as, Waters et al. (1993) and Montes et al. (2001), as well as literature that operationalised constructs of attachment theory via structured interviews such as *The Working*

Model of the Child Interview (WMCI) (Zeanah et al., 1986). Bretherton et al. (1991) and Waters and Waters (2006) secure base scripts' studies, *The Adult Attachment Interview* (AAI; (Main et al., 1985)) and the *Parent Attachment Interview* (Bretherton et al., 1989) all informed which constructs of attachment were operationalised via the vignette.

Hughes and Huby (2004) guidelines on key considerations when constructing vignettes for social research were also consulted. These guidelines included, consulting the literature and specialists in the area, piloting the vignette, contextualising the vignette with the sample in mind, giving due consideration to vignette length, and making the vignette relevant and realistic to the target population rather than hypothetical, to reduce social desirability bias.

A number of vignettes were developed initially that involved play, feeding, managing distress and communication. All vignettes were piloted amongst a general population sample of approximately five parents of toddlers, and reviewed by an experienced Paediatric Clinical Psychologist (CMC). Results of the pilot suggested many of the vignettes were operationalising the same attachment related constructs and could likely be distilled into one. The final vignette portrayed a common parenting situation centered around a tired toddler refusing to eat a meal and becoming distressed by same. The associated follow-up questions were reviewed on multiple occasions to remove any ambiguous or repetitive text to increase the internal validity of responses. The final vignette was accompanied by the following questions: Question 1, *What strategies do you use in this situation?* Question 2, *What do you usually say to your child when this happens?* Question 3, *How does the situation end?*

The vignette and follow-up questions aimed to assess parents' sensitivity in responding to their child in an emotive and stressful feeding situation. For the coding process and purpose of this study, sensitivity was operationalised as the parental offering of appropriate emotional and physical responsiveness, empathy, and attunement, to the child's needs during a distressing situation. The core mechanisms of attachment (sensitivity, reciprocity, attunement, empathy

and physical touch), as well as other constructs associated with parent-child relationships (mutual enjoyment/delight, mentalisation, containment, parental perception of the child) were also considered as part of a sensitive response. In contrast, an insensitive response was considered to display the opposite of the above (intrusiveness, hostility, avoidance of emotion, one sided interactions and use of bribery).

Qualitative Questions – Infant Massage Experience

Participants who completed the massage intervention were asked, (1) *What are your memories from the infant massage intervention?* and (2) *Do you think it impacted your parenting at the time? If yes, how?* This method of subjective assessment is at risk of recall bias, defined as an error that occurs when participants do not accurately remember a past experience (Spencer et al., 2017). Recall bias can be affected by the way the question is asked, the length of time between the event and recalling it, the participant's age, education and socioeconomic status, as well as how important the event was to them at the time (Spencer et al., 2017).

Attempts to mitigate and reduce the risk of recall bias were made by presenting the same question to all participants, and by working with a sample who were well educated, of higher socioeconomic status and who engaged well at the time of intervention (Spencer et al., 2017). Furthermore, the responses were analysed qualitatively with the primary aim of exploring the sample's experience of infant massage within the context of attachment theory. This type of research question is less likely to be affected by recall bias, compared to studies looking to correlate or predict outcomes based on recalled information.

Data Analysis

Quantitative Analysis Plan

The 48-month data file was combined with the 2-week to 18-month data file using IBM SPSS for MAC V28. Participant ID and date of birth were used to match participants. After checking for errors a sample of 124 final participants remained. An intent to treat analysis plan was employed.

Multivariate analysis assumptions were checked including; sample size, outliers, multicollinearity, multivariate normality, linearity and homogeneity of variance co-variance. Mahalanobis distance was used to assess the number of outliers and the multivariate distribution of the dependent variables using the associated critical values for two (13.82), three (16.27) and four (18.47) dependent variables (Pallant, 2020). Overall there was very limited outliers identified for each MANOVA. Box's M test of equality of variance was also checked to assess the variance of co-variance matrices for each MANOVA. Some violations were noted during analysis. Despite these violations, MANOVA was used due its statistical robustness and the large sample size, as advised by Fidell and Tabachnick (2003) and Pallant (2020). MANOVA examined the multivariate differences between groups with respect to maternal mental health and the parent-child relationship by combining associated dependent variables at each time point. MANOVA was chosen to reduce Type 1 errors that may result from multiple t-tests. Independent t-tests examined univariate differences between groups on the *EQ5D-3L* self-report of overall health only.

Finally, some of the continuous dependent variables were transformed into new variables in SPSS. These new variables were used to dichotomise interval data into clinically meaningful groups defined as “caseness” or “non-caseness” as described in Chapter Five.

Qualitative Analysis Plan

Vignette Analysis

Flexibility and researchers experience and discretion is an important element of content analysis according to Hsieh and Shannon (2005). Content analysis provided the flexibility required to assess the qualitative data using a deductive approach. Deductive content analysis is suitable when there is an existing knowledge base and theoretical framework on the topic of interest, and the researcher wishes to apply this knowledge to context-specific data, as was the case for both the vignette and infant massage responses (Elo & Kyngäs, 2008).

A deductive structured categorisation matrix was used to analyse parents' responses to the vignette. The matrix enabled the large body of existing attachment, sensitivity and feeding literature to inform and operationalise constructs observed in participants' responses. In particular, the work of Black and Aboud (2011) and De Wolff and van Ijzendoorn (1997) informed the matrix. The step-by-step process of how the matrix and categories were derived are detailed in Appendix G.

Categorisation and Inter-rater reliability

A total of 117 participants provided a vignette response. Initially responses were categorised into three categories based on the evidence of sensitive responding (Clearly, Partially or Not Evidenced). Responses were categorised as per the content analysis protocol in Appendix G. Raters reached 92% initial concordance on whether responses showed evidence of sensitivity. The majority of discrepancies (61%) were related to the level of sensitivity i.e. clearly or partially, evidenced by the response, rather than whether sensitivity was evident or not evident (10 of 26 discrepancies). Consensus on discrepant responses was reached by discussion between raters. In total ($N=117$), 29% were categorised as sensitivity "Clearly Evidenced", 20% as "Partially Evidenced" and 51% as "Not Evidenced". The initial three categories were consequently dichotomised for the purpose of statistical analysis and to insure

construct validity. The clearly and partially evidenced categories were collapsed into one (Sensitivity Evidenced) thereby resulting in two categories i.e. Sensitivity Evidenced (49%) or Sensitivity Not Evidenced (51%).

Massage Experience – Qualitative Analysis

Mothers' experience of taking part in the infant massage intervention was analysed using deductive content analysis. An unstructured approach allowed attachment theory and the infant massage literature to guide the development of the codes, categories and themes applied, while also integrating the subjectivity that emerged from participants' responses. This approach was considered most suitable as the study aimed to answer a specific research question, while also allowing individuals' unique experiences to be accounted for. The transcripts were read through in full for familiarisation with the data. Next, each segment of data related to the research question was coded, a list of codes and their corresponding categories are in Appendix I. Following the examination of codes through an attachment theory and infant massage perspective i.e. considering how the codes are associated with constructs or ideas from attachment theory and the infant massage literature, categories were created by grouping similar codes together resulting in overall themes. These themes were reviewed and refined to be specific and comprehensive in how they captured the individual and collective experience of participants. Table 6.2. provides the final themes and associated individual participant quotations.

Quality assurance was completed by an independent rater who reviewed a sample of the transcripts, codes, categories and themes applied by the first author. Discrepancies were discussed and consensus reached regarding the final themes.

Table 6.2:*Themes and associated quotations detailing mothers experience of infant massage.*

Positive memories of an enjoyable experience for mother and baby.	Space to be mindful and relax.	Supporting connection between mother and infant.	Research demands and the individual challenges.
<i>“It was enjoyable and my son seemed to really like it.”</i>	<i>“It helped us forgot our worries and focus on the massage while listening to soothing music.”</i>	<i>“Spending lots of quality mindful time with my daughter.”</i>	<i>“John had silent reflux so at times it was challenging to do the massage.”</i>
<i>“My child enjoyed the massages”</i>	<i>“It definitely calmed me as I had to take the time to do it so I was more relaxed for sure.”</i>	<i>“Nice opportunity to bond.”</i>	<i>“But trying to fit all the sessions in & do them the length of time that we were suppose to, could be stressful at times, as I took it seriously.”</i>
<i>“Found it so helpful, I still use some of the massage techniques after bathtime etc.”</i>	<i>“It was relaxing to do for both me and my child.”</i>	<i>“Encourages a lovely bond between parent and child and I would strongly encourage it.”</i>	<i>“Not really added a little to stress.”</i>
<i>“Lovely memories of the precious time spent with my child.”</i>	<i>“Yes, it was a nice way to spend totally focused time with my son.”</i>	<i>“It made me more aware of his reactions.”</i>	<i>“My daughter didn’t love the massages so I stopped when the research ended.”</i>

Summary and Conclusions

A pragmatist philosophy underpinned this research study which employed a mixed-methods design that drew on the strengths of quantitative research to test hypotheses derived from existing empirical literature, as well as the subjective and contextual richness that qualitative analysis produces. The positivist approach allowed for conclusions regarding causation and associations between variables to be drawn, while the constructivist model complemented these findings by adding context and expanding insights and understanding about two specific phenomena of interest (attachment theory and infant massage).

Overall, this methodological design allowed the research question to be answered more effectively, particularly as the findings were divergent. This divergence suggests that the subjective benefits and influence of infant massage as perceived by participants of this study, may not have been accurately captured by the measures of maternal health or the parent-child relationship employed. The measures used at all time points to measure maternal mental health are based on a psychopathology model, and are typically used to detect the presence or severity of clinical presentations. These scales have been shown to detect differences in state anxiety and depression in cross-sectional studies of infant massage amongst samples of parents with pre-term infants (Afand et al., 2017; Pados & McGlothen-Bell, 2019). However, other studies have suggested there are differences in the factor structure of some of these scales (*BDI-II* and *BAI*) when trialled with non-clinical versus clinical samples (Lips & Ng, 1986). The sensitivity of these psychopathology scales to detect subtle changes in individuals' psychological wellbeing, wellbeing related factors or attachment related constructs, e.g. mindfulness, self-compassion, positive affect, relaxation and emotion regulation, is unclear. Therefore, the chosen measures of mental health, and attachment related factors, may have lacked both sensitivity and specificity with respect to the elements of maternal wellbeing and

psychological/attachment constructs, that are associated with infant massage in a non-clinical sample.

In this regard, the qualitative findings provide an alternative perspective regarding elements of mental health, psychological wellbeing and maternal attitudes and perceptions, that may be influenced by infant massage. In particular mindfulness appeared to be an important psychological construct mentioned by many mothers. One of the few qualitative studies on infant massage by Midtsund et al. (2019), references mindfulness in their qualitative categories through the use of language such as “focus” “attention” and “regulating feelings”. Similarly, elements of mindfulness are described by Cheng et al. (2011) amongst fathers who engaged in an infant massage intervention. However, overall the construct of mindfulness is not explicitly discussed in the infant massage scientific literature despite it being referenced in infant massage guidelines, empirical papers and review studies.

The study findings are mostly in line with existing literature which suggests infant massage has a positive impact on mother-infant dyads, but that these differences may be most significant amongst “at risk” groups (O'Higgins et al., 2008). However, the findings also suggest that greater attention should be paid to evaluating the association between infant massage and more nuanced psychological and attachment factors by using measures of wellbeing, or maternal perceptions, that are more statistically sensitive to changes in these constructs, particularly amongst non-clinical samples whose baseline level of mental health and sensitivity may be higher than “at risk” peers.

To conclude, the research methodology employed by the present study had many strengths, particularly the inclusion of a qualitative measure of infant massage experience, as this has provided evidence that may guide the direction of future infant massage research in non-clinical groups.

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Chapter Seven: Discussion and Conclusion.

Summary of Findings

The overall aim of this thesis was to explore the relational and parental benefits, of early interventions that are associated with and grounded in attachment theory.

The systematic review in Chapter Three sought to examine the efficacy of the *Attachment and Biobehavioural Catch-Up* (ABC) programme with respect to improving attachment - related parent behaviour. The findings suggested that the ABC programme has a small to medium effect with respect to improving parental sensitivity when compared to time matched psychoeducational control groups. Significant small to large effects on other attachment related parent behaviours such as withdrawal, intrusiveness, positive regard, beliefs about infant crying, response to infants' emotional faces and knowledge of secure base scripts, were also noted. However, none of these behaviours offered results as robust as those pertaining to the positive effect of ABC on parental sensitivity. These findings were specifically relevant to "at risk" samples, with all studies reporting on infants and parents who had experience of a number of psychosocial risk factors, and several studies included samples linked with, or referred to child protective services. Despite extraneous factors such as psychopathology and social deprivation, the effect of ABC on attachment - related parent behaviour remained significant when these factors were controlled for. These findings suggest ABC may have specific clinical utility for those dyads where the primary caregiver is experiencing psychosocial risk and whose infants, based on the literature, are more likely to develop insecure attachments. However, the efficacy of ABC in improving attachment-related parent behaviour with low-risk community based samples outside of the United States remains unclear and may be an avenue for future review and research.

