

**The Relationship between Parental Mentalization and
Maternal Psychopathology: During and After Postpartum
Period**

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Thesis declaration form

I confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

Signature:

Name:

Date:

Overview

The overall focus of the thesis is on postpartum psychopathology; factors that influence the development and maintenance of postpartum depressive (PPD) symptomatology, as well as the relationship between parental mentalization and the presence of maternal psychopathology at different time points. This thesis consists of three parts:

Part one presents a systematic literature review on factors in relation to PPD symptomatology in adolescent mothers. Despite higher prevalence of PPD in adolescent mothers, it remains a relatively less well researched area when comparing to that of the adult literature. The current review built upon Reid & Meadows-Oliver's (2007) review, to address the gaps in knowledge by examining possible relationships between PPD symptoms and maternal age, antenatal depressive (AND) symptoms, support and ethnicity. Possible mediating and moderating factors were also explored.

Part two is an empirical paper on the relationship between parental mentalization and maternal psychopathology at two time points. Using maternal mind-mindedness (MMM) as a mentalizing construct, the results showed an association between postpartum maternal psychopathology and later mentalization after the infant's first year, but not that of concurrent maternal mental state. The data for this study was based on two large research trials on parent-infant relationships at the Anna Freud Centre and the coding of MMM data was conducted jointly with another trainee.

Part three is a critical appraisal discussing reflections on issues that arose during the process of the research, especially on joining established research trials and conducting longitudinal studies. Some more general comments on the field of parental mentalization and postpartum psychopathology research were also made.

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Part 1: Literature Review

A Systematic Literature Review into Factors related to Postpartum Depressive Symptomatology in Adolescent Population: Maternal age, Ethnicity, Antenatal Depressive Symptoms and Support

Abstract

Aims

This review aimed to evaluate the literature that examines factors (maternal age, ethnicity, antenatal depressive symptoms and support) in relation to Postpartum Depressive (PPD) symptomatology in adolescent mothers.

Methods:

A systematic literature search was conducted using databases PsychINFO, MEDLINE, EMBASE, CINAHL and Maternity and Infant Care. After inclusion and exclusion criteria were applied, 17 studies were identified as suitable for this review.

Results:

Results showed antenatal depressive (AND) symptoms and support to be associated with PPD symptoms, but not maternal age or ethnicity. Studies highlighted parental competence and conflict as potentially accounting for the relationship between support and PPD symptoms. Contributing factors to this relationship were relationship status, living arrangement, antenatal expectation and socioeconomic status. Due to most studies being part of a larger project, a broad range of other variables were measured often with limited rationale for their inclusion.

Conclusion:

The current literature indicates AND symptoms and support are related to PPD symptoms. However, there remains a lack of specificity to these relationships. Further research is needed to improve our understanding of the interaction between the relevant factors involved.

Introduction

The transition to motherhood can be overwhelming and impact on a mother's psychological and biological wellbeing. Postpartum depression (PPD) is the most common mood disorder associated with childbirth (NHMRC, 1999). Reviews have shown an overall prevalence of 13% to 19.2% in childbearing population (O'Hara & Swain, 1996; Gavin, Gaynes, Lohr, Meltzer-Brody, Gartlehner & Swinson, 2005), with much higher estimates in adolescent mothers (Robertson, Grace, Wallington & Stewart, 2004).

Despite the higher prevalence of PPD, there are many possible factors and mechanisms that may confer risk and/or resilience to PPD in adolescent mothers. Research investigating this can have significant clinical implication in minimising detrimental effects of PPD on adolescent mothers, their parenting behaviours, the mother-infant relationship, and their children's behavioural and cognitive outcomes.

Definition of PPD

PPD is generally defined as an episode of major or minor depressive disorder persisting at least two weeks with onset in the first four weeks following pregnancy (Wisner, Moses-Kolko & Sit, 2010). PPD differs from the common postpartum blues and more acute postpartum psychosis; Postpartum blue is a mild and brief mood disturbance that commonly occurs three to five days following childbirth, with an incidence of approximately 40% to 80% (Buttner, O'Hara & Watson., 2012). Postpartum psychosis, on the other hand, is a less common (with rare incidence of approximately 0.1% to 0.5%), acute, and psychotic episode that begins within the first two weeks after delivery (Sit, Rothschild & Wisner. 2006).

Risk factors for adolescent mothers

Unlike risk factors in PPD for women for all ages that is well researched over the years and have resulted in several meta-analyses (Beck 2001; O'Hara & Swain 1996; Robertson et al. 2004), there is only one review on adolescent PPD (Reid & Meadows-Oliver, 2007). Synthesising findings of 12 studies, Reid and Meadows-Oliver (2007) indicated the need to expand beyond the current research focus on social support in understanding the factors in relation to adolescent PPD. They also called for more longitudinal studies to unpick the associations and temporal aspects between different factors and PPD.

The current review aims to build upon Reid & Meadows-Oliver's (2007) review, to address the gaps in knowledge on specific risk factors to adolescent mothers (Robertson et al., 2004; Reid & Meadows-Oliver, 2007) and to examine any possible relationship between PPD symptoms and maternal age, antenatal depressive (AND) symptoms, support and ethnicity, factors that were consistently highlighted in PPD literature for mothers of all ages.

Maternal age and PPD. It is a common belief that postpartum functioning may be affected by unique social and personal issues experienced by young mothers; the parallel developmental tasks of adolescence and parenting an infant is believed to increase risk of PPD (Ventura 2001). This is supported by recent functional-neuroimaging studies in adolescents that has revealed surplus dopamine availability and earlier maturation of the limbic system that respond to spontaneous social-affective states in early adolescence, accompanied by a relatively delayed development of frontal cortical area that is related to the regulation of emotions (Ernst & Fudge, 2009; Somerville, Jones, & Casey, 2010; Luciana, Wahlstrom, Porter, & Collins, 2012; Van Duijvenvoorde & Crone, 2013). This developmental trajectory helps explain the tendency of adolescents to take more emotional (less rational) decisions resulting in actions that do not adequately take into account long-

term outcomes (e.g. risk taking behaviours such as unintentional pregnancy) or to exhibit extreme sensitivities to social context that lead some of them prone to problems such as depression (Dahl, 2004).

Indeed, PPD has been reported to affect as much as 26% of adolescent mothers (O'Hara & Swain, 1996) which is twice as much as the prevalence in the general population (approximately 13%) across 17 states in the United States by the Centre for Disease Control and Prevention (MMWR, 2008). However, these estimates are often derived from small research samples of adolescent mothers using cross-sectional designs and often only include English-speaking adolescent mothers from the United States.

Nonetheless, the exact importance of maternal age in the aetiology of PPD remains unclear. Meta-analyses on adult mothers (maternal age > 18 years old) have found no association between maternal age and PPD (O'Hara & Swain, 1996; Robertson et al., 2004). Further, the cut-off age used to define adolescent motherhood often differs among studies in adolescent PPD. Recent literature on neurobiological development suggests that adolescence spans the developmental phase between childhood and adulthood (Van Duijvenvoorde & Crone, 2013). Although adolescents may display adult-like levels of maturity, it is believed that other areas of life (such as changes in social roles and responsibilities) can extend into the early twenties (Arnett, 2004; Dahl & Gunnar, 2009; Steinberg Cauffman, Woolard, Graham, & Banich, 2009; Van Duijvenvoorde & Crone, 2013).

Integrating these neurobiological insights into the conceptualisation of adolescence, one could argue that a relationship exists between maternal age and PPD, with adolescent mothers more likely than older mothers to have PPD. It is also highly probable that an age cut-off of 18 years old that is commonly used across adolescence PPD studies may not be the most appropriate approach in understanding the relationship between maternal age and PPD in

adolescent mothers. Instead, the current study includes studies where the age cut-off for adolescence extends into their early twenties.

Ethnicity and PPD. The nature of ethnic differences in adolescent PPD appears to have received less attention than other demographic variables such as maternal age and gender of the child in meta-analyses on risk factors of PPD in mothers of all ages (Beck 2001; O'Hara & Swain 1996; Robertson et al. 2004).