The major research project (MRP) in Chapter Five also wished to examine the efficacy of an attachment based early intervention. Unlike the systematic review, the MRP investigated the impact of an early dyadic intervention on a non-clinical community based sample. Specifically, the MRP investigated the influence of infant massage on a healthy sample over a 4 year period. This longitudinal randomised control trial (RCT) utilised mixed-methods, which proved to be a significant strength of the study. Divergent results relating to the benefits and effects of infant massage between the quantitative and qualitative findings were found. Overall the quantitative findings suggested that infant massage was not significantly associated with changes in maternal health or attachment related factors amongst our healthy sample when standardised measures of mental health and the mother-infant relationship were employed. One quantitative exception was the proportion of mothers in the “caseness” group for stress, which was significantly higher in the control group at 48-months. It may be postulated that stress, which is not a measure of psychopathology, may be tapping into the more subtle constructs related to wellbeing that may be influenced by infant massage in a non-clinical population.

The findings from deductive content analysis depicted four core themes of mothers’ infant massage experience, with three of these themes appearing to support the literature on infant massage and attachment theory. Mothers recalled in rich, sensory detail their experience of infant massage as positive, enjoyable and memorable. “*Space to be mindful and relax*” was a theme derived from participants recollections of noticing how both they and their infant were more relaxed during massage time. They described how massage aided them to practice being present with their infant without being distracted by other domestic tasks. It appeared that the task of massage gave them space, both physically and mentally, to be fully attentive and present with their newborn.

Another informative theme was “*Supporting connection between mother and infant*” with many mothers describing massage as an “opportunity” to spend time, to connect and bond with their newborn. This category aligns with the limited qualitative evidence on infant massage from Midsund et al. (2019) and Cheng et al. (2011) who both noted that parents reported the opportunity for one to one time with the infant that was not associated with changing, feeding and bathing, was a positive addition to their routine which aided parents to become more responsive and attuned to their infant.

Overall, the majority of participants described the infant massage intervention as a memorable experience which had a positive impact on the dyad generally. Recollections of challenges experienced were also described. Some mothers described their experience of massage as stressful which appeared to be related to the time demands of following the intervention protocol, and performing massage on infants with gastrointestinal problems such as colic.

Overall the MRP findings portray, 1. Space to be mindful, 2. Opportunity to connect and 3. A positive experience, as the subjective and experiential benefits mothers described from taking part in infant massage, despite these categories lacking statistical significance in the data.

Limitations

A number of limitations were discussed throughout the chapters of this thesis. The systematic review in Chapter Three aimed to synthesise the effect of ABC on attachment-related parent behaviour in “at risk” groups. However, a number of potentially relevant articles identified during the screening of reference lists of the eligible studies, were excluded as they were unpublished or had not been peer-reviewed. A number of the included studies were also authored by the interventions founders Dozier and Bernard, which may also be a limitation to

the overall findings in relation to the research question. Although common in review research, publication bias may have biased the overall conclusion in favour of ABC as an attachment promoting intervention based on the former points. However, based on the methodological quality of included studies it is probable the findings are valid and robust.

There are also limitations to the MRP which sought to examine the benefits of infant massage on a community sample over 4 years. These limitations are important to consider in the overall interpretation of the MRP findings. The ethical and practical difficulty in controlling for informal engagement in infant massage by the control group was noted as a possible bias in the findings. However, the comprehensive and protocol driven intervention based on IAIM training received by the intervention group was robust and distinct helping to minimise potential bias.

There was substantial attrition between baseline and 48-month up follow-up (54%) which is beyond the 50% rate that Underwood et al. (2016) identified as part of inclusion criteria for a review on longitudinal studies on maternal depression. Despite this large figure, the similarity of the baseline demographic data with respect to responders and non-responders reduces the risk of bias as suggested by Saiepour et al. (2019), who argued that attrition only becomes problematic when those retained are significantly different from either the original total sample, or those who dropped out. In the present study responders and non-responders were similar on all demographic measures except mothers nationality, with less non-Irish mothers taking part at 48-months follow-up. Further examination of this difference revealed that non-Irish mothers significantly differed from Irish mothers at baseline on a number of demographic variables. Compared to Irish participants, there were significantly less non-Irish participants in employment, with a third level education and living in a household earning above the average income. Without full contextual data, and bearing in mind the small number of non-Irish participants overall, it is not possible to infer reasons for these differences.

Other limitations included a weak Cronbach's alpha for the closeness subscale of the *Child Parent Relationship Scale -Short Form (CPRS-SF)*. Similarly, the *Maternal Postnatal Attachment Scale (MPAS)* had adequate reliability based on the Cronbach's alpha scores, but neither of these self-report measures of the mother-child relationship showed good psychometric properties overall.

As discussed in detail in Chapter Six, the inconsistent choice of measures, as well as the inclusion of measures typically used to assess psychopathology further limited the potential power and reliability of the findings. It is possible that if measures were consistent, sensitive to a non-clinical, well-resourced population, as well as sensitive to the relevant psychological constructs e.g. mindfulness, were employed instead, statistical findings may have shown more significant results. In spite of the above, the use of qualitative measures to assess both the relationship and benefits of infant massage at 48-months buffered some of the effect this methodological weakness may have had overall.

Contribution of the Research

The systematic review offered a novel contribution to the ABC literature with respect to the intervention's effect on attachment related parent behaviours. In addition the review added to the broader evidence base regarding attachment informed early interventions and their influence on parent behaviours. The review highlighted a consistent methodological shortcoming amongst most of the 11 included studies pertaining to the measure of sensitivity used. The "adapted *Observation of the Caregiving Environment (ORCE)* coding scale" was referenced consistently, however the original validation paper by Mills-Koonce (2013) remains unpublished. Parental sensitivity was the most frequently measured parent behaviour, and overall the results of the review reported ABC had a significant small to medium effect on this

construct. These results may be undermined if the validity and reliability of the measure is not clear. Many studies reported the coding protocol and provided inter-rater reliability statistics, but access to a validation paper would support these findings further.

The systematic review also added to the evidence regarding the influence of ABC on other attachment related parent factors that are less commonly examined such as; beliefs about infant crying (Thorpe et al., 2021), parental knowledge of secure base scripts (Raby et al., 2021), and changes in event related potential associated with maternal response to infants expressed emotion (Bernard et al., 2015).

The findings of this review has a number of clinical implications. Firstly, it presents ABC as a brief, manualised home visiting programme that appears to be effective in improving attachment-related parent behaviour. The finding that the effect of ABC remains despite the presence of one or more psychosocial risk factors is also clinically informative. Organisations who have contact with “at risk” women during antenatal and postnatal periods should consider providing access to ABC not only as a reactive measure e.g. when risk of neglect/adversity/abuse, is reported, but as a preventative, psychoeducational and enriching opportunity for new mother-infant dyads. In addition, research into ABC with specific groups, such as mothers with perinatal depression, may provide important information on its efficacy with targeted populations. Lastly, research and use of the intervention outside the United States should be prioritised to validate its efficacy and practicality within culturally and socially diverse services and samples.

The major research project provides a number of novel insights and additions to the infant massage evidence base. Firstly, it suggests that there are several subjective benefits to taking part as described by a non-clinical sample of mothers living in Ireland. Although these benefits were not visible statistically the rich detail of mothers recollections of their experience four years post participation suggest the intervention was impactful and important at the time.

This knowledge may be useful for perinatal or primary care clinicians who can signpost or suggest this enriching evidenced based activity to patients. Providing clinicians with access to infant massage training from the International Association of Infant Massage (IAIM) may also be a priority for organisations who support mothers and infants, both those with relational disruptions or risk factors e.g. perinatal depression, traumatic birth, and those without.

The addition and development of the novel feeding vignette to measure parental sensitivity is an important contribution to attachment theory and infant mental health research. There is a gap in the literature with respect to validated brief methods of measuring attachment related parent behaviour amongst parents of four year olds. The vignette and coding protocol designed for this research showed promising inter-rater reliability and elicited detailed responses that could be assessed for constructs of attachment. This method was far less burdensome than lengthy structured interviews or observational measures. The vignette may be useful in future as a complementary or screening measure that clinicians working with mother-infant dyads could utilise to assess a parents style of response to a distressed child. However, the results obtained from the vignette should be considered as suggestive rather than conclusive due to the infancy and lack of psychometric validity associated with the vignette and coding protocol. Substantial further research involving larger samples, attachment and infant mental health expert raters and factorial or other psychometric analysis on the vignette and coding protocol would be required to further its validation and test-retest-reliability. This would be essential before it is used in a clinical setting.

Conclusion

The aim of this thesis was to explore the effect of attachment based early interventions on attachment-related parent behaviours. The systematic review on ABC, and the MRP on infant massage have added important insights and evidence to the literature for each

intervention separately, and to the overall early intervention, attachment and infant mental health evidence base. These findings may inform the work of clinicians and organisations working with mother-infant dyads, as well as future research into these topics.

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Chapter Eight: Appendices

Appendix A: Infant Mental Health Journal Author Guidelines

1. Article Types

Original Papers are reports of new research, empirical findings or conceptual analyses that make a significant contribution to knowledge, to the extant literature, and to the science of infant and early childhood mental health. Manuscripts should not exceed 10,000 words, inclusive of references but not tables or figures. Abstracts are unstructured and no more than 225 words. All manuscripts must include a data availability statement, an ethics statement, key findings, and statement of relevance of the work for infant and early childhood mental health.

Brief Reports are no more than 5,000 words and are appropriate for preliminary findings of cutting-edge pilot studies. Case reports reflecting novel or highly significant clinical approaches may be considered as well. Abstracts are unstructured and no more than 225 words. All brief reports must include a data availability statement, an ethics statement, key findings, and statement of relevance of the work for infant and early childhood mental health.

Review Articles reflect critical, thorough literature reviews or theoretical/conceptual articles that synthesize and critique the research literature to date or offer new theoretical and conceptual frameworks that are highly relevant to the field of infant and early childhood mental health. Manuscripts should not exceed 10,000 words, inclusive of references but not tables or figures. All manuscripts must include a data availability statement (if applicable), an ethics statement (if applicable), key findings, and statement of relevance of the work for infant and early childhood mental health.

Special Collections/Special Sections are collections of three to five manuscripts on a topic highly relevant to the field of infant and early childhood mental health. Authors interested in submitting special sections should contact the editor. The editor will require a brief proposal include the proposed focus of the collection/section, working titles/foci of the manuscripts, rationale for the collection/special section. If the collection/special section is approved by the editor, each manuscript will go through the standard review process.

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 - Data sharing and data availability statement
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- Abstract (unstructured) No subheadings are required in the abstract but abstracts should include a brief introductory sentence, the research question(s), the sample size, the ethnic-racial characteristics of the sample, a brief summary of the methods, results, and conclusions.
- Up to six keywords appearing below the abstract;
- Relevance and Key Findings
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 - Intentionally cite the relevant work of diverse scholars, and as far as possible, actively work to collaborate with scholars from the countries in which studies are conducted.
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- Main body: formatted as introduction, methods, results, discussion, conclusion and implications for practice and/or further research.
 - In support of fully transparent research, please make sure to fully describe recruitment processes, data collection methods, data analyses, and results. Please include reports of effect sizes, confidence intervals, or other information that provides additional context for the interpretation of findings.
 - Consider making measures and protocols available in an open sources framework, such as Open Science Framework, Dataverse, Databrary, or in another repository that you may find through the Registry of Research Data Repositories.
 - Please be cautious not to overinterpret findings or suggest implications that go beyond the scope of the results.
- References (formatted using the citation style of the APA Publication Manual: 7th Edition;

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- Figures: Figure legends must be added beneath each individual image during upload AND as a complete list in the text.

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Appendix B: Scopus Search String.



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Combine queries...

e.g. #1 AND NOT #3

Q?

ID	Name	Query	Documents	Date last run	Actions
#1	ABC Search 12.08.2021	TITLE-ABS-KEY (("early" OR "parent" OR "mother") AND ("intervention") AND ("attachment and biobehavioural catchup" OR "attachment and biobehavioural catch-up" OR "attachment and biobehavioural catch up" OR "ABC")) View Less ^ Edit query	315	13 Aug 2021	

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Appendix C: Cochrane Risk of Bias Tool

Bias domain	Source of bias	Support for judgment	Review authors' judgment (assess as low, unclear or high risk of bias)
Selection bias	Random sequence generation	Describe the method used to generate the allocation sequence in sufficient detail to allow an assessment of whether it should produce comparable groups	Selection bias (biased allocation to interventions) due to inadequate generation of a randomised sequence
	Allocation concealment	Describe the method used to conceal the allocation sequence in sufficient detail to determine whether intervention allocations could have been foreseen before or during enrolment	Selection bias (biased allocation to interventions) due to inadequate concealment of allocations before assignment
Performance bias	Blinding of participants and personnel*	Describe all measures used, if any, to blind trial participants and researchers from knowledge of which intervention a participant received. Provide any information relating to whether the intended blinding was effective	Performance bias due to knowledge of the allocated interventions by participants and personnel during the study
Detection bias	Blinding of outcome assessment*	Describe all measures used, if any, to blind outcome assessment from knowledge of	Detection bias due to knowledge of the allocated

		which intervention a participant received. Provide any information relating to whether the intended blinding was effective	interventions by outcome assessment
Attrition bias	Incomplete outcome data*	Describe the completeness of outcome data for each main outcome, including attrition and exclusions from the analysis. State whether attrition and exclusions were reported, the numbers in each intervention group (compared with total randomised participants), reasons for attrition or exclusions where reported, and any reinclusions in analyses for the review	Attrition bias due to amount, nature, or handling of incomplete outcome data
Reporting bias	Selective reporting	State how selective outcome reporting was examined and what was found	Reporting bias due to selective outcome reporting
Other bias	Anything else, ideally prespecified	State any important concerns about bias not covered in the other domains in the tool	Bias due to problems not covered elsewhere

Appendix D: Prisma Guidelines for Systematic Reviews.

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	

Appendix D: Prisma Guidelines for Systematic Reviews.

Section/topic	#	Checklist item	Reported on page #
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome-level assessment (see Item 12).	
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group and (b) effect estimates and confidence intervals, ideally with a forest plot.	
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., health care providers, users, and policy makers).	
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review level (e.g., incomplete retrieval of identified research, reporting bias).	
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	

Appendix E: Feeding Vignette in Major Research Project.

The final part of this questionnaire includes the description of a brief and common scenario that most parents have likely experienced. We would like you to tell us how you have or would respond to this situation. Try and answer by recalling what actually happened rather than what you think should have happened. All details are relevant.

Scenario

Imagine you are having dinner and your child is refusing to eat. They are becoming more irritable and tearful the more you encourage them to take another bite. They are responding “No, no, no.” You know they are tired, having just returned from a few hours in the park.

You are also tired and in a hurry to finish dinner. We would like you to tell us;

1. What strategies do you usually use in this situation?
2. What do you usually say to your child when this happens?
3. How does this situation end?

Appendix F: Table 5.6. Comparing Population and Sample Norms on Outcome Measures.

Table 5.6: Sample total, population norms and effect size deviations on maternal health and relationship measures.

Variable	Total Sample N (%) Caseness	Total Sample M(SD)	Population Norms M(SD)	Effect Size Deviation
Maternal Mental Health				
<i>DASS-21</i> (<i>Depression</i>)	7 (5.6)	1.56 (2.44)	2.83 (3.87) ¹	d = -0.33
<i>DASS-21 (Anxiety)</i>	3 (2.4)	1.10 (1.82)	1.88 (2.95) ¹	d = -0.26
<i>DASS-21 (Stress)</i>	6 (4.8)	4.55 (3.12)	4.74 (4.20) ¹	d = -0.05
<i>BDI-II</i>	5 (4.0)	6.16 (6.45)	5.7 (6.8) ²	d = 0.07
<i>BAI</i>	8 (6.5)	3.98 (6.25)	4.09 (5.06) ³	d = -0.02
<i>EPDS (Depression)</i>	5.19 (4.24)	5 (4.0)	4.9 (3.7) ⁴	d = 0.03
<i>EPDS (Anxiety)</i>	30 (24.2)	2.9 (2.27)	2.8 (1.8) ⁴	d = 0.05
<i>EQ5D-3L (48 months)</i>	-	84.6 (11.3)	80.4 (15.6) ⁹	d = 0.27
Child-Parent Attachment				
<i>MPAS Quality of Attachment</i>	-	42.16 (3.00)	41.17 (2.67) ⁵	d = 0.37
<i>MPAS Absence of Hostility</i>	-	21.52 (2.36)	19.36 (2.95) ⁵	d = 0.73
<i>MPAS Pleasure in Interaction</i>	-	22.07 (2.21)	20.97 (2.85) ⁵	d = 0.39
<i>MPAS Overall Score</i>	-	85.75 (5.63)	83.4 (5.15) ⁶	d = 0.56
<i>CPRS Closeness</i>	-	33.53 (1.55)	37.28 (2.71) ⁸	d = -1.38

Variable	Total Sample N (%) Caseness	Total Sample M(SD)	Population Norms M(SD)	Effect Size Deviation
<i>CPRS Conflicts</i>	-	15.45 (5.52)	16.52 (5.19) ⁸	d = -0.21

Population norms: Henry and Crawford (2005).¹ Kjærgaard et al. (2014).² Muntingh et al. (2011).³ Brouwers et al. (2001).⁴ Brassel et al. (2020).⁵ Petri et al. (2018).⁶ Driscoll and Pianta (2011).⁸ Jiang et al. (2021)⁹

Appendix G: Vignette Deductive Analysis Protocol.

The vignettes were coded by three blind and independent raters using three possible categories related to the research question i.e. Sensitivity was; clearly evidenced, partially evidenced, or not evidenced. Raters reached 92% concordance on whether responses showed evidence of emotional sensitivity following the below protocol.

- **Step 1:** The research question was clearly defined, “Does this parent show sensitivity when responding to their child in this situation?”
- **Step 2:** All vignette responses were read three times through the research question and attachment theory lens. Memos were made during this initial screening phase when language or behaviours that appeared related to attachment mechanisms were evident e.g. *“I knew they were tired.”*
- **Step 3:** Several attachment constructs were considered in line with the research question, attachment and feeding literature during the first review of the data. Further review of these constructs led to the development of a list of constructs/codes grounded in attachment theory and parenting models, aligned with the research question. The full list of considered constructs during the structured matrix classification development are included in Appendix H.
- **Step 4:** These constructs were used to inform the development of the three categories that were considered to operationalise the constructs and answer the research question. It was decided that participants would be categorised based on the quality of evidence of these constructs in their response.
- **Step 5:** Vignette responses were categorised by the primary researcher who was blind to participants group assignment.
- **Step 6:** Two blinded independent researchers each categorised 50% ($n=62$) of the total sample of vignette responses to check for inter-rater reliability.

- **Step 7:** Each participant was then labelled with one category based on consensus between raters.
- **Step 8:** Categories were collapsed into Sensitivity Evidenced (Clearly or Partially), or Sensitivity Not Evidenced for the purpose of analysis.
- **Step 9:** Associations between infant massage and type of parenting response were examined quantitatively.

Appendix H: Initial Vignette Codes and Categories to Inform Structured Categorisation Matrix.

Codes

- Sensitive responding.
- Sensitivity.
- Mentalisation.
- Empathy.
- Responsivity.
- Reciprocity.
- Physical affection.
- Closeness.
- Physical proximity.
- Boundary setting/Secure base.
- Offering choice.
- Hostility.
- Physical control.
- Punitive.
- Avoidance.
- Intrusiveness.
- Parental distress/uncontainment.
- Demanding.
- Bribery.
- Distraction.
- Creative strategies.
- Taking the child's lead.
- Appropriate rewards.
- Inappropriate rewards/Bribery.
- Coaxing.
- Games.

Categories

- Attachment promoting behaviours.
- Attachment disrupting behaviours.
- Miscellaneous behaviours.
- Applying strategies/techniques.
- Responsive parenting.
- Unresponsive parenting.
- Emotional Sensitivity.
- Sensitive response.

Appendix I: Codes and Categories – Infant Massage Experience.

Positive memories of an enjoyable experience for mother and baby.	Space to be mindful and relax.	Supporting connection between mother and infant.	Research demands and the individual challenges.
• Enjoyable • positive experience • positive • enjoyable • positive • enjoyable - positive • enjoyable • enjoyable for parent & infant • enjoyable for parent & infant • enjoyable • relaxing for both infant & parent enjoyable • infant enjoyed massage & still does • enjoyable • relaxing – child enjoyed infant massage • positive – enjoyable • enjoyable • positive & relaxing effect • positive	• relaxing • Relaxing • ensured 1:1 time w/infant relaxing • relaxing for both infant & parent enjoyable • time set aside to relax w/infant • relaxing – child enjoyed infant massage • relaxing • calming effect on infant • positive & relaxing effect • recalling it as relaxing • enjoyed 1:1 time - time to bond & relax • relaxing • positive & relaxing • positive spending relaxed time w/infant • Time to relax	• time w/infant recalling pos. memories, precious 1:1 time w/infant • More bonding time • recalling singing lullabies to infant • recalling singing & smells • • Insured time to connect w/infant daily • Time to slow down • Provided 1:1 time • Protected time for engaging w/infant • Protected time w/infant • Supported connection w/infant • Brought closer to infant • Connected with infant daily • Provided time for connection	• Demanding on time • Not possible w/more than 1 child • time consuming • time consuming • demanding to do 3 massages/day • infant did not like massage • stressful to fit in all massages • hated taking part, regrets taking part • stressful to do everyday • reflux made it more challenging • infant tolerated IM, not enjoyable • recalling challenges of recording data

• enjoyable • Enjoyed • enjoyable, • positive • positive 1:1 experience w/infant • • enjoyed 1:1 time - time to bond & relax • helpful • positive experience • positive, enjoyable & relaxing • positive memories • positive spending relaxed time w/infant • loved it • w/infant recalling pos. memories, precious 1:1 time w/infant • Informative • recalling singing lullabies to infant • recalling singing & smells • informative – learned a lot re: massage & sleeping • still use massage w/child • recalling massage as part of good routine	• Time to slow down • Relaxing for baby • Relaxed the bedtime routine • Helped me relax • Created relaxing time for whole family • Daily relaxing time • Relaxing time • Relaxed w/baby • Child still asks for massage • Being totally in the moment with infant • Lovely moments during massage • Helped be present w/baby • Helped with mindfulness • Supported mindfulness • Just focusing on being in the moment • Supported routine	• Provided quality • Support bonding • Supported bonding • Helped bonding • Another way to bond with child • Offered dad a physical way to bond with infant time w/infant • Time to focus on baby • Learned about benefits of touch for infant	• recalling challenges of massage for child w/reflux & colic difficult to find comfortable position • Sleepless nights made adherence hard • No impact compared to other children w/o massage • It added stress • Using the app was distressing • Overthinking while doing it could be stressful • Didn't use with future kids
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-
- noticing massage influence on child temperament
 - using massage w/other children
 - recalls recording sleep
 - recalling people met at IM were lovely
 - infant still enjoys massage
 - Enjoyed meeting other parents
 - Gave confidence to help relieve baby's wind
 - Very enjoyable overall
 - Positive impact overall
-

Appendix J: Clinical Research Ethics Committee Letter of Ethical Approval.

COISTE EITICE UM THAIGHDE CLINICIÚIL

Clinical Research Ethics Committee of the Cork Teaching Hospitals

Tel: +353-21-4901901

Email: crec@ucc.ie

University College Cork
Lancaster Hall
6 Little Hanover Street
Cork
Ireland

Our Ref: ECM 3 (ggg) 04/04/17 & ECM 3 (llll) 09/03/20218th April 2021

Professor Geraldine Boylan
Director of INFANT
INFANT Centre
5th Floor
Cork University Maternity Hospital
Wilton
Cork

Re: BABY SMART (Study of massage therapy, sleep and neurodevelopment).

The following documents have been approved:

- Cover Letter dated 4th March 2021
- Amendment Application Form signed 4th March 2021
- Follow Up Email Version 1.0
- 48 Month Poster Version 3.0 dated 6th April 2021.

Yours sincerely



Professor David Kerins
Chairman
Clinical Research Ethics Committee
of the Cork Teaching Hospital

The Clinical Research Ethics Committee of the Cork Teaching Hospitals, UCC, is a recognised Ethics Committee under Regulation 7 of the European Communities (Clinical Trials on Medicinal Products for Human Use) Regulations 2004, and is authorised by the Department of Health and Children to carry out the ethical review of clinical trials of investigational medicinal products. The Committee is fully compliant with the Regulations as they relate to Ethics Committees and the conditions and principles of Good Clinical Practice

Appendix K: Clinical Psychology Research Ethics Committee Letter of Approval.