Studies on adult mothers has shown that ethnic minorities, especially African-American women, were constantly found to have more commonly reported PPD symptoms than their White counterparts. Moreover, being from an ethnic minority in general appears to have an adverse contribution to psychological functioning (Schoenbach, Garrison & Kaplan, 1984; Deal & Holt, 1998; Howell, Mora, Horowitz, & Leventhal, 2005), with the rate of PPD in ethnic minority adolescents estimated to be greater than 40% (Szigethy & Ruiz, 2001). Despite this possible vulnerability in ethnic minorities, a recent review on PPD in adolescent mothers failed to identify any significant relationship between ethnicity and adolescent mothers' PPD symptoms (Reid & Meadows-Oliver's, 2007).

Multiple international studies have confirmed that PPD is present in women from all cultural and ethnic backgrounds, and have found similar prevalence PPD rate among African, Australian, Italian, Dutch, Greek, English and Chilean mothers (Cox et al., 1983; Dennerstein, Lehert & Riphagen, 1989; Thorpe, Dragonas & Golding, 1992; Jadresic, Nguyen & Halbreich, 2007).

As suggested by Deal and Holt (1998), the relationship between ethnicity and PPD symptoms could be indirectly mediated by other factors such as perceived social support and stress. Indeed, studies that examined ethnic differences in social context and social relations among African American and White adolescent mothers showed that African-American were more

likely than White adolescent mothers to be younger, originate from single-parent households, to remain single for longer durations, co-reside with grandmothers and receive less involvement from the father of the infant (Unger & Cooley, 1992).

Collating the available evidence to date, it is possible to hypothesise that ethnicity itself does not necessarily contribute to one's experience of PPD and a relationship between ethnicity and adolescent PPD is only expected in the presence of other mediating factors.

Antenatal depressive (AND) symptoms and PPD. Despite vast research attention given to PPD, recent longitudinal studies of adult mothers have suggested that levels of depression may be highest prenatally, and decline over the postpartum period (Andersson, Dundrom-Poromaa, Wulff, & Bixo, 2006; Evans, Heron, Francomb, Oke, & Golding, 2001). In adult samples, AND symptoms are found to be a moderate to strong predictor of PPD (e.g. O'Hara & Swain 1996, Johnstone et al., 2001; Josefsson et al., 2002; Milgrom et al., 2008; Rich-Edwards et al., 2006; Neter et al., 1995), with the association between AND and PPD stronger when assessed via self-report than when assessed via an interview. Evidence also suggests that AND can have negative effects on the fetus and long-term child development even after controlling for PPD (Field, 2011; Hay, Pawlby, Waters, Perra, & Sharp, 2010).

The relationship between AND and PPD symptoms was not explored in Reid and Meadows-Oliver's (2007) review but will be addressed in the current review. Given that adolescent mothers report almost double the rate of AND symptoms during the third trimester of pregnancy when compared with older mothers (e.g. MMWR, 2008), a relationship between AND and PPD is expected, with a stronger relationship hypothesised to exist among adolescent mothers than their adult counterpart.

Social Support and PPD. Social support is a multi-faceted concept that has received immense research interest in the study of adolescent PPD. Having access to socially

supportive relationships is generally seen as a key resilience factor across the life-span, and poor social support in pregnancy has been shown to have moderate to strong associations with PPD outcomes in a meta-analysis based on over 500 women of all ages (O'Hara & Swain, 1996). This result is consistent with the review of adolescent PPD, where adolescent mothers who perceived more supportive relationships with their families were found to have reported fewer PPD symptoms (Reid & Meadows-Oliver's, 2007).

Studies have consistently found differences between perceived and received social support in women of all ages with PPD (Anderson et al., 2004). A review on adolescent PPD explored the relationship between this mismatch and PPD symptoms, and suggested possible mediating/moderating factors such as adolescent mothers' awareness of the resources, willingness to seek help, as well as loneliness and sense of parental inadequacy (Reid & Meadows-Oliver, 2007). The same review also suggested a bi-directional relationship between social support and PPD where depression may reduce a mother's recognition and ability to seek support.

Sources of support available for adolescent mothers can be for example, from a partner, father of the infant, family members, welfare or other government programmes (Reid & Meadows-Oliver, 2007). Unfortunately, adolescent mothers' sources of support can simultaneously be experienced as sources of conflict, perhaps due to lack of autonomy when compared to their adult counterpart (Chase-Lansdale, BrooksGunn & Zamsky, 1994; Richardson, Barbour & Bubenzer, 1991; Voran & Philips, 1993). The stress of being locked in negative relationships is suggested to have a negative impact on one's self-esteem and self-confidence and may in turn exacerbate adolescent mothers' PPD symptoms (Reid & Meadows-Oliver's, 2007). Studies on PPD in mothers of all ages attributed discrepancies in the relationship between perceived support from the infant's father and PPD symptoms to different measures of depression.

Given the evidence to date, it would appear that a relationship exists between social support and adolescent PPD, when correlations were examined in the last review by Reid and Meadows-Oliver (2007). There is however strong evidence in the literature that suggest potential mediating/ moderating variables within this relationship that have not been appraised in consideration of statistical properties and will be addressed in the current review.

Summary and aims

In the past two decades, a body of research has emerged linking different risk factors to adolescent PPD. Whilst Reid and Meadows-Oliver's (2007) review on adolescent PPD has served as a helpful overview of all the factors that are correlated with PPD, it does not provide a clear picture of the relationship between various risk factors and PPD. It would appear that factors related to adolescent PPD and how the disorder manifests in this specific age group remain poorly understood and the current review will seek to clarify this. The review will also seek to look at any possible mediating and moderating factors that may underlie the relationships.

Further, the review by Reid and Meadows-Oliver (2007) was conducted not long after Robertson et al. (2004) called for research attention in this area. The current review would therefore hope to capture more up-to-date literature, particularly longitudinal studies, to allow a more in-depth exploration of the possible link between PPD symptoms and maternal age, AND symptoms, support and ethnicity, as well as any factors (e.g. moderating and mediating factors) that mitigate the relationship if any in order to bring forth a better understanding to the nature of adolescent PPD and its correlates.

In sum, the current review aims to address the following questions:

- 1) What is the prevalence of PPD in adolescent mothers?

- 2) Looking at statistical associations, is there a relationship between adolescent PPD symptoms and the risk factors of maternal age, AND symptoms, support and ethnicity?
- 3) If so, through examining the statistical methods and reasoning across studies, to what extent do these factors mitigate PPD symptoms in adolescent mothers?
- 4) If so, what are the factors that might explain and/ or mediate this relationship using statistical mediation analysis such as guidelines by Baron and Kenny (1986)?
- 5) If so, what are the other factors that contribute to and moderate this relationship?
- 6) What is the quality of the evidence in reference to the design of the studies and statistical methods used? In particular, how adequately have these factors and PPD symptoms been measured in these studies and what is the quality of the study designs?

Methods

Initial scoping exercises uncovered three meta-analyses examining the risk factors for PPD across age groups (Beck 2001; O'Hara & Swain 1996; Robertson et al. 2004), as well as one systematic review specifically on adolescent population (Reid & Meadows-Oliver, 2007).

Appropriate databases (PsychINFO, MEDLINE, EMBASE, CINAHL and Maternity and Infant Care) were selected and the reference lists of relevant papers from previous reviews were searched. PsychINFO focuses primarily on psychological literature and related disciplines. MEDLINE covers medicine, nursing, dentistry, the health care system and preclinical sciences. EMBASE consists of bio-medical literature and pharmacological literature. CINAHL includes journal articles about nursing, allied health, biomedicine and healthcare, while the last database, Maternity and Infant Care contains literature regarding pregnancy, labour, birth, postpartum care, and neonatal care and the first year of an infant's

life. Combining these five databases ensured that over 10,000 journals were included in the search.

Previous review papers on risk factors in postpartum depression were used to explode the search terms. Keywords used in the review papers were applied using robust search term strategies including use of truncation of keywords and mapping to subject headings, to capture as many variants as possible in order to guarantee an exhaustive search to capture all the relevant literature. This is combined with the search terms in reference to the age group that is relevant to the current review.