Coláiste na nEalaíon, an Léinn Cheiltigh
agus na nEolaíochtaí Sóisialta
College of Arts, Celtic Studies
and Social Sciences

Scoil an Síceolaíochta Feidhmi
School of Applied Psychology

University College Cork,
Cork, Ireland.

T +353 (0)21 490 4551 / 4552
E infoapsych@ucc.ie
<http://www.ucc.ie/en/apsych/>

3rd February 2021

Clinical Psychology Research and Ethics

Dear Emma,

Do early indicators of maternal mental health and attachment influence later parent child relationships and do infant massage interventions exert influence: a 48-month follow-up of Enrich study participants.

Emma O'Byrne

Thank you for your ethics application and subsequent changes. Your application has been approved by the Clinical Psychology Research and Ethics Committee and you have full ethical approval for the above named project.

Yours sincerely,

Dr Mike Murphy
Chair Clinical Psychology Research and Ethics Panel

Dr Carol Linehan
Head of School of Applied Psychology

Ollscoil na hÉireann, Corcaigh
National University of Ireland, Cork

Appendix L: Recruitment Email and Text for 48-Month Follow-Up Study.

Dear Parents,

You and your child have been involved with and supported our research at the INFANT Centre since your child was only 2 weeks old as part of the BabySMART study. Your involvement, time and commitment to all stages of our research is invaluable. Without the support of families like yours, research into infant development would not be possible and we are so grateful for your input to date. It has been an insightful journey as we followed your child from 2 weeks to 4 months to 18 months. Projects like these are so important as they allow us to observe infant development over time. Therefore, we are now inviting you to continue this journey as we invite you to take part in the follow up with all participants at approximately 48 months.

Unlike the first stages of the BabySMART study, **this follow-up will not require you to come into our clinic due to health and safety around Covid-19.** All the information can be collected through a short 15 minute, online survey (link is attached below). There is also information about the follow-up and consent form at the beginning of the questionnaire. These are similar to those that you have read before when you first met a researcher at INFANT. However, if you should have any questions about it please feel free to contact us using the study email provided below.

Should you wish to take part, we would be grateful if you could complete the attached questionnaire at some stage over the next 7 days. Some more information about this research is attached to this email.

We hope you and your family are safe and healthy during these turbulent times and wish you and your little one all the best for the future.

Yours Sincerely,

The BabySmart Research Team

Link: https://cacsss.eu.qualtrics.com/jfe/form/SV_b7daQLycRciehOB

Email: babysmart@ucc.ie

Recruitment Text

Hello! We at the BabySMART team hope your little one is continuing to grow and thrive since we last met. This is a reminder to keep an eye on your email over the next 24 hours. We are sending an important email about an exciting next phase of our study that we would like to invite you to be apart of. The BabySMART Team.

Appendix M: Information and Consent Form.

Study Information

Participant Information Leaflet

Study Title: BabySMART (Study of Massage therapy, sleep AndneurodevelopMenT)

Supplemental PIL/ICF: 48 Month Follow-Up of Baby SMART Study Participants

Principal Investigator: Prof Geraldine Boylan,

Sites of Investigation: Cork University Hospital (CUH)

INTRODUCTION

You are being invited to take part in a research study. Before you decide whether to take part it is important for you to understand why we are doing this research and what is involved. Please take time to read this leaflet, and if you want to, discuss it with your doctor, midwives, family, or friends. Please feel free to ask us if anything is not clear, or if you would like more information. Thank you for taking the time to read this.

ABOUT THE STUDY

Some time ago you participated in the BabySMART study which examined your child's sleep and development. Your child is now approximately 4 years of age and the research team is following up all families who participated in the BabySMART study to evaluate early childhood outcomes. Through this research we will be able to see how children's social and emotional development progresses across time and if early family and infant characteristics in infancy affect these outcomes. Exploring this can help us to understand more about the different factors that contribute to healthy child development, which is essential for future child and parent healthcare.

WHY HAVE I BEEN CHOSEN?

You have been invited to participate because you and your child participated in the BabySMART study when your child was an infant. All families who were involved in the original research are being invited to participate in this follow-up study. Your invitation to participate is not because your child was doing any better or worse than others in the original study.

DO I HAVE TO TAKE PART?

Participation in this study is completely voluntary. There is no obligation to participate, and should you choose to do so, you can refuse to answer specific questions in the online survey and to withdraw from the research, up until the time your data is fully anonymised. You will not be asked to give a reason for withdrawing. This research is entirely independent from any treatment services you may be receiving.

WHAT WILL HAPPEN TO ME IF I TAKE PART?

Should you choose to participate, you will be asked to answer some questions on our onlinequestionnaires.

Online Questionnaires:

Part 1 of the questionnaire requires you to answer multiple-choice questions that ask about your own experiences as a parent, as well as experiences with your child.

Part 2 of the questionnaire will present a few common parenting situations and ask you how you would respond in each.

In total we expect that completion of the questionnaires will take about 15-20 minutes. We hope that you will enjoy participation.

ARE THERE ANY RISKS INVOLVED IN PARTICIPATING?

We do not anticipate any adverse outcomes to you from your participation, and this study has received ethical approval from the UCC Clinical Research Ethics Committee. It is worth noting that some topics we will be exploring throughout the study may be sensitive in nature. For example, we are interested in exploring different aspects of emotional functioning and how this influences people's experience of parenting. To explore this, we will ask some questions about how you feel, your relationship with your child and your child's development. Sometimes, people find that these questions can bring up difficult or surprising emotions for them. If this were to happen, we have made sure to include some contact information for services and supports at the end of the survey. We will also include details so that you can get in touch with the research team directly, should you need further guidance around who to contact for support.

WHAT HAPPENS TO THE INFORMATION COLLECTED?

By participating in this study, information from you (also called "personal data") will be collected for the purposes mentioned above in this Participant Information Leaflet. This personal data includes, for example:

Information that directly identifies you (such as your name, and your year of birth)

Information on your health and medical condition including your medical history

Information contained in the results after analysis.

To ensure confidentiality, the data generated during this follow-up study will be coded with the unique Study ID Number that you were allocated in the original BabySMART study. Any information that leaves the clinical site will be labelled with this Study ID Number only. Every person that has access to your uncoded data (that is kept at the INFANT Centre, Cork University Hospital) is subject to professional secrecy and confidentiality. Data that directly identifies you (uncoded data) is stored in a locked filing cabinet separate to study documentation. Only study personnel can match your name to your unique Study ID Number.

This data will solely be accessible to the study research team, the study Sponsor and their representatives to check if the study is conducted properly and that your rights are being respected. If this occurs all personal information made available for inspection will be handled in the strictest confidence and in accordance with legal data protection requirements. All information collected about you will be kept private and confidential and will be stored in a secure web based database. The information will be pseudo-anonymised (coded) and any information that could identify you will not be stored on the database. Only fully anonymised data will be shared with external study collaborators for analysis and possible publications.

All data will be shared with the INFANT Centre at Cork University Hospital (CUH). The information collected will be included as part of fulfilling the theses requirements of the Doctor of Clinical Psychology programme at UCC and may be published in peer reviewed journals or presented at relevant conferences. However, you or your child will never be identified individually during these presentations and will not be revealed in any reports or publications. Names or anything else identifiable to you or your child will not be released or published. This data will also be used to inform the development of perinatal services in the future.

WHAT HAPPENS TO THE INFORMATION FROM THE STUDY?

University College Cork (UCC) is the study's Sponsor and will act as the data controller for this study. Any personal data which you provide to the University will be treated with the highest standards of security and confidentiality in accordance with Irish and European Data Protection legislation.

Any personal data you provide to us during the study will be processed fairly and lawfully. Signing the Informed Consent Form means that your personal data will be used for the purposes outlined in this Participant Information Leaflet (PIL).

The clinical site, the study investigators and the members of the study team will use your personal data within the scope defined above. The General Data Protection Regulation allows us to process your data because you have provided your consent. You have a right to request access to this information and to have a copy of it. You have the right to have any incorrect or inaccurate data deleted unless this request makes it impossible or very hard to conduct the study.

You are entitled to withdraw your consent at any time. If you do withdraw your consent, we will keep your coded personal data collected prior to withdrawal, for processing along with other data collected as part of the study to preserve the integrity of the study.

Your personal information will be stored securely at the INFANT Centre. A pseudo-anonymised database (where only your assigned unique numbers are used and there is no identifiable information) will also be stored on researcher's password protected encrypted computers at UCC. All information management will adhere to the Data Protection Act and GDPR.

We are also obliged to ensure the safety and welfare of our participants. This means that if the information you provide suggests that you, your child, or another person is at risk of harm, then we may need to break the confidentiality agreement. If this were to happen, we would try to contact you first, to discuss any concerns we have identified. This would give us the opportunity to provide you with additional information about available resources or supports. Where necessary, we may also contact the appropriate organisations or services on your behalf to ensure you are fully supported.

WHAT WILL HAPPEN TO THE RESULTS OF THIS RESEARCH?

Results of this research study may be published in medical journals and presented at scientific meetings. However, you will never be identified individually during these presentations and will not be revealed in any reports or publications. Your name or anything else identifiable to you will not be released or published. If you would like to receive a summary of the study findings please indicate this on the consent form attached. The findings will be shared in 2022/23. The data provided may also be used by INFANT Centre research team for future research projects.

FOR HOW LONG WILL THIS DATA BE KEPT?

We will keep identifiable information about you from this study for a minimum of 10 years after the study has concluded, as per UCC Code of Research Conduct document. We would like your permission to allow us to store your de-identified data for future related research for a period of 10 years. Further research analyses may be performed but this will be subject to further ethics approval if applicable.

If you have any complaints in connection with our processing of your personal data, you can contact UCC's Information Compliance Manager:
Office of Corporate & Legal Affairs, University College Cork,
Western Road, Cork
E: foi@ucc.ie Tel: +353 21 4903949

You also have the right to lodge a complaint with the Data Protection Commission if you are unhappy with our processing of your personal data. Details of how to lodge a complaint can be found on the Data Protection Commission's website (www.dataprotection.ie), or by telephoning 1890 252 231.

WHO HAS REVIEWED THIS STUDY

All research in Ireland is carefully reviewed by an independent group of people, called a Research Ethics Committee, to protect your safety, rights, wellbeing, and dignity. This study has been approved by the Clinical Research Ethics Committee of the Cork Teaching Hospitals (CREC).

WHAT WILL HAPPEN IF I DO NOT WISH TO CARRY ON IN THIS STUDY?

You are free to withdraw at any time, to any reason without giving a reason. This will not affect the high level of care you will expect for yourself. We would however like your permission to use the information that has already been collected up to the point of withdrawal.

WHO IS CONDUCTING THIS RESEARCH?

This research is being conducted by a team of researchers from the INFANT centre and the School of Applied Psychology at University College Cork (UCC) as outlined below. Emma O'Byrne and Shane MacSweeney are completing this research as part of a Doctoral Clinical Psychology Training Programme.

SUPPORTS AND RESOURCES

You may wish to approach your family doctor (GP) in relation to any mental health concerns you may have. Your GP may refer you to a mental health professional or provide information about supports and resources available to you.

If you require urgent help in relation to your mental health and your GP is unavailable, you can contact a GP out-of-hours service, or mental health services through your local mental health unit or hospital. If you or someone needs urgent emergency assistance, please phone 999 or 112.

Please call the YourMentalHealth Information Line on freephone 1800 111 888 to find out information about mental health services operating in your area. You can also [send a text to 50808](https://text50808.ie/). Visit <https://text50808.ie/> to find out more.

ADDITIONAL RESOURCES:

Samaritans - Phone 116 123

Pieta House - <http://www.pieta.ie/> or phone 1800 247 247 'Text About It' - <https://text50808.ie/>

Aware - 1800 80 48 48

Women's Aid – Phone 1800 341 900

Men's Aid – Phone 0818 222 240

Search for available services delivered online, by phone or face-to-face – <https://www2.hse.ie/services/mental-health/services-search/>

WHERE CAN I GET MORE INFORMATION?

The study will be fully explained to you and any questions answered before you decide if you want to take part. If you have any further questions regarding this study, please contact the Principal Investigator: Professor Geraldine Boylan, email: g.boylan@ucc.ie or a member of the study team;

Emma O'Byrne, Trainee Clinical Psychologist, 119224672@umail.ucc.ie

Shane MacSweeney, Trainee Clinical Psychologist, 119224718@umail.ucc.ie

Dr. Chris McCusker, Senior Lecturer in Clinical Psychology, christopher.mccusker@ucc.ie

Professor Deirdre Murray, Consultant Paediatrician, email: d.murray@ucc.ie

Dr Leanna Fogarty, Clinical Research Psychologist, leannafogarty@yahoo.com

Consent Form**Participant Informed Consent Statement**

Study Title: BABYSMART (Study of Massage therapy, sleep AndneurodevelopMenT) 48 month follow-up

I have read the information leaflet about this study and have been given a copy to keep.

The information has been fully explained to me and I have been able to ask questions and have them answered satisfactorily. I understand why the research is being done and any risks involved.

I agree to participate in a 4-year follow up study based on my participation in the BabySMART study with the INFANT Centre at Cork University Hospital.

I am aware that participation is voluntary, and I may withdraw my consent at any time. If I withdraw from the study, I agree that the coded personal data collected prior to withdrawal may still be processed along with other data collected as part of the study to preserve the integrity of the study. I am aware that my decision not to continue participation at any stage will not restrict my access to health care services normally available to me.

I am aware that confidentiality of records concerning my involvement in this study will be maintained according to national and EU Data Protection Laws. When required by law, the records of this study may be reviewed by government agencies, ethics committee and sponsors of the study.

I understand that the sponsors and Investigators have such insurance as is required by law in the event of injury resulting from this research.

I agree that I can be contacted in the future in relation to this and other research studies

I would like to receive a summary of the research findings by email when available in 2022/2023

I give permission for the information collected from me to be stored for possible future related commercial or collaborative research *without my further consent being required* but subject to approval of a Research Ethics Committee.

I consent that data collected for this study may be used, now or in the future, and understand that I will not benefit financially if this research leads to the development of a new treatment, drug, or device.

I agree that data can be anonymised and used by University College Cork for training and research purposes. I agree to my anonymised data being used in future research presentations, peer reviewed journals and other methods of dissemination.

I understand some of the questionnaires used throughout this project contain items which might be sensitive in nature and measure various aspects of emotional health. I understand that if the information I provide suggests that I, my child, or another person is at risk of harm, that there may be a need to break the confidentiality agreement. I understand if this were to happen, the researchers will try to contact me first, to discuss any concerns they have identified, but in the event I am uncontactable I understand that under these circumstances' confidentiality may be breached.

I understand if I have further queries concerning my rights in connection with the research, I can contact the Clinical Research Ethics Committee of the Cork Teaching Hospitals, Lancaster Hall, Little Hanover Street, Cork (Tel 021 4901901).

By clicking this circle, I am consenting to the above and would like to take part in this study.



Appendix N: Study Questionnaire.

Demographic Information

First Name

Surname

Child's date of birth (dd/mm/yyyy)

Child's gender

- ☐ male
- ☐ Female
- ☐ Prefer not to say

Relationship with the child

- ☐ Mother
- ☐ Father
- ☐ Guardian
- ☐ Other (Please Specify)

Marital status

- ☐ Married/Civil partnership
- ☐ Co-habiting
- ☐ In a relationship (not living together)
- ☐ Single

General Health

Under each heading, please tick the ONE box that best describes your health TODAY.

Mobility

- ☐ I have no problems in walking about
- ☐ I have some problems in walking about
- ☐ I am confined to a bed

Self-Care

- ☒ I have no problems with self-care
- ☐ I have some problems washing or dressing myself
- ☐ I am unable to wash or dress myself.

Usual Activities (*e.g. work, study, housework, family or leisure activities*)

- ☐ I have no problems with performing my usual activities
- ☐ I have some problems with performing my usual activities
- ☐ I am unable to perform my usual activities

Pain/Discomfort

- ☐ I have no pain or discomfort
- ☐ I have moderate pain or discomfort
- ☐ I have extreme pain or discomfort

Anxiety/Depression

- ☐ I am not anxious or depressed
- ☐ I am moderately anxious or depressed
- ☐ I am extremely anxious or depressed

In your own opinion how good or bad is your own health today on a scale of 0-100(where 100 is the best imagineable health state and 1 is the worst).

Strengths and Difficulties Questionnaire (2-4) © Robert Goodman, 2005 Strengths and Difficulties Questionnaire (2-4)

© Robert Goodman, 2005

For each item please mark the box for Not True, Somewhat True or Certainly True. It would help us if you answered all items as best you can even if you are not absolutely certain or the item seems daft! Please give your answers on the basis of the child's behaviour over the last six months or this school year.

Considerate of other people's feelings			
	Not True	Somewhat True	Certainly True
Restless, overactive, cannot stay still for long			
	Not True	Somewhat True	Certainly True
Often complains of headaches, stomach-aches or sickness			
	Not True	Somewhat True	Certainly True
Shares readily with other children (treats,toys, pencils etc.)			
	Not True	Somewhat True	Certainly True
Often has temper tantrums or hot tempers			
	Not True	Somewhat True	Certainly True
Not True			
	S		
omewhat True			
	C		
ertainly True			

Rather solitary, tends to Play alone.	Not True	Somewhat True	Certainly True
Generally obedient, Usually does what adults Request.	Not True	Somewhat True	Certainly True
Many worries, Often seems worried.	Not True	Somewhat True	Certainly True
Helpful if someone is hurt, upset or feeling ill	Not True	Somewhat True	Certainly True
Constantly fidgeting or squirming	Not True	Somewhat True	Certainly True
Has at least one good friend	Not True	Somewhat True	Certainly True
Often fights with other children or bullies them	Not True	Somewhat True	Certainly True
Often unhappy, down- hearted Or tearful.	Not True	Somewhat True	Certainly True
Generally liked by other children	Not True	Somewhat True	Certainly True
Easily distracted, concentration wanders	Not True	Somewhat True	Certainly True
Nervous or clingy in new situations, easily loses confidence	Not True	Somewhat True	Certainly True

Kind to younger children	Not True	Somewhat True	Certainly True
Often argumentative with adults	Not True	Somewhat True	Certainly True
Picked on or bullied by other children	Not True	Somewhat True	Certainly True
Often volunteers to help others (parents, teachers, other children)	Not True	Somewhat True	Certainly True
Can stop and think about things before acting	Not True	Somewhat True	Certainly True
Can be spiteful to others	Not True	Somewhat True	Certainly True
Gets on better with adults than with other children	Not True	Somewhat True	Certainly True
Many fears, easily scared	Not True	Somewhat True	Certainly True
Sees tasks through to the end, good attention span	Not True	Somewhat True	Certainly True

Parental Wellbeing

Please read each of the 21 statements and select a number 0, 1, 2 or 3 which indicates how much the statement applies to you over the past week. There are no right or wrong answers. Do not spend too much time on any statement.

I found it hard to wind down

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time

I was aware of dryness of my mouth

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time

I couldn't seem to experience any positive feeling at all

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time

I experienced breathing difficulties (e.g. excessively rapid breathing, breathlessness in the absence of physical exertion)

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time3 –
- ☐ 3- Applied to me very much or most of the time

I found it difficult to work up the initiative to do things

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time

I tended to over-react to situations

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time.

I experienced trembling (e.g. in the hands)

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time

I felt that I was using a lot of nervous energy

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time

I was worried about situations in which I might panic and make a fool of myself

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time.
- ☐ 3 - Applied to me very much or most of the time.

I felt that I had nothing to look forward to

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time

I found myself getting agitated

- ☐ 0- Did not apply to me at all
- ☐ 1- Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerate degree or a good part of the time ☐
- 3- Applied to me very much or most of the time.

I found it difficult to relax

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time.

I felt down-hearted and blue

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time³
- ☐ - Applied to me very much or most of the time

I was intolerant of anything that kept me from getting on with what I was doing

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time

I felt I was close to panic

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time

I was unable to become enthusiastic about anything

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time

I felt I wasn't worth much as a person

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time

I felt I was rather touchy

- ☐ 0 - Did not apply to me at all.
- ☐ 1 - Applied to me to some degree, or some of the time.
- ☐ 2- Applied to me to a considerable degree or a good part of the time.
- ☐ 3 - Applied to me very much or most of the time.

I was aware of the action of my heart in the absence of physical exertion (e.g. sense of heart rate increase, heart missing a beat)

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time.

I felt scared without any good reason

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time

I felt that life was meaningless

- ☐ 0 - Did not apply to me at all
- ☐ 1 - Applied to me to some degree, or some of the time
- ☐ 2- Applied to me to a considerable degree or a good part of the time
- ☐ 3 - Applied to me very much or most of the time

Parent-Child Relationship

The next 15 questions ask about how you feel about the relationship you have with your child. Please reflect on the degree to which each of the following statements currently applies to your relationship with your child. Using the scale below, select the appropriate number for each item.

I share an affectionate, warm relationship with my child.

- ☐ 1 - Definitely does not apply
- ☐ 2 - Not really
- ☐ 3 - Neutral, not sure
- ☐ 4 - Applies somewhat
- ☐ 5 - Definitely applies

My child and I always seem to be struggling with each other.

- ☐ 1 - Definitely does not apply
- ☐ 2 - Not really
- ☐ 3 - Neutral, not sure
- ☐ 4 - Applies somewhat
- ☐ 5 - Definitely applies

If upset, my child will seek comfort from me

- ☐ 1 - Definitely does not apply
- ☐ 2 - Not really
- ☐ 3 - Neutral, not sure
- ☐ 4 - Applies somewhat
- ☐ 5 - Definitely applies

My child is uncomfortable with physical affection or touch from me.

- ☐ 1 - Definitely does not apply
- ☐ 2 - Not really
- ☐ 3 - Neutral, not sure
- ☐ 4 - Applies somewhat
- ☐ 5 - Definitely applies

My child values his/her relationship with me.

- ☐ 1 - Definitely does not apply
- ☐ 2 - Not really
- ☐ 3 - Neutral, not sure
- ☐ 4 - Applies somewhat
- ☐ 5 - Definitely applies

When I praise my child, he/she beams with pride.

- ☐ 1 - Definitely does not apply
- ☐ 2 - Not really
- ☐ 3 - Neutral, not sure
- ☐ 4 - Applies somewhat
- ☐ 5 - Definitely applies

My child spontaneously shares information about themselves.

- ☐ 1 - Definitely does not apply
- ☐ 2 - Not really
- ☐ 3 - Neutral, not sure
- ☐ 4 - Applies somewhat
- ☐ 5 - Definitely applies

My child easily becomes angry at me.

- ☐ 1 - Definitely does not apply
- ☐ 2 - Not really
- ☐ 3 - Neutral, not sure
- ☐ 4 - Applies somewhat
- ☐ 5 - Definitely applies

It is easy to be in tune with what my child is feeling.

- ☐ 1 - Definitely does not apply
- ☐ 2 - Not really
- ☐ 3 - Neutral, not sure
- ☐ 4 - Applies somewhat
- ☐ 5 - Definitely applies

My child remains angry or is resistant after being disciplined.

- ☐ 1 - Definitely does not apply
- ☐ 2 - Not really
- ☐ 3 - Neutral, not sure
- ☐ 4 - Applies somewhat
- ☐ 5 - Definitely applies

Dealing with my child drains my energy.

- ☐ 1 - Definitely does not apply
- ☐ 2 - Not really
- ☐ 3 - Neutral, not sure
- ☐ 4 - Applies somewhat
- ☐ 5 - Definitely applies

When my child is in a bad mood, I know we're in for a long and difficult day.

- ☐ 1 - Definitely does not apply
- ☐ 2 - Not really
- ☐ 3 - Neutral, not sure
- ☐ 4 - Applies somewhat
- ☐ 5 - Definitely applies

My child's feelings towards me can be unpredictable or can change suddenly.

- ☐ 1 - Definitely does not apply
- ☐ 2 - Not really
- ☐ 3 - Neutral, not sure
- ☐ 4 - Applies somewhat
- ☐ 5 - Definitely applies

My child is sneaky or manipulative with me.

- ☐ 1 - Definitely does not apply
- ☐ 2 - Not really
- ☐ 3 - Neutral, not sure
- ☐ 4 - Applies somewhat
- ☐ 5 - Definitely applies

My child openly shares their feelings with me.

- ☐ 1 - Definitely does not apply
- ☐ 2 - Not really
- ☐ 3 - Neutral, not sure
- ☐ 4 - Applies somewhat
- ☐ 5 - Definitely applies

Scenarios

Did you complete the infant massage group at INFANT?

☐ Yes ☐ No

What are your memories from the infant massage experience?

Do you think it impacted your parenting at the time? If yes, how?