“postpartum depress*”, “postnatal depress*”, “post partum depress”, “post natal depress*”, “depression, postpartum”, “perinatal depress*”

AND

“risk factor*”, “prevent*”, “protective factor*”, “contribut*”, “protect*”

AND

“adolescen*”, “teen*”

The results were restricted to human studies, English language, peer reviewed journals (only available on PsychINFO). No limit was set on publication dates in order to maximise the number of articles found in this focused area of research.

The initial search resulted in 281 studies, which was reduced to 267 once duplicates were removed. A breakdown of the stages is listed in Table 1.

Table 1

Breakdown of search strategy and results

Database	Exclusion Criteria	Results
<i>PsychINFO</i>	Peer reviewed journal English Language, Human Studies Duplicates removed	37 37
<i>MEDLINE</i>	English Language, Human Studies Duplicates removed	40 37
<i>EMBASE</i>	English Language, Human Studies Duplicates removed	69 67
<i>Maternity and Infant Care</i>	English Language, Human Studies Duplicates removed	18 18
<i>CINAHL</i>	Peer reviewed journal English Language, Human Studies Duplicates removed	140 140
	Total	281
	Duplicates removed	267

The inclusion criteria were that both PPD and risk factors were examined and that the focus was on adolescent mothers. The following exclusion criteria were used to screen the titles and abstracts.

- 1) Clearly irrelevant (i.e. study not on PPD)
- 2) Paternal depression
- 3) Review or theoretical papers (retained for introduction/ discussion if relevant)
- 4) Conference abstracts
- 5) Single case studies
- 6) Non English language studies
- 7) Not looking specifically in an adolescent population
- 8) Studies focused on treatment outcomes
- 9) Studies focused on impact on child development, parenting style or maternal physical health if no relevant data was included

From this, 107 studies remained and their full texts were obtained. Additional hand searching was carried out from references and this produced four extra papers for inclusion. The Consort diagram in Figure 1 gives a summary of this procedure.

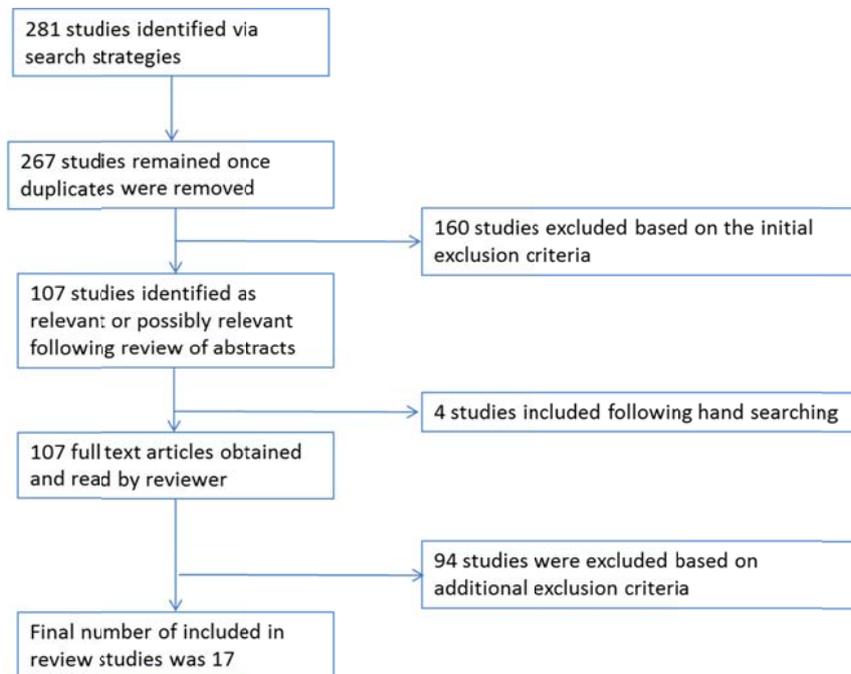


Figure 1. Consort diagram of search procedure

The total of 107 papers were then reviewed in full text using the criteria above. Guided by conceptual definition of PPD by Beck and Gable (2001), only cases of nonpsychotic depression and those exploring PPD in mothers within the first year following childbirth are included. Only literature with clear specification of the timing of PPD assessment that is greater than two weeks postpartum was included in order to exclude reporting of postpartum blues. We also only include prospective studies to improve predictive power and avoid retrospective bias. The following additional exclusion criteria were subsequently developed:

- 1) Studies that did not statistically examine the relationship between PPD in adolescent group and factors of interest in the current review (maternal age, ethnicity, antenatal depressive symptoms and support) e.g. qualitative studies

- 2) Studies that did not use standardised measures or standard diagnostic criteria such as DSM-IV on PPD
- 3) Studies where risk factors were not defined or measured
- 4) Taken into account the neurobiological conceptualisation of adolescence, studies where maternal age up to 21 years old were included

As a result, a further 94 papers was excluded. The remaining 17 articles met all inclusion criteria and were included in the review. The reason for having the two stage exclusion process with more stringent criteria at the second stage ensure that no potentially suitable studies were excluded at the initial stage prior to full text review.

Results

Characteristics of the Studies

Overall, 17 papers met the inclusion criteria for review: 15 independent studies and two reporting on data from the same sample (Caldwell, Antonucci & Jackson, 1998; Caldwell , Antonucci, Jackson, Wolford & Osofsky, 1997). The studies are described in a table in Appendix A. Despite use of rigorous search methods, the current study only captured nine additional studies (deCastro, Hinojosa-Ayala & Prado, 2011; Edwards, Thullen, Isarowong, Shiu, Henson & Hans, 2012; Fagan & Lee, 2010; Figueiredo, Pacheco & Costa, 2007; Meltzer-Brody, Bledsoe-Mansori, Johnson, Killian, Hamer, Jackson, Wessel & Thorp, 2013; Cox, Buman, Valenzuela, Joseph, Mitchell & Woods, 2008; Nune & Phipps, 2012; Schmidt, Wiemann, Rickert and Smith, 2006; Secco, Profit, Kennedy, Walsh, Letourneau & Stewart, 2007) when compared to the last review conducted by Reid and Meadows-Oliver (2007). Four studies (Lesser & Koniak-Griffin, 2000; Troutman & Cutrona, 1990; Field, Pickens, Prodromidis, Malphurs, Fox & Bendell, 2000; Leadbeater, Bishop & Raver, 1996) from the Reid and Meadows-Oliver's (2007) review were excluded as the factors of interest in the

current review (maternal age, ethnicity, antenatal depressive symptoms and support) were not investigated.

14 out of the 17 studies were conducted in the USA, one in Canada, one in Mexico and one in Portugal. Many of the studies (N=11) used the data of other larger studies, with results being analysed in different ways or data added. Six of these studies were part of experimental research looking at effectiveness of interventions, including three randomised-controlled trials and three quasi-experimental studies. Five other studies were part of other larger non-experimental studies.

Design

Types of design. 10 studies (Barnet et al., 1995; Caldwell et al., 1998; Edwards, et al., 2012; Fagan & Lee, 2010; Figueiredo et al, 2007; Kalil, Spencer, Spieker & Gilchrist, 1998; Meltzer-Brody et al., 2013; Schmidt et al., 2006; Secco et al., 2007; Logsdon, Birkimer, Simpson and Looney, 2005) were longitudinal in design while seven (Birkeland et al., 2005; Caldwell et al., 1997; Cox et al., 2008; deCastro et al., 2011; Hudson, Elek an Campbell-Grossman, 2000; Panzarine, Slater & Sharps, 1995; Nune& Phipps, 2012) were cross-sectional. All studies used adolescent samples from the community; four studies were recruited from prenatal clinics while three recruited from parenting programmes. Other venues of recruitment included adolescent health clinics, high schools, postnatal clinics, post-delivery suites, alternative public schools and primary health care centres. Three studies recruited samples from multiple sites. Control groups were generally not included in the studies, except in three studies that compared adolescent mothers with older mothers (Nune & Phipps, 2012; Figueiredo et al., 2007; deCastro et al., 2011). All studies used an observational design in examining the factors in association with PPD. Without an experimental design, the studies are unable to provide rigorous evidence to show how

different factors are causally related to PPD due to potential confounds. However, this is an issue generally in research on risk factors for PPD due to ethical and practical difficulties in manipulating these variables.