The final part of this questionnaire includes the description of a brief and common scenario that most parents have likely experienced.

We would like you to tell us how you have or would respond to this situation. Try and answer by recalling what actually happened rather than what you think should have happened. All details are relevant.

Scenario

Imagine you are having dinner and your child is refusing to eat. They are becoming more irritable and tearful the more you encourage them to take another bite. They are responding "No, no, no." You know they are tired, having just returned from a few hours in the park. You are also tired and in a hurry to finish dinner. We would like you to tell us;

What strategies do you usually use in this situation?

What do you usually say to your child when this happens?

How does the situation usually end?

Appendix O: SPSS Output

Multivariate Scale Correlation Statistics

Table 1: *Correlations Maternal Mental Health at 4-months*

Correlations		EPDS scale – total score (depression)	EPDS scale – anxiety score
EPDS scale – total score (depression)	Pearson Correlation	1	.866**
	Sig. (2-tailed)		<.001
	N	121	121
EPDS scale – anxiety score	Pearson Correlation	.866**	1
	Sig. (2-tailed)	<.001	
	N	121	121

** . Correlation is significant at the 0.01 level (2-tailed).

Table 2: *Correlations Attachment related factors at 4-months*

Correlations		Maternal attachment – quality of attachment subscale score	Maternal attachment – absence of hostility subscale score	Maternal attachment – pleasure in interaction subscale score	Maternal attachment – overall score
Maternal attachment – quality of attachment subscale score	Pearson Correlation	1	.485**	.149	.796**
	Sig. (2-tailed)		<.001	.104	<.001
	N	121	121	121	121
Maternal attachment – absence of hostility subscale score	Pearson Correlation	.485**	1	.314**	.803**
	Sig. (2-tailed)	<.001		<.001	<.001
	N	121	121	121	121
Maternal attachment – pleasure in interaction subscale score	Pearson Correlation	.149	.314**	1	.605**
	Sig. (2-tailed)	.104	<.001		<.001
	N	121	121	121	121
Maternal attachment – overall score	Pearson Correlation	.796**	.803**	.605**	1
	Sig. (2-tailed)	<.001	<.001	<.001	
	N	121	121	121	121

** . Correlation is significant at the 0.01 level (2-tailed).

Table 3: *Correlations* Maternal Mental Health at 18-months.

		Correlations	
		Becks Anxiety Inventory (BAI) Total Score (Mothers only)	Becks Depression Inventory (BDI-2) (Mothers only)
Becks Anxiety Inventory (BAI) Total Score (Mothers only)	Pearson Correlation	1	.759**
	Sig. (2-tailed)		<.001
	N	117	117
Becks Depression Inventory (BDI-2) (Mothers only)	Pearson Correlation	.759**	1
	Sig. (2-tailed)	<.001	
	N	117	117

** . Correlation is significant at the 0.01 level (2-tailed).

Table 4: *Correlations* Maternal Mental Health at 48-months

		Correlations		
		DASS21 Stress (Mothers only)	DASS21 Depression (mothers only)	DASS21 Anxiety (Mothers only)
DASS21 Stress (Mothers only)	Pearson Correlation	1	.644**	.723**
	Sig. (2-tailed)		<.001	<.001
	N	114	114	114
DASS21 Depression (mothers only)	Pearson Correlation	.644**	1	.601**
	Sig. (2-tailed)	<.001		<.001
	N	114	115	115
DASS21 Anxiety (Mothers only)	Pearson Correlation	.723**	.601**	1
	Sig. (2-tailed)	<.001	<.001	
	N	114	115	115

** . Correlation is significant at the 0.01 level (2-tailed).

Table 5: *Correlations* Attachment factors at 48-months.

Correlations		Total CPRS Conflicts (mothers only)	Total CPRS Closeness (mothers only)
Total CPRS Conflicts (mothers only)	Pearson Correlation	1	-.177
	Sig. (2-tailed)		.058
	N	115	115
Total CPRS Closeness (mothers only)	Pearson Correlation	-.177	1
	Sig. (2-tailed)	.058	
	N	115	115

Multivariate Analysis of Variance Statistics**Table 6:** *MANOVA Maternal Mental Health at 4-months*

		Multivariate Tests^a					
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.631	100.892 ^b	2.000	118.000	<.001	.631
	Wilks' Lambda	.369	100.892 ^b	2.000	118.000	<.001	.631
	Hotelling's Trace	1.710	100.892 ^b	2.000	118.000	<.001	.631
	Roy's Largest Root	1.710	100.892 ^b	2.000	118.000	<.001	.631
Baby_Programme	Pillai's Trace	.021	1.259 ^b	2.000	118.000	.288	.021
	Wilks' Lambda	.979	1.259 ^b	2.000	118.000	.288	.021
	Hotelling's Trace	.021	1.259 ^b	2.000	118.000	.288	.021
	Roy's Largest Root	.021	1.259 ^b	2.000	118.000	.288	.021

a. Design: Intercept + Baby_Programme

b. Exact statistic

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	EPDS scale – total score	2.109 ^a	1	2.109	.116	.734	.001
	EPDS scale – anxiety score	5.900 ^b	1	5.900	1.145	.287	.010
Intercept	EPDS scale – total score	3229.712	1	3229.712	178.055	<.001	.599
	EPDS scale – anxiety score	1021.701	1	1021.701	198.369	<.001	.625
Baby_Programme	EPDS scale – total score	2.109	1	2.109	.116	.734	.001
	EPDS scale – anxiety score	5.900	1	5.900	1.145	.287	.010
Error	EPDS scale – total score	2158.519	119	18.139			
	EPDS scale – anxiety score	612.910	119	5.151			
Total	EPDS scale – total score	5420.000	121				
	EPDS scale – anxiety score	1637.000	121				
Corrected Total	EPDS scale – total score	2160.628	120				
	EPDS scale – anxiety score	618.810	120				

a. R Squared = .001 (Adjusted R Squared = -.007)

b. R Squared = .010 (Adjusted R Squared = .001)

Table 7: *MANOVA Attachment related factors at 4-months.***Multivariate Tests^a**

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.996	10115.702 ^b	3.000	117.000	<.001	.996
	Wilks' Lambda	.004	10115.702 ^b	3.000	117.000	<.001	.996
	Hotelling's Trace	259.377	10115.702 ^b	3.000	117.000	<.001	.996
	Roy's Largest Root	259.377	10115.702 ^b	3.000	117.000	<.001	.996
Baby_Programme	Pillai's Trace	.006	.237 ^b	3.000	117.000	.871	.006
	Wilks' Lambda	.994	.237 ^b	3.000	117.000	.871	.006
	Hotelling's Trace	.006	.237 ^b	3.000	117.000	.871	.006
	Roy's Largest Root	.006	.237 ^b	3.000	117.000	.871	.006

a. Design: Intercept + Baby_Programme

b. Exact statistic

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	Maternal attachment – quality of attachment subscale score	3.415 ^a	1	3.415	.377	.540	.003
	Maternal attachment – absence of hostility subscale score	2.349 ^b	1	2.349	.418	.519	.004
	Maternal attachment – pleasure in interaction subscale score	.209 ^c	1	.209	.042	.837	.000
	Maternal attachment – overall score	8.544 ^d	1	8.544	.268	.605	.002
Intercept	Maternal attachment – quality of attachment subscale score	211577.264	1	211577.264	23363.944	<.001	.995
	Maternal attachment – absence of hostility subscale score	55076.674	1	55076.674	9805.230	<.001	.988
	Maternal attachment – pleasure in interaction subscale score	58038.424	1	58038.424	11760.634	<.001	.990
	Maternal attachment – overall score	875293.358	1	875293.358	27494.168	<.001	.996
Baby_Programme	Maternal attachment – quality of attachment subscale score	3.415	1	3.415	.377	.540	.003
	Maternal attachment – absence of hostility subscale score	2.349	1	2.349	.418	.519	.004
	Maternal attachment – pleasure in interaction subscale score	.209	1	.209	.042	.837	.000
	Maternal attachment – overall score	8.544	1	8.544	.268	.605	.002
Error	Maternal attachment – quality of attachment subscale score	1077.630	119	9.056			
	Maternal attachment – absence of hostility subscale score	668.431	119	5.617			
	Maternal attachment – pleasure in interaction subscale score	587.262	119	4.935			
	Maternal attachment – overall score	3788.436	119	31.836			
Total	Maternal attachment – quality of attachment subscale score	216174.620	121				
	Maternal attachment – absence of hostility subscale score	56697.670	121				
	Maternal attachment – pleasure in interaction subscale score	59504.000	121				
	Maternal attachment – overall score	893440.370	121				
Corrected Total	Maternal attachment – quality of attachment subscale score	1081.045	120				
	Maternal attachment – absence of hostility subscale score	670.780	120				
	Maternal attachment – pleasure in interaction subscale score	587.471	120				
	Maternal attachment – overall score	3796.981	120				

a. R Squared = .003 (Adjusted R Squared = -.005)

b. R Squared = .004 (Adjusted R Squared = -.005)

c. R Squared = .000 (Adjusted R Squared = -.008)

d. R Squared = .002 (Adjusted R Squared = -.006)

Table 8: MANOVA Maternal Mental Health at 18-months.

Multivariate Tests ^a							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.478	52.210 ^b	2.000	114.000	<.001	.478
	Wilks' Lambda	.522	52.210 ^b	2.000	114.000	<.001	.478
	Hotelling's Trace	.916	52.210 ^b	2.000	114.000	<.001	.478
	Roy's Largest Root	.916	52.210 ^b	2.000	114.000	<.001	.478
Baby_Programme	Pillai's Trace	.014	.810 ^b	2.000	114.000	.447	.014
	Wilks' Lambda	.986	.810 ^b	2.000	114.000	.447	.014
	Hotelling's Trace	.014	.810 ^b	2.000	114.000	.447	.014
	Roy's Largest Root	.014	.810 ^b	2.000	114.000	.447	.014

a. Design: Intercept + Baby_Programme

b. Exact statistic

Tests of Between-Subjects Effects							
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	25.3 Becks Anxiety Inventory (BAI)	53.217 ^a	1	53.217	1.372	.244	.012
	25.4 Becks Depression Inventory (BDI-2)	12.923 ^b	1	12.923	.309	.579	.003
Intercept	25.3 Becks Anxiety Inventory (BAI)	1746.482	1	1746.482	45.025	<.001	.281
	25.4 Becks Depression Inventory (BDI-2)	4309.334	1	4309.334	103.009	<.001	.472
Baby_Programme	25.3 Becks Anxiety Inventory (BAI)	53.217	1	53.217	1.372	.244	.012
	25.4 Becks Depression Inventory (BDI-2)	12.923	1	12.923	.309	.579	.003
Error	25.3 Becks Anxiety Inventory (BAI)	4460.749	115	38.789			
	25.4 Becks Depression Inventory (BDI-2)	4810.991	115	41.835			
Total	25.3 Becks Anxiety Inventory (BAI)	6370.000	117				
	25.4 Becks Depression Inventory (BDI-2)	9267.000	117				
Corrected Total	25.3 Becks Anxiety Inventory (BAI)	4513.966	116				
	25.4 Becks Depression Inventory (BDI-2)	4823.915	116				

a. R Squared = .012 (Adjusted R Squared = .003)

b. R Squared = .003 (Adjusted R Squared = -.006)

Table 9: MANOVA Maternal Mental Health at 48-months.