Participants and Sampling. Sample size ranged from 21 to 6317 participants. All studies gave sufficient descriptive statistics in relation to the demographics of the participant sample. The majority of the studies used a volunteer sampling method, with only two studies using a higher quality method using stratified random sampling (Figueiredo et al., 2007; Nune & Phipps, 2012). Most of the studies are therefore open to the effect of sampling biases which could reduce the generalizability of the finding to the general population. Moreover, only one study (Birkeland et al., 2005) reported power analysis as a method to determine the sample size; the majority of the studies are therefore susceptible to Type-II errors.

Peripartum Depressive Symptomatology Measures. All 17 studies employed a standardised measure of depressive symptoms. Two studies used more than one measure of depressive symptoms. The measures used to assess depressive symptoms in each of the studies are detailed in Table 2.

Table 2

Measures of Peripartum depressive (AND and PPD) symptoms used across studies

Measures of PPD	N
Centre for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977)	5
Center for Epidemiological Studies Depression Scale for Children Short version (CES-DC; Welssman, Orvaschel and Padian, 1980; Faulstich, Carey, Ruggiero, Enyart & Gresham, 1986)	3
Centre for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) read by researcher	1
Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden & Sagovsky, 1987)	2
EPDS- Spanish version (Alvarado, Sifuentes, Salas & Martinez. 2006)	1
EPDS- Portuguese version (Augusto et al., 1996)	1
Beck Depression Inventory -short form- 13-items (Volk, Pace & Parchman, 1993)	1
Beck Depression Inventory (BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) read by researcher	1
Beck Depression Inventory Amended Version (BDI-IA; Beck & Steer, 1993)	1
Diagnostic Interview Schedule for Children (Costello, Edelbrock & Costello, 1985) – was used to diagnose dysthymia and major depression	1
Rhode Island Pregnancy Risk Assessment Monitoring System (RI PRAM) is a modified version of Patient Health Questionnaire-2	1
Hospital Anxiety and Depression Scale (HADS; Zigmond and Snaith, 1983)	1

The Centre for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) is the most commonly used measure (N=6) and its children's scale (CES-DC; N=3; Welssman, Orvaschel and Padian, 1980; Faulstich, Carey, Ruggiero, Enyart & Gresham, 1986).

Five studies (Edwards et al., 2012; Caldwell et al. 1998; Caldwell et al., 1997; Kalil et al., 2008; Logsdon et al., 2005) were self-administered while one study had the CES-D read by the researcher in consideration of adolescent mothers' literacy levels (Fagan & Lee, 2010). A clinical cut-off score of ≥ 16 was used across all studies to identify clinical levels of depressive symptoms (Radloff, 1977). It has been shown to have demonstrated evidence of content, concurrent, and discriminant validity of the CES-D (Lewinsohn, Hops, Roberts, &

Seeley, 1992; Weissman, Sholomskas, Pottenger, Prushoff, & Locke, 1977), and high internal consistency reliability has been reported in pregnant and postpartum women (Logsdon, 2002).

The children's scale (CES-DC) was used in three studies (Cox et al., 2008; Barnett et al., 1995; Hudson et al., 2000), a clinical cut-off score of ≥ 15 was used to identify depressive symptoms across all studies (Faulstich et al., 1986; Radloff, 1977). Good concurrent validity and test-retest reliability have been reported, demonstrating stronger validity than the adult scale among adolescents (Faulstich et al., 1986).

Another common choice of measure is the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden & Sagovsky, 1987; N=2) and its translated versions (N=2), which was developed to examine depressive symptoms in women during the postpartum period i.e. within a year after childbirth. The EPDS focuses on the psychological aspects of depression which is useful as the somatic depressive symptoms could be similar to the experience of raising an infant i.e. tiredness, disturbed sleep and decreased libido. The EPDS has good psychometric properties and has been validated for use antenatally and postnatally (Cox et al., 1987; Cox & Holden, 2003).

Translated versions of the EPDS were validated and used in studies in Mexico and Portugal. deCastro et al. (2011) used the Spanish translated version of the EPDS which was validated by Alvarado, Sifuentes, Salas & Martinez (2006). A clinical cut-off of ≥ 13 was found by deCastro et al. (2011) following comparison with the Beck Depression Inventory (BDI-II)-Mexican Version (Beck, Steer & Brown, 1996), with a sensitivity of 71.74% and specificity of 93.25% to allow correctly classify 90.60% of the cases. The EPDS Portuguese version used by Figueiredo et al. (2007) showed good internal consistency, test-retest reliability and external validity (Figueiredo, 1997) with a clinical cut-off of 12 (Areias, Kumar, Barros & Figueiredo, 1996; Augusto, Kumar, Calheiros, Matos & Figueiredo, 1996).

Beck Depression Inventory (BDI) (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) is a measure that has been widely used among adolescents with good reported internal consistency (Strober, Green & Carlson, 1981). It was used in three studies including one study where BDI was read to the participants (Panzarine et al., 1995). Two other versions of the BDI-short form and BDI-amended version were also utilised by Schmidt et al. (2006) and Secco et al. (2007).

Prevalence of PPD symptoms. Of 17 studies, 13 assessed and reported percentage of adolescent mothers with PPD symptoms, while the other four reported depressive symptoms in mean scores. The prevalence of PPD symptoms of adolescent mothers range from 10.3% to 53.6%, and it was difficult to make meaningful interpretation to the variability found in the prevalence of PPD among studies in different time points. The prevalence rate (%) of PPD symptoms in each of the studies are detailed in Table 3.

Quality of Studies

The quality of methodology in each study was assessed using Kmet, Lee & Cook's (2004) Quality Assurance Checklist (Appendix B). Of 14 criteria, criteria five, six and seven were excluded as the current review does not include intervention studies. Moreover, criteria 12 looking at controlling for confounding variables was also not applicable for the five cross-sectional studies with only one sample group (Birkeland et al., 2005; Caldwell et al., 1997; Cox et al., 2008; Hudson et al., 2000; Panzarine et al., 1995). Each paper was hence assessed according to the remaining 11 criteria and awarded a score of two when all specified criteria are met, a score of one when the specified criteria are partially met and zero when none of the specified criteria was met. A total percentage score was also calculated for each paper (Table 4). Appendix C offers qualitative comments about studies that raise concerns and why.

Table 3

Prevalence rate (%) of PPD symptoms reported in studies

Time of postpartum Assessment	Measures, Prevalence of PPD symptoms (%)	Reference	Period of postpartum Assessment	Mean prevalence of PPD symptoms in period of postpartum assessment (%), Total number of studies (N)
2 weeks postpartum	CES-DC , 53.6 %	Cox, Buman, Valenzuela, Joseph, Mitchell & Woods (2008)	Up to one month postpartum	48.99% (Range from 43.5 to 53.6%), N=2
4 weeks postpartum	BDI, 43.5% have mild PPD symptoms	Secco, Profit, Kennedy, Walsh, Letourneau & Stewart (2007)		
6 weeks postpartum	EPDS, 10.3%	Meltzer-Brody, Bledsoe-Mansori, Johnson, Killian, Hamer, Jackson, Wessel & Thorp (2013)	6 weeks postpartum	19.15% (range from 10.3- 28%), N=2
	CES-D, 28%	Logsdon, Birkimer, Simpson and Looney (2005)		
2 months postpartum	CES-DC, 36%	Barnet, Joffee, Duggan, Wilson & Repke (1995)	2-4 months postpartum	35.125% (range from 25.6 to 53%), N=4
3 months postpartum	CES-DC, 53%	Hudson, Elek & Campbell-Grossman (2000)		
2-3 months postpartum	EPDS, 25.9%	Figueiredo, Pacheco & Costa (2007)		
4 months postpartum	CES-D, 25.6%	Edwards, Thullen, Isarowong, Shiu, Henson & Hans (2012)		
6 months postpartum	BDI, 44%	Panzarine, Slater & Sharps (1995)		
12 months postpartum	BDI short-form, 28.4%	Schmidt, Wiemann, Rickert and Smith (2006)	12 months postpartum	12 months postpartum: 25.2% (range from 22.4% to 28.4%), N=2
	CES-D, 22.4%	Edwards, Thullen, Isarowong, Shiu, Henson & Hans (2012)		

Strengths of the studies. Overall, the quality of the studies was high, with all studies assessed as having a clear research question, appropriate study designs and sufficient description of their research sample. The measures used by studies were mostly well researched and validated, this could however be a reflection of the selection criteria in this current review. Another strength of this current review is the inclusion of a good number of longitudinal studies (N=10), while stringent criteria of using only prospective reporting helps

to provide important data in establishing possible causality due to the temporal nature in which variables can be assessed. Moreover, as mentioned above, most studies in this review also utilised appropriate control for confounding variables by either using control groups in the study design or adopting multivariate models at analysis stage. This is to the exception of Barnett et al. (1995) and Meltzer-Brody et al. (2013), both longitudinal studies where t-tests were used to examine the difference between depressed and non-depressed groups. Without using a matched control group such as nonchildbearing adolescents, it is difficult to control for potential confounding variables such as level of non-postpartum specific depressive symptoms and social support.

Table 4

Assessment of Quality of Studies using Quality Assurance Criteria (Kmet, Lee & Cook, 2004)

Reference	Quality Assurance Criteria												Total Score (%)
	Item number	1	2	3	4	8	9	10	11	12	13	14	
Barnet, Joffe, Duggan, Wilson & Repke (1995)	2	2	1	2	2	2	2	2	2	0	1	2	81.82%
Birkeland, Thompson & Phares (2005)	2	2	1	2	2	2	2	2	2	N/A	2	2	95%
Caldwell, Antonucci, Jackson, Wolford & Osofsky (1997)	2	2	1	2	1	1	2	0	0	N/A	2	1	70%
Caldwell, Antonucci & Jackson (1998)	2	2	1	2	2	1	2	0	2	2	2	2	81.82%
Cox et al. (2008)	2	2	1	2	2	2	1	2	2	N/A	2	2	90%
deCastro, Hinojosa-Ayala & Prado (2011)	1	2	1	2	2	2	2	2	2	2	2	2	90.90%
Edwards et al. (2012)	2	2	1	2	2	2	2	2	2	2	2	2	95.45%
Fagan & Lee (2010)	2	2	1	2	1	2	2	2	2	2	2	2	95.45%
Figueiredo, Pacheco & Costa (2007)	2	2	1	2	1	1	2	2	2	2	2	2	86.36%
Hudson, Elek an Campbell-Grossman (2000)	2	2	1	2	2	1	2	0	0	N/A	2	2	80%
Kalil, Spencer, Spieker & Gilchrist (1998)	2	2	1	2	2	2	2	0	2	2	2	2	95%
Logsdon, Birkimer, Simpson and Looney (2005)	2	2	1	2	2	1	1	1	2	2	2	2	72.72%
Meltzer-Brody et al. (2013)	2	2	2	2	2	2	2	2	2	0	2	2	90.91%
Nune & Phipps (2012)	2	2	2	2	2	2	2	2	2	2	1	2	95.45%
Panzarine, Slater & Sharps (1995)	2	2	1	2	2	1	2	0	0	N/A	2	2	80%

Schmidt, Wiemann, Rickert and Smith (2006)	2	2	2	2	2	2	2	2	2	1	2	95.45%
Secco et al. (2007)	2	2	1	2	2	1	2	2	2	1	1	81.82%

Limitations of the studies. The most common limitations identified across studies were small sample sizes (N=6) and sampling method (N=14) meaning results were not necessarily generalizable. As mentioned above, only one study (Birkeland et al., 2005) made use of a priori power analysis to ensure sufficient sample size, while most studies made use of convenience sample from affiliated intervention studies where participants self-selected to the programmes. Difficulties in generalising were also due to samples being taken from a specific subset of the population (e.g. very low income urban community, particular ethnic group or alternative schools specifically for adolescent mothers) and samples potentially being representative only of those with normal delivery. Adolescent mothers volunteering to take part in these studies are likely to be more resourceful and motivated.

Another weakness that may result in potential bias is that only one study made use of blinding of the researchers, whereby the researcher was unaware of the hypothesis of the study (Panzarine et al., 1995). Moreover, estimates of variance are omitted in results reporting in five studies, the failure to consider sample variability makes it difficult to determine the reliability of the results obtained from the study sample when compared with the true population (Caldwell et al., 1997; Caldwell et al., 1998; Hudson et al., 2000; Kalil et al., 1998; Pazarine et al., 1995).

Factor one: Maternal age

Variation in the' definition of adolescent motherhood is observed across studies (Table 5). Across the 17 studies, adolescent maternal age ranges from 12 to 21, with five (Barnet et al., 1995; Logsdon et al., 2005; Panzarine et al., 1995; Schmidt et al., 2006; Cox et al., 2008) and

seven (Birkeland et al., 2005; Caldwell et al., 1997; Caldwell., 1998; deCastro et al., 2011; Fagan & Lee, 2010; Hudson et al., 2000; Nune & Phipps, 2012) studies adopting a cut-off age of 18 and 19 respectively, whilst two studies regarded adolescence to be expanded into the 20s. Three studies examined the difference between adolescent and adult age groups (deCastro et al., 2011; Figueiredo et al. 2007; Nune & Phipps, 2012). Maternal age was collected via interview at baseline, with exception of Logsdon et al. (2005) who devised a self-report demographic questionnaire.

Relationship between maternal age and PPD symptoms. Six studies examined maternal age (Barnet et al., 1995; Panzarine et al., 1995; Figueiredo et al., 2007; Caldwell et al., 1998; Caldwell et a., 1997; Kalil et al., 1998). Only two studies looked at the correlation between PPD symptoms and maternal age and they both found no significant association between them. The coefficient was reported by Kalil et al. (1998) to be 0.03 while no coefficients was reported by Barnet et al. (1995).

Maternal age as predictor of PPD symptoms. Using regression analysis to assess the independent value of maternal age as predictor of PPD symptoms, Figueiredo et al. (2007) reported maternal age as not significant in their regression model, where R squared value of maternal age was unable to explain any supplementary variance ($\Delta R^2=0.000$, $p=0.883$) for PPD at 2 to 3 months postpartum.

Using standardised regression coefficients (β values) to describe the effect of different demographic variables in the context of other predictors, Kalil et al., (1998) reported that being a younger mother ($\beta=-2.11$), welfare-reliant ($\beta=3.91$), or a school drop-out ($\beta =3.57$) was related to PPD symptoms at six months, while Figueiredo and colleagues (2007) identified that living with the family of origin ($\beta=0.252$) and maternal age less than 18 ($\beta=3.29$) were associated with an increase in PPD symptoms at 2 to 3 months postpartum.

This is however contrasted by Caldwell's et al. (1998) study where age ($\beta=0.028$) was found not to be a predictor of adolescent mother's PPD symptomatology.

Maternal age and degree of PPD symptomatology. Using ANOVA and chi-square, Panzarine et al. (1995) found no significant differences among the PPD groups of different degree of symptomatology on age.

Differences among maternal age groups on PPD symptoms across time. Using two way ANOVA, no significant difference is found on age (≤ 17 vs 18-19) across different time points, three and twelve months postpartum (Caldwell et al., 1997).

Association between ethnicity and PPD symptoms. No significant association was found between ethnicity and PPD symptoms in the two studies that explored the relationship using correlation (Birkeland et al., 2005; Nune & Phipps, 2012).

Factor two: Ethnicity

Ethnic composition in studies. Ethnicity was the most commonly measured demographic variable (Table 6). All but three studies (Cox et al. 2008; Panzarine et al., 1995; Figueiredo et al., 2007) reported ethnic composition of their sample. African-American appeared to be the most commonly recruited participants reported by 14 studies (with an average of 49.61%, range from 13-100%). It is difficult to draw any conclusion from the varied ethnic composition observed across studies. Despite using merely volunteer sampling method, there were studies that using sample from virtually one ethnic group. For example, only young African American mothers were recruited in Edward's et al. (2012) study and 92.2% of the adolescent mothers were black in Panzarine's et al. (1995) study.