Multivariate Tests ^a							
Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.723	95.809 ^b	3.000	110.000	<.001	.723
	Wilks' Lambda	.277	95.809 ^b	3.000	110.000	<.001	.723
	Hotelling's Trace	2.613	95.809 ^b	3.000	110.000	<.001	.723
	Roy's Largest Root	2.613	95.809 ^b	3.000	110.000	<.001	.723
Baby_Programme	Pillai's Trace	.045	1.730 ^b	3.000	110.000	.165	.045
	Wilks' Lambda	.955	1.730 ^b	3.000	110.000	.165	.045
	Hotelling's Trace	.047	1.730 ^b	3.000	110.000	.165	.045
	Roy's Largest Root	.047	1.730 ^b	3.000	110.000	.165	.045

a. Design: Intercept + Baby_Programme

b. Exact statistic

Tests of Between-Subjects Effects							
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	FortyEightMonths_Maternal_DASS21_Stress	19.126 ^a	1	19.126	1.981	.162	.017
	FortyEightMonths_Maternal_DASS21_Depression	22.552 ^b	1	22.552	3.864	.052	.033
	FortyEightMonths_Maternal_DASS21_Anxiety	13.517 ^c	1	13.517	4.168	.044	.036
Intercept	FortyEightMonths_Maternal_DASS21_Stress	2321.512	1	2321.512	240.514	<.001	.682
	FortyEightMonths_Maternal_DASS21_Depression	262.552	1	262.552	44.988	<.001	.287
	FortyEightMonths_Maternal_DASS21_Anxiety	132.570	1	132.570	40.878	<.001	.267
Baby_Programme	FortyEightMonths_Maternal_DASS21_Stress	19.126	1	19.126	1.981	.162	.017
	FortyEightMonths_Maternal_DASS21_Depression	22.552	1	22.552	3.864	.052	.033
	FortyEightMonths_Maternal_DASS21_Anxiety	13.517	1	13.517	4.168	.044	.036
Error	FortyEightMonths_Maternal_DASS21_Stress	1081.058	112	9.652			
	FortyEightMonths_Maternal_DASS21_Depression	653.633	112	5.836			
	FortyEightMonths_Maternal_DASS21_Anxiety	363.220	112	3.243			
Total	FortyEightMonths_Maternal_DASS21_Stress	3463.000	114				
	FortyEightMonths_Maternal_DASS21_Depression	951.000	114				
	FortyEightMonths_Maternal_DASS21_Anxiety	516.000	114				
Corrected Total	FortyEightMonths_Maternal_DASS21_Stress	1100.184	113				
	FortyEightMonths_Maternal_DASS21_Depression	676.184	113				
	FortyEightMonths_Maternal_DASS21_Anxiety	376.737	113				

a. R Squared = .017 (Adjusted R Squared = .009)

b. R Squared = .033 (Adjusted R Squared = .025)

c. R Squared = .036 (Adjusted R Squared = .027)

Table 10: *MANOVA Attachment factors at 48-months.***Multivariate Tests^a**

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.998	29030.910 ^b	2.000	112.000	<.001	.998
	Wilks' Lambda	.002	29030.910 ^b	2.000	112.000	<.001	.998
	Hotelling's Trace	518.409	29030.910 ^b	2.000	112.000	<.001	.998
	Roy's Largest Root	518.409	29030.910 ^b	2.000	112.000	<.001	.998
Baby_Programme	Pillai's Trace	.007	.406 ^b	2.000	112.000	.667	.007
	Wilks' Lambda	.993	.406 ^b	2.000	112.000	.667	.007
	Hotelling's Trace	.007	.406 ^b	2.000	112.000	.667	.007
	Roy's Largest Root	.007	.406 ^b	2.000	112.000	.667	.007

a. Design: Intercept + Baby_Programme

b. Exact statistic

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	FortyEightMonths_Maternal_CPRS_Conflicts	13.950 ^a	1	13.950	.456	.501	.004
	FortyEightMonths_MATERNAL_CPRS_Closeness	1.213 ^b	1	1.213	.505	.479	.004
Intercept	FortyEightMonths_Maternal_CPRS_Conflicts	27193.846	1	27193.846	888.498	<.001	.887
	FortyEightMonths_MATERNAL_CPRS_Closeness	128563.265	1	128563.265	53522.514	<.001	.998
Baby_Programme	FortyEightMonths_Maternal_CPRS_Conflicts	13.950	1	13.950	.456	.501	.004
	FortyEightMonths_MATERNAL_CPRS_Closeness	1.213	1	1.213	.505	.479	.004
Error	FortyEightMonths_Maternal_CPRS_Conflicts	3458.537	113	30.607			
	FortyEightMonths_MATERNAL_CPRS_Closeness	271.431	113	2.402			
Total	FortyEightMonths_Maternal_CPRS_Conflicts	30931.000	115				
	FortyEightMonths_MATERNAL_CPRS_Closeness	129566.000	115				
Corrected Total	FortyEightMonths_Maternal_CPRS_Conflicts	3472.487	114				
	FortyEightMonths_MATERNAL_CPRS_Closeness	272.643	114				

a. R Squared = .004 (Adjusted R Squared = -.005)

b. R Squared = .004 (Adjusted R Squared = -.004)

Pearson's Chi Square

Table 11: *Sensitivity Evidenced/Not Evidenced Between Infant Massage and Control Groups.*

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.127 ^a	1	.288		
Continuity Correction ^b	.766	1	.382		
Likelihood Ratio	1.129	1	.288		
Fisher's Exact Test				.352	.191
Linear-by-Linear Association	1.117	1	.290		
N of Valid Cases	117				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 24.85.

b. Computed only for a 2x2 table

7.3|Baby Enrichment Programme * Dichotomised_Vignettegroups Crosstabulation

			Dichotomised_Vignettegroups		Total
			1	2	
7.3 Baby Enrichment Programme	Control	Count	35	31	66
		% within 7.3 Baby Enrichment Programme	53.0%	47.0%	100.0%
		% within Dichotomised_Vignettegroups	61.4%	51.7%	56.4%
		% of Total	29.9%	26.5%	56.4%
	Intervention	Count	22	29	51
		% within 7.3 Baby Enrichment Programme	43.1%	56.9%	100.0%
		% within Dichotomised_Vignettegroups	38.6%	48.3%	43.6%
		% of Total	18.8%	24.8%	43.6%
Total	Count		57	60	117
	% within 7.3 Baby Enrichment Programme		48.7%	51.3%	100.0%
	% within Dichotomised_Vignettegroups		100.0%	100.0%	100.0%
	% of Total		48.7%	51.3%	100.0%

Table 12: *Pearson's Chi Square, Comparing Stress Caseness Between Groups.*

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.503 ^a	1	.019		
Continuity Correction ^b	3.707	1	.054		
Likelihood Ratio	7.793	1	.005		
Fisher's Exact Test				.029	.021
Linear-by-Linear Association	5.454	1	.020		
N of Valid Cases	114				

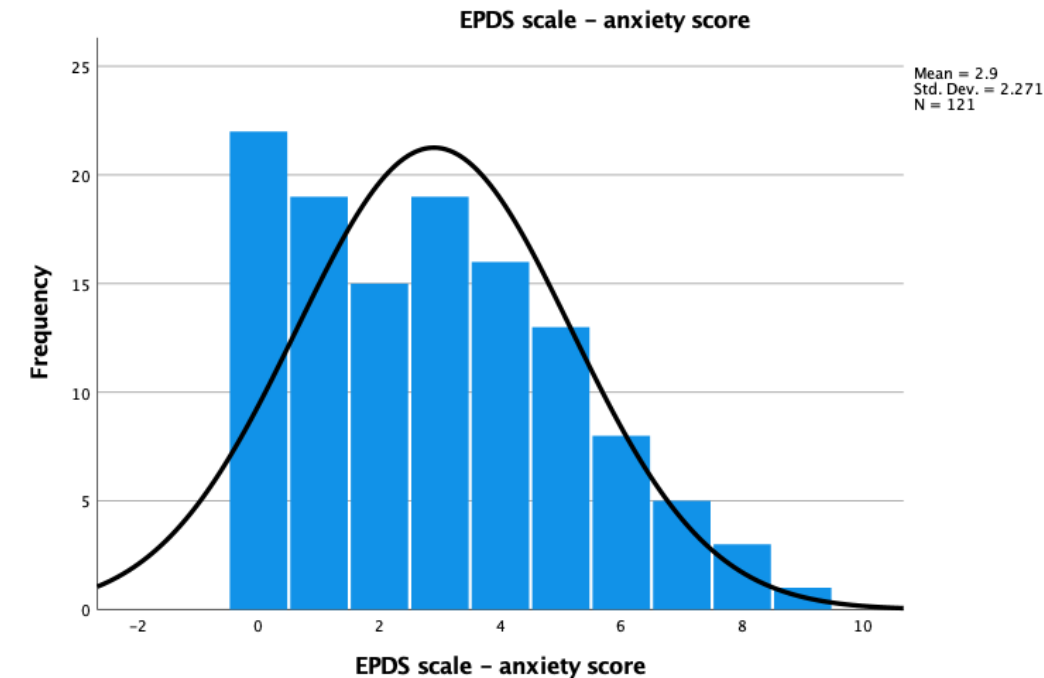
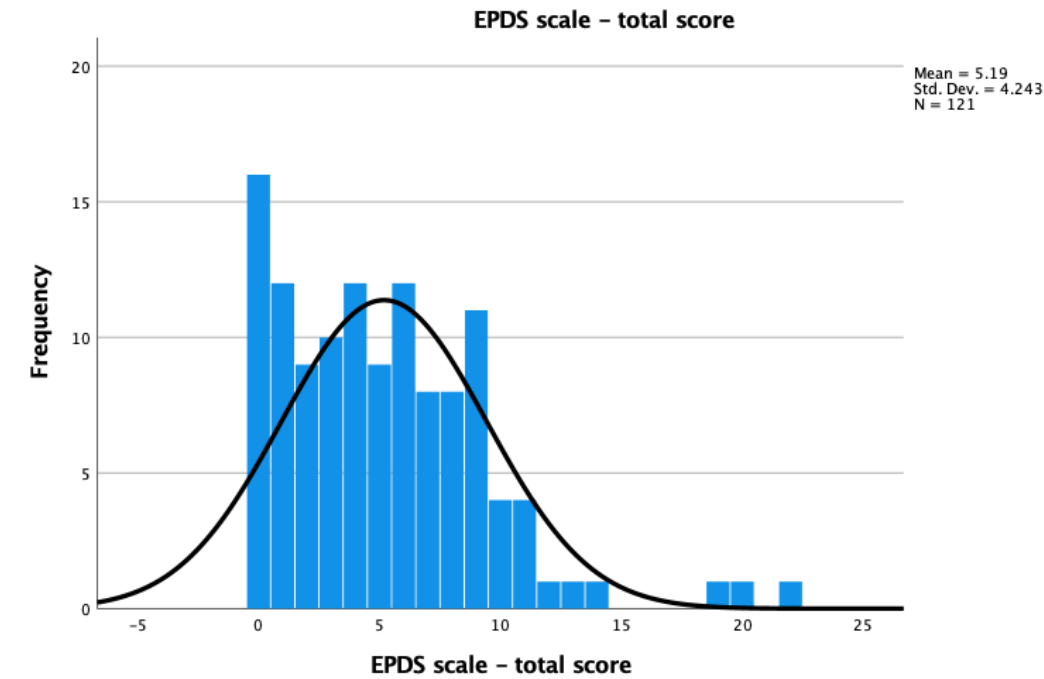
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.79.

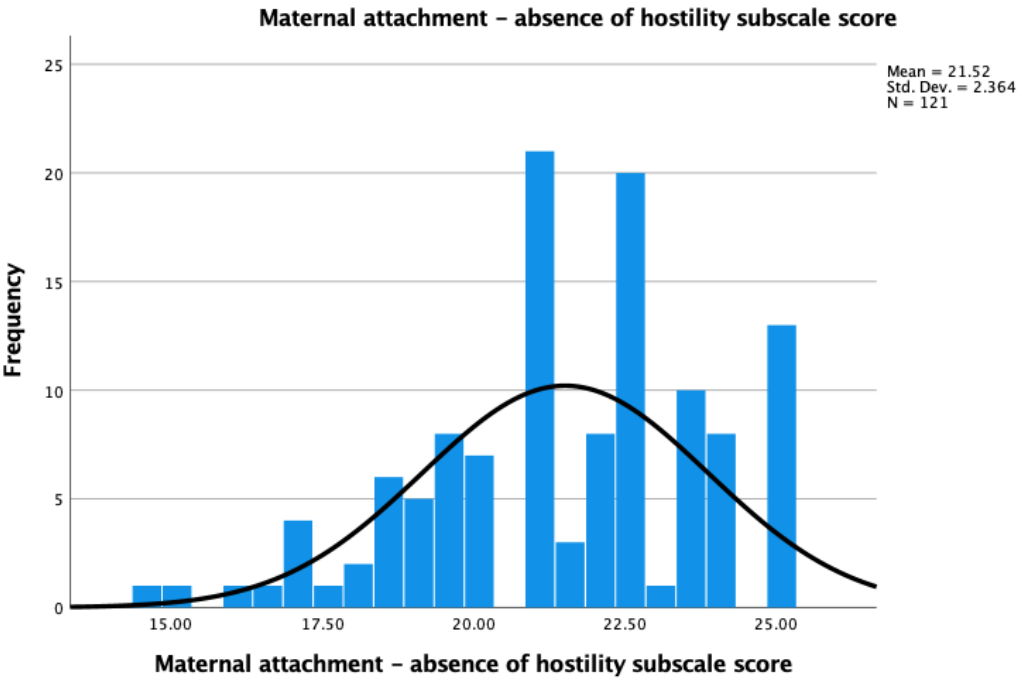
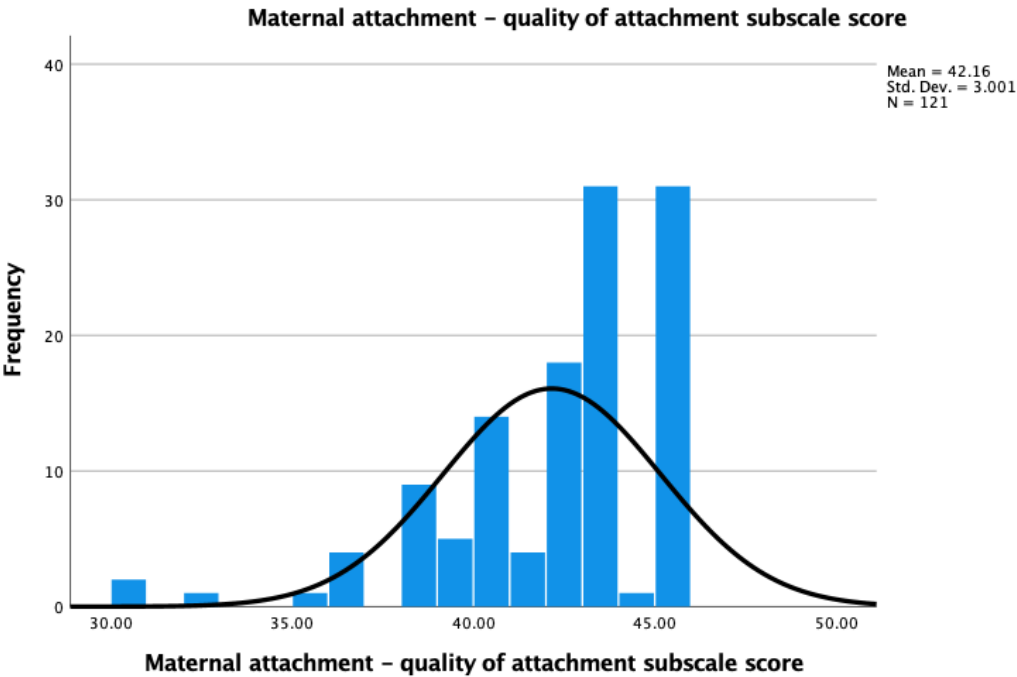
b. Computed only for a 2x2 table