Table 5
Maternal age of adolescent mothers across studies

Study	Maternal age range	Mean Age	SD
1. Barnet, Joffe, Duggan, Wilson & Repke (1995)	12-18	16.3	1.3
2. Birkeland, Thompson & Phares (2005)	15-19	17	1.03
3. Caldwell , Antonucci, Jackson, Wolford & Osofsky (1997)	14-19	17.4	1.49
4. Caldwell, Antonucci & Jackson (1998)	14-19	17.17	1.44
5. Cox et al. (2008)	<19	17.6	1.2
6. deCastro, Hinojosa-Ayala & Prado (2011)	Adolescent mothers: 14-19 years ; Adult mothers: 20-43 years	Adolescent mothers 17.5; Adult mothers 27.28	Adolescent mothers 1.25; Adult mothers 5.49
7. Edwards et al. (2012)	14-21	18.3	1.7
8. Fagan & Lee (2010)	13-19	17.26	1.67
9. Figueiredo, Pacheco & Costa (2007)	Adolescent mothers: 14-18; Adult mothers: 15-40	Not reported	Not reported
10. Hudson, Elek an Campbell-Grossman (2000)	15-19	18	11.4
11. Kalil, Spencer, Spieker & Gilchrist (1998)	15-17	16.5	Not reported
12. Logsdon, Birkimer, Simpson and Looney (2005)	13-18	16	1.3
13. Meltzer-Brody et al. (2013)	12-20	18.3	Not reported
14. Nune& Phipps (2012)	Adolescent maternal age range: 15-19 ; Young adults age range: 20-24; Adult age 25-29; Adults age over30	Not reported	Not reported
15. Panzarine, Slater & Sharps (1995)	13-18	15.5	Not reported
16. Schmidt, Wiemann, Rickert and Smith (2006)	13-18	16.8	1.17
17. Secco et al. (2007)	range of 5 years	16.79	1.79

Table 6

Ethnicity of Adolescent mothers across studies

Ethnicity	Number of studies	Average (%)	Range (%)
Black-American	12	49.61%	13-100%
White-American	4	51.48%	38-70%
Hispanic-American	3	51.80%	46-62%
Caucasian-American	3	25.52%	19-39%
Latino-American	2	37.65%	34-41%
First Nation	2	43.50%	41-46%
Asian-American	1	1.00%	1-1%
Native-American	1	37.00%	37-37%
Mexican-American	1	4.76%	5-5%

Ethnicity as predictor of PPD symptoms. Three studies (Nune & Phipps, 2012; Schmidt et al., 2006; Caldwell et al., 1998) utilised various form of regression analysis to assess the relative influence of various potential predictors of PPD symptoms. None of the studies reported on R squared value to comment on the predictive weight of PPD.

Using standardised regression coefficients (β values) to describe the effect of different demographic variables in the context of other predictors, Caldwell et al. (1998) and Nune & Phipps (2012) reported that ethnicity is not a significant predictor of adolescent mothers' depressive symptomatology.

Using odd ratios, Schmidt et al. (2006) reported Caucasian adolescent mothers to be two times more likely to report PPD symptoms than their African-American counterpart at three months postpartum. At 12 months postpartum, African-American adolescent mothers continue to score lower than their Caucasian and Mexican-American counterparts; Mexican-American adolescent mothers were 2.6 times more likely to report PPD symptoms than

African-American adolescent mothers. Therefore, African-American adolescent mothers appear to have the lowest rate of PPD symptoms across time points.

Differences among the relationship between ethnicity and PPD symptoms across time. Using two way ANOVA, no significant difference is found among ethnic groups (White and Black) on PPD symptoms in two studies (Caldwell et al., 1997; Birkeland et al., 2005) while ethnic differences in PPD symptoms were however found by Schmidt et al. (2006) at each point of follow-up (three and 12 months postpartum). Moreover, in Schmidt's et al. (2006) study, African-American were found to be significantly less likely than Caucasians to report PPD symptoms at three months ($p=0.048$) using chi-square.

Interactions between ethnicity and other predictor variables. Using weighted logistic regression in each age group, Nune & Phipps (2012) reported minority adult mothers over age of 25 (Black-American and Hispanic-American) to have significantly ($p=0.0003$) increased odds of experiencing PPD symptoms compared to their adolescent (age 15 to 19) counterparts at four months postpartum.

Factor three: Antenatal Depressive (AND) symptoms and PPD symptoms

Of six studies that examined AND symptoms, one study (Fagan & Lee, 2010) reported a mean AND score of 34.96 using CES-D while five studies investigated the prevalence rate of AND symptoms and reported a prevalence of 38.24% (Range: 20.1- 56%) (Edwards et al., 2012; Barnet et al., 1995; Logsdon et al., 2005; Figueiredo, et al., 2007; Meltzer-Brody et al., 2013). However, when restricted to considering the three US studies at third trimester of pregnancy, prevalence of AND symptoms was then reported as 48.4%, with a closer range of 42-56%. The prevalence rate (%) of AND symptoms in each of the studies are detailed in Table 7.

Table 7

Prevalence rate (%) of AND symptoms reported in studies

Reference	Timing of Antenatal Assessment	Prevalence of AND symptoms and choice of measures
Edwards, Thullen, Isarowong, Shiu, Henson & Hans (2012), USA	Third trimester	CES-DC: 47.2%
Barnet, Joffe, Duggan, Wilson & Repke (1995), USA	Third trimester	CES-DC: 42%
Logsdon, Birkimer, Simpson & Looney (2005); USA	Third trimester	CES-D: 56%
Figueiredo, Pacheco & Costa (2007); Portugal	Third trimester	EPDS: 25.9%
Meltzer-Brody, Bledsoe-Mansori, Johnson, Killian, Hamer, Jackson, Wessel & Thorp (2013); USA	Late second trimester	EPDS: 20.1%

Association between AND symptoms and PPD symptoms. Out of six studies that reported AND symptoms, only one study assessed the correlation between AND symptoms and PPD symptoms (Fagan & Lee, 2010) and reported a correlation coefficient of $r=0.47$ which indicates that AND symptoms had a medium effect size on PPD symptoms (Cohen, 1992).

AND symptoms as predictor of PPD symptoms. Three studies employed different forms of regression analysis to assess the independent value of AND symptoms. Of these studies, one study (Figueiredo et al., 2007) used multiple regression and reported AND symptoms contributed independently to the variance in PPD scores, accounting for 24.9% of the variance in postpartum EPDS results ($R^2=0.249$, $\beta=0.499$, $F [1,104]=34.502$, $p=0.000$) which is indicative of a large effect size on PPD symptoms (Cohen, 1992).

Using odd ratios, Barnet et al. (1995) reported odds of scoring in the depressed range at 2 and 4 months postpartum were 5.7 times and 2.2 times greater for those who scored depressed in the third trimester respectively than for those who did not (95% confidence

interval, 0.9 to 5.3), while Meltzer-Brody et al. (2013) reported AND symptoms increased the risk of PPD symptoms 6 weeks postpartum by 4.89 times.

Comparison with Adult mothers. One study examined the differences between AND and PPD symptoms in adolescent and adult mothers (Figueiredo et al., 2007). Using t-tests to examine the differences between AND and PPD symptoms: Adolescent mothers have significantly more depressive symptoms than adults both before ($t=4.461$, $p=0.002$) and after delivery ($t=5.766$, $p=0.032$). Using chi-square to examine differences in pregnancy and postpartum depressive symptoms between adolescent and adult mothers: there were significantly more cases of EPDS>12 in the adolescent group, both in pregnancy (adolescent 25.9% vs adult 11.1%) $X^2(1)=3.927$, $p=0.041$ and the postpartum period (adolescents 25.9% vs adults 9.3%) $X^2(1)=5.173$, $p=0.021$. Also, all cases of EPDS>12 in pregnancy and the postpartum period belonged to the adolescent mother group ($X^2(1)=9.818$, $p=0.001$).