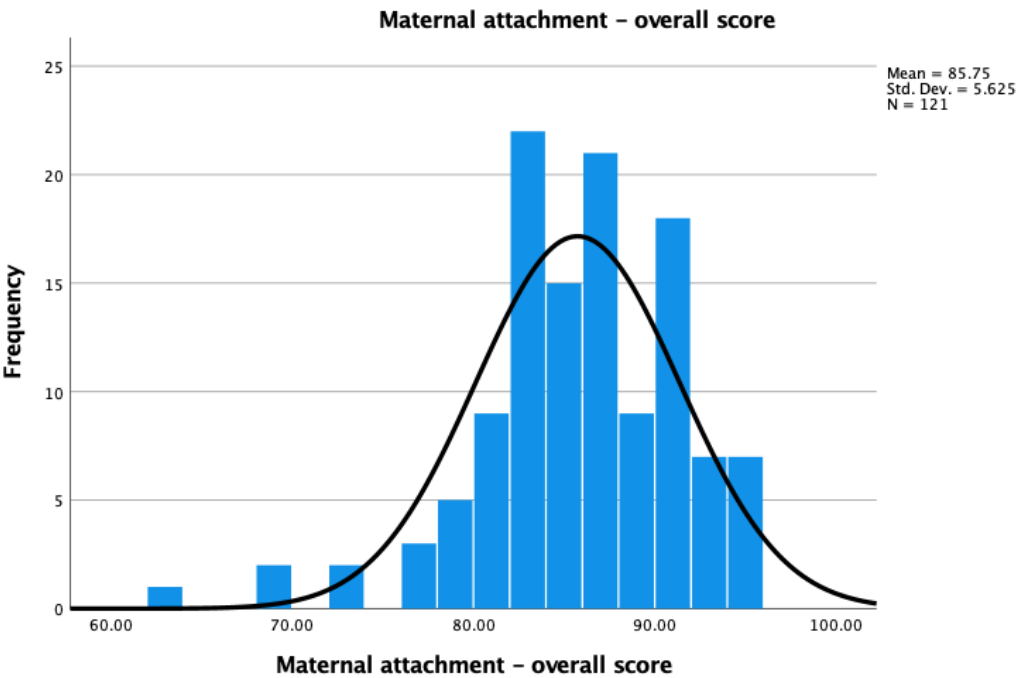
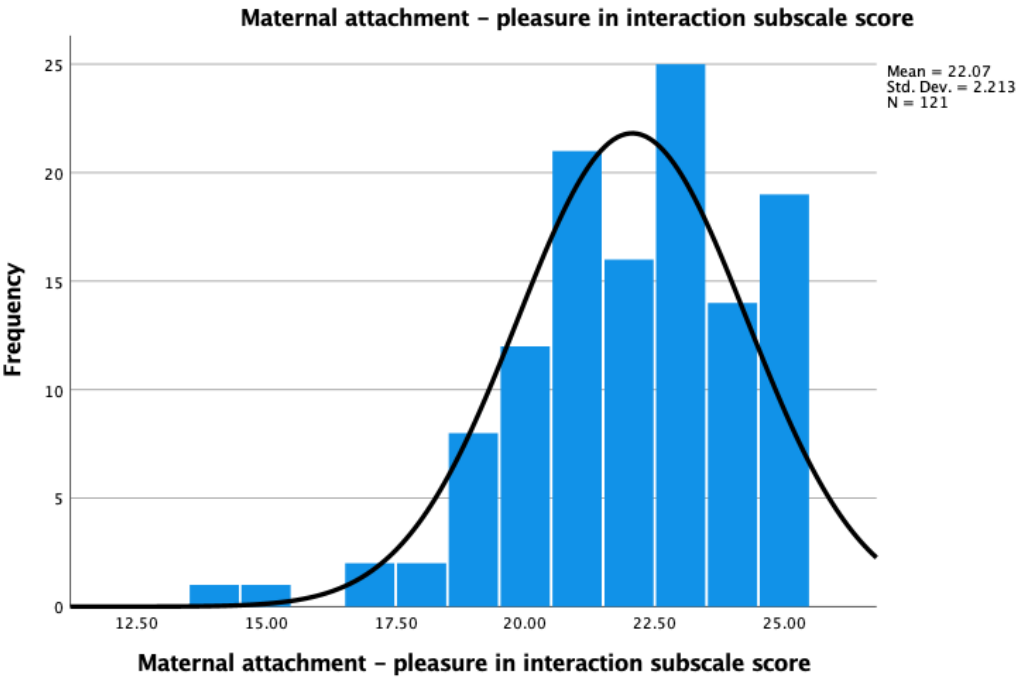
Crosstab					
		DASS21 Stress Caseness (mothers only)			
		Not Caseness DASS Stress	Caseness (DASS Stress)	Total	
Participation in Baby Enrichment Programme	Control	Count	55	6	61
		% within Participation in Baby Enrichment Programme	90.2%	9.8%	100.0%
		% within DASS21 Stress Caseness (mothers only)	50.9%	100.0%	53.5%
		% of Total	48.2%	5.3%	53.5%
	Intervention	Count	53	0	53
		% within Participation in Baby Enrichment Programme	100.0%	0.0%	100.0%
		% within DASS21 Stress Caseness (mothers only)	49.1%	0.0%	46.5%
		% of Total	46.5%	0.0%	46.5%
Total		Count	108	6	114
		% within Participation in Baby Enrichment Programme	94.7%	5.3%	100.0%
		% within DASS21 Stress Caseness (mothers only)	100.0%	100.0%	100.0%
		% of Total	94.7%	5.3%	100.0%

Descriptive Statistics for Responder Sample Only

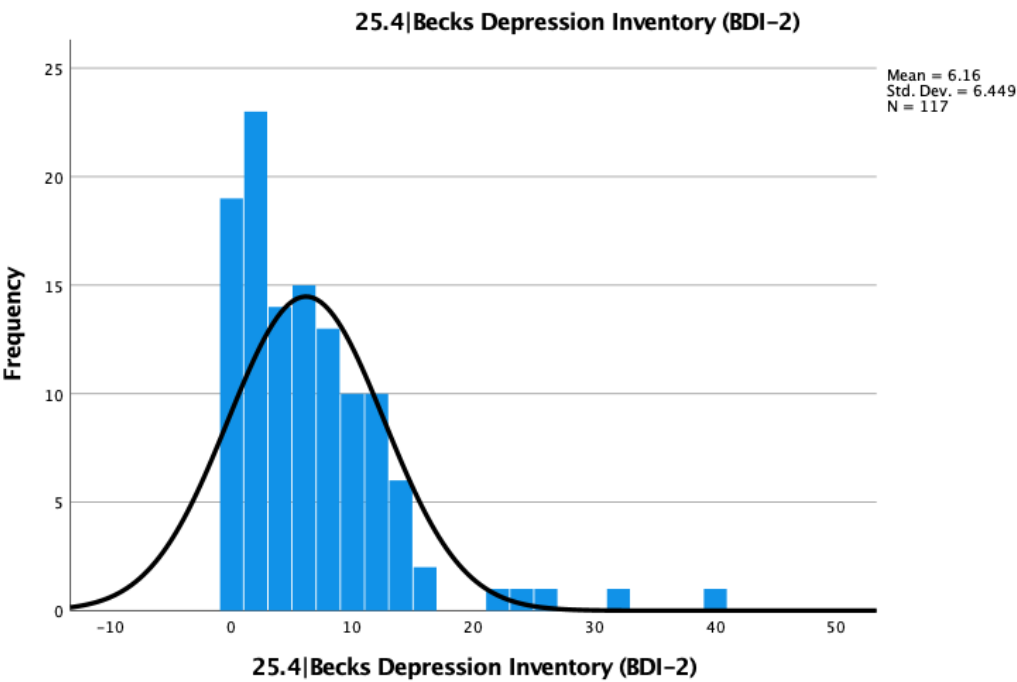
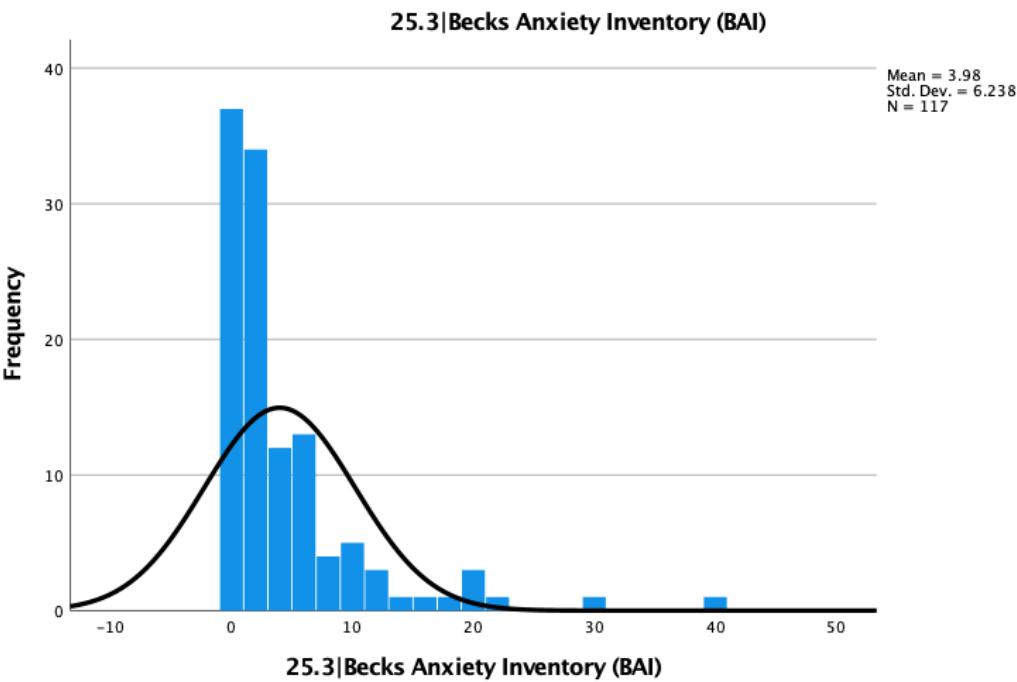
Histograms: EPDS, EPDS Anxiety, MPAS Subscales (4-months)







Histograms: BAI, BDI-II (18-months)



Histograms: CPRS-SF; Closeness scale, Conflicts scale, DASS-21 depression, anxiety and stress subscales.