Factor four: Support

Support Measurement. Of the 12 studies, eight studies used (at least one) standardised measures; three studies only used some of the items/ subscales in the measure as the other items were deemed inappropriate (Fagan & Lee, 2010; Meltzer- Brody et al., 2013; Hudson et al., 2000), while deCrastrro et al. (2011) used the translated and validated Mexican version. Four remaining studies relied solely on non-standardised measures of social support (Edwards et al., 2012; Nune & Phipps et al., 2012; Barnet et al., 1995; Schmidt et al., 2006) that were designed by the authors.

A total of 10 standardised measures of social support were used across the studies, with multiple measures used by some studies. For example, Fagan & Lee (2010) used a combination of standardised and non-standardised measures, including use of a two-item non standardised measure to assess mothers' satisfaction with father's involvement with the baby.

Although the measure demonstrated adequate reliability, Fagan & Lee (2010) recognised the limitation of the measure and commented on the need to use a scale with more items which demonstrates psychometric properties in further studies.

Source of support. Of the 12 studies, four studies measured social support in regards to specific resources. This includes two studies focused on support from father of the baby (Fagan & Lee, 2010; Meltzer-Brody et al., 2013), while two studies focussed on support from the mother of the adolescents (Barnet et al., 1995; Kalil et al., 1998). Two other studies examined support in combination of that from family and friends (Secco et al., 2007), as well as parent and father of baby (Edwards et al., 2012). Some others look at source of support in a broader sense (Cox et al., 2008; deCastro et al., 2011; Hudson et al., 2000; Logsdon et al., 2005; Nune & Phipps, 2013), with one study asking participants to consider support in the contexts of friends, family, professionals or others (Panzarine et al., 1995).

Type of social support measured. Of the standardised measures of support (see table in Appendix D), five measured perceived support with another measure measuring both perceived support and satisfaction with support, while one measured received social support. Three studies included measures of both perceived and received support, with one of them also capturing satisfaction with support (how often the father had disappointed the mother or was critical). Moreover, Meltzer-Brody et al. (2013) included a measure of social adjustment, which assessed satisfaction with support as well as levels of social functioning.

Of the five studies that used non-standardised measures of social support, two measured received support and one measured perceived positive support. One study that made use of a questionnaire transposed from an interview schedule measured several dimensions of support; source of support and conflict, perceived support and conflict, as well as satisfaction with these supportive behaviours. The other study by Fagan & Lee (2010) used a measure to

examine perceived support and combined the use of two other measures to look at satisfaction with support and perceived support pre and post-natally.

The majority of the standardised measures capture informational, instrumental and emotional support. However, the scoring on these measures was often combined and therefore unable to differentiate the types of support in the conceptualisation of social support.

In addition, the vast majority of the measures used were validated in college students and medical doctors and are therefore not specific to the target population in question. Only one questionnaire (Postpartum Support Questionnaire; Lodsdon, 2002) was developed specifically for support during pregnancy and postpartum period, and is more likely to be sensitive to the immediate or proximal effect of social support on PPD than other general social support measures.

Association between social support and PPD symptoms. Of the 12 studies that looked into the relationship between social support and PPD symptoms, six studies (Fagan & Lee, 2010; Cox et al., 2008; Meltzer-Brody et al., 2013; Secco et al., 2007; Nune & Phipps, 2012; Hudson et al., 2000) examined the correlation between social support and PPD and a correlation coefficient for this relationship was reported in all studies except Cox et al. (2008) and Nune & Phipp (2012). All these relationship were reported to be statistically significant, with greater levels of social support (general support, satisfaction with postpartum father involvement, antenatal father support, postpartum father support and support from family and friends) associated with lower levels of PPD symptoms. The reported r values ranged broadly from -0.17 to -0.61, indicating social support has an effect size ranging from small to large (Cohen, 1992).

Social support as predictors of PPD symptoms. Seven studies utilised regression analyses to assess the relative influence of various potential predictors of PPD symptoms. All

except one (Secco et al., 2007) reported that social support made an independent contribution to the variance in PPD symptoms when other variables were controlled for.

Three of the seven studies reported the R squared values for social support once the effect of other variables (e.g. other aspects of social support and demographics) were controlled. Fagan & Lee (2010) reported the R squared value of adolescent mothers' postpartum satisfaction with fathers' involvement as 0.36; this is very similar to the R squared value of 0.354 and 0.26 on overall social support reported by Cox and colleagues (2008) and Caldwell et al. (1998) respectively, all indicating a large effect size.

Using odds ratios, three studies (deCastro et al., 2011; Nune & Phipps, 2012; Meltzer-Brody et al., 2013) reported social support to be negatively associated with PPD symptoms, with odds ratio ranging from 0.24 to 0.83.

Reporting standardised regression coefficient (beta values) to describe social support in the context of other predictors, Edwards et al. (2012) reported beta values of support from adolescent mothers' parent figure and father of the baby to be -0.022 and -0.019 respectively. Interestingly, Caldwell et al. (1998) identified a positive relationship between supportive relationship and PPD symptoms, with beta value reported to be 0.03.

Mediating factors between the relationship between support and PPD symptoms.

Given the evidence to support the negative relationship between social support and PPD symptoms, factors that could potentially explain the relationship were then examined. A mediating variable can be defined as a third variable which is influenced or generated by the independent variable (e.g. social support) which then influences the dependent variable (e.g. PPD symptoms), thus mediating the relationship (Baron & Kenny, 1986).

Three studies performed additional mediation analyses to extend their understanding of significant finding:

Utilising Baron and Kenny's (1986) guidelines, Fagan & Lee (2012) found that parental competence but not maternal stress significantly mediated the association between satisfaction with father involvement and PPD symptoms. Using the same method, Caldwell et al., (1998) also identified conflict to be a mediating factor between supportive maternal relationship and PPD symptoms.

Logsdon et al. (2005) conducted Path Analysis, using standardised beta weights generated through multiple regressions to assess covariation among study variables and estimate the strengths of the direct and indirect interactions among variables. With very limited statistics presented in their paper, Logsdon et al. (2005) reported path analysis shown support to have a statistically significant direct effect on PPD symptoms, but there is lack of evidence of an indirect effect of support on PPD symptoms through self-esteem. They also revealed the relationship between social support and PPD symptoms in adolescents to be non-linear, and hence proposed that receiving too much support can be damaging, especially when the support does not match the support that is desired.

Factors that contribute to or moderate the relationship between support and PPD symptoms. This section looks at additional factors identified by studies that lead to an increased risk of PPD symptoms and when applicable, how these factors contribute to or impact on the relationship between social support and PPD symptoms

Relationship status and living arrangement. Using a hierarchical linear model, Edwards et al., (2012) investigated the effect of relationship status and living arrangement have on the relationship between support and PPD symptoms. Firstly, when relationship status is added to the model, there was no longer a relationship between father support and

PPD symptoms. Results also revealed that greater support from the baby's father was only related to fewer PPD symptoms for mothers who are partnered with the father. Father support was not significantly related to PPD symptoms among mothers who were either in a friendship or had no relationship with the father. Secondly, when living arrangement was added to the hierarchical linear model, greater support from adolescent mothers' parent was found to be only related to fewer PPD symptoms for mothers who were coresiding with the parents, whereas mothers who did not coreside with their parents had moderate levels of PPD symptoms regardless of the level of support they received from the parent figure.

Maternal self-esteem. Cox et al. (2008) utilised a hierarchical linear regression and reported that social support moderates (buffers) the relationship between maternal self-esteem and PPD symptoms. This conclusion however requires caution as, with all non-experimental design, it is not possible to infer the direction of causality and cross-sectional studies are especially ill placed to comment on the relationship between variables over time.

Antenatal infant care emotionality and socioeconomic status. Moreover, failing to report any relevant statistics in the stepwise multiple regression, Secco et al. (2007) reported "a loss of relationship between perceived family support and PPD in the stepwise multiple regression" when "prenatal infant care emotionality" and socioeconomic status were included in the regression model.

Different types of supportive relationship and PPD symptoms across time. Edwards et al. (2012) utilised hierarchical linear modelling model, revealing that support from the father of the baby and PPD symptoms remained consistent over time, with a higher level of father support related to lower levels of PPD symptoms from pregnancy through to 24 months. On the other hand, the association between support from a parent figure and PPD symptoms appear to become stronger over time.

Maternal age as a moderating factor between social support and PPD symptoms.

Two studies examined the effect of social support on PPD symptoms among mothers of different age groups.

Based on the minimisation of the Akaike's information criterion (AIC) index, Nune & Phipps (2012) used a forward selection method to devise age specific predictive models for moderate-severe PPD symptoms. They found that adolescent postpartum depressive symptoms appeared to be most influenced by social support while adult postpartum depressive symptoms were influenced by social support in a combination with a couple of factors such as pregnancy intention, race, stress and economic status. De Castro et al. (2011), on the other hand, used Chi-square to examine the difference between adults and adolescent mothers in their individual, family and sociodemographic factors. No differences were found in relation to PPD and social support between adolescent and adult mothers. Both results suggest that social support is an important factor in relation to PPD symptomatology.

De Castro et al. (2011) further investigated differences among different types of support received in adolescent and adult mothers; they found that significantly more adult than adolescent mothers received economic support from the father and perceived the baby's father as important and protective, while significantly more adolescent than adult mothers (90.12% vs 64.98%) reported having received support to take care of the baby.

Support and severity of PPD Symptomatology. Using t-tests, Barnett et al. (1995) found significant differences in the prevalence of PPD symptoms between highly stressed adolescent mothers who reported low social support (53%) and those who had high social support (35%). They therefore suggested that support exerts its greatest protective effects under high stress conditions.

Using one-way MANOVA, Panzarine et al. (1995) found no difference in the frequency of support received among adolescent mothers with different levels of PPD symptomatology. They, however, found that adolescent mothers who reported any PPD symptoms to be less satisfied with the support received, experience more negative feeding interactions with their infants, use more emotion-focused coping strategies, and report less confidence and gratification in their maternal role than did adolescent mothers with no PPD symptoms.

Discussion

Summary of Findings

This current review examined the relationship between four factors (maternal age, ethnicity, AND symptoms and support) and PPD reported in 17 studies using samples of adolescent mothers. The aim was to establish the current evidence base for a link between these factors and the development of PPD symptoms in adolescent populations, as well as to consider which factors may account for and contribute to this relationship. A summary of the findings of this review is as follows:

Prevalence of PPD in adolescent mothers. The prevalence of PPD symptoms of adolescent mothers ranged from 10.3 to 53.6%. This variability could be due to variation in depression scales, sample size, as well as characteristics and timing of PPD measurement.

Maternal age. As the first review that examined the relationship between maternal age and PPD symptoms in the adolescent population, the studies in the current review generally failed to demonstrate any direct relationship between maternal age and PPD symptoms. Despite including adolescent samples with maternal age under 18 years old, current studies replicate results from the adult population (O'Hara & Swain, 1996; Robertson et al., 2004). Moreover, there are some suggestions that maternal age itself does not

necessarily account for higher PPD rate but rather, with presence of factors such as welfare status, education level and living arrangement. This finding also posits the importance to investigate other age-specific factors, including ethnicity, AND symptoms and support that are examined in this current review.

Ethnicity. There is a general lack of a direct statistical relationship found between ethnicity and PPD symptoms in adolescent mothers, supporting the findings from the last review on adolescent mothers and our hypotheses. Adding to this, opposite to a general perception of minority adolescent mothers being more at risk to PPD symptoms, Schmidt's et al (2006) study found African-American adolescent mothers to have lowest rate of PPD symptoms across postpartum time points (3 and 12 months postpartum) when compared to Mexican-American and Caucasian adolescent mothers. They are also significantly less likely than Caucasian adolescent mothers to report PPD symptoms at 3 months. Despite not statistically tested in any of the papers in this view, this interesting finding can possibly be explained by the fact that African-American adolescent mothers are culturally more likely than their White counterparts to co-reside with their mothers, a factor that could lead to receiving more positive support if it is appraised as helpful rather than conflictual and this speculation can be further explored in future research (Caldwell & Antonucci, 1997; Reid & Meadows-Oliver, 2007).

Nonetheless, an epidemiological study by Nune & Phipps (2012) showed that older Black-American and Hispanic-American mothers (over the age of 25) were reported to have increased odds of experiencing PPD symptoms. This suggests possible contributing (moderating) role maternal age has on the relationship between ethnicity and PPD symptoms, and perhaps how some of the more salient issues related to ethnic minorities might have more adverse effects on older minority mothers. However, again, this suggestion will require further statistical exploration which is not available in the papers reviewed.

AND symptoms. As the first review to investigate the relationship between AND symptoms and PPD symptoms in adolescent mothers, there is emerging evidence to support the link between AND and PPD symptoms in adolescent mothers. Fagan & Lee (2010) and Figueiredo et al. (2007) investigated the statistical relationship between AND and PPD using correlation and regression analyses revealed a medium to large effect size (Cohen, 1992) that is in line with the literature for adult population (e.g. O'Hara & Swain, 1996). Moreover, adding to the knowledgebase, a study directly comparing the AND symptoms statistically in adolescent and adult mothers revealed that adolescent mothers were more inclined to exhibit more depressive symptoms and have more cases of depressive symptoms (EPDS>12) during pregnancy and the postpartum period when compared to their adult counterparts (Figueiredo et al., 2007). Future studies can further explore the role of maternal age in moderating the relationship between AND and PPD and the possible underlying neurobiological mechanism that could predispose some adolescents to depression perhaps even before pregnancy (Dahl, 2004).

Support. Similar to the adult literature and the last review on adolescent PPD by Reid and Meadows-Oliver (2007), a negative relationship exists between the level of support and prevalent of PPD symptoms, except for Caldwell et al. (1998) where a positive relationship was identified. The current review adds to the evidence base in examining studies that used mediation analysis by following Baron and Kenny's (1986) guideline in uncovering mediating factors between support and PPD symptoms in adolescent mothers such as parental competence and conflict with their own mother. In other words, it is possible that mothers are better psychologically adjusted (i.e. with lower rate of PPD symptoms) when they feel competent as parents and that one way of achieving this is to have their level of expectations matched with the actual level of involvement others are able to offer. This is consistent with a fine line between support and interference suggested by previous studies, especially with

regard to childbearing (Chase-Lansdale et al., 1994; Richardson et al., 1991; Voran & Philips, 1993).

In terms of other moderating factors, Reid and Meadows-Oliver's (2007) review have found mother's satisfaction of support, conflict, loneliness and self-esteem to contribute to the relationship between support and PPD symptoms. Through rigorous examination of statistical methods and reasoning across studies, the current review identified additional moderating factors in contributing to the relationship between support and PPD symptoms such as consistency of care provided by father of the baby, satisfaction of support, parental stress, living arrangement, relationship status, "prenatal infant care emotionality" (defined by the authors as adolescent mothers' antenatal expectations of how they would feel following delivery), socioeconomic status and maternal age to impact on the relationship between support and PPD symptoms. Another important finding that was highlighted in the current review is that the complexity of support as a multi-dimensional construct that interact with numerous co-occurring factors. Research on support and PPD symptoms in adolescents may benefit from more formal mediation and moderation analyses to robustly test out the statistical relationships among these variables.

Measures of depressive symptomatology

All studies made use of standardised measures of depression such as CES-D, CES-DC, EPDS and BDI to establish perpartum (AND and PPD) symptomatology. There is, however, a lack of consensus on the type of measure used to measure AND and PPD symptoms, with a total of 12 different measures used across 17 studies. Moreover, several limitations of using these PPD measures are also noted for the two most commonly used measures:

First of all, despite its popularity in postpartum research, the CES-D was developed for use in epidemiology studies of depressive symptomatology in general population (Radloff, 1977)

and was not designed for diagnostic purposes. In a study that examined the use of the CES-D in screening depressive symptoms in a sample (n = 1,710) of adolescent, many false positives were generated (Roberts, Andrews, Lewinsohn, & Hops, 1990). Moreover, the CES-D includes items that assess somatic symptoms of depression that resemble common experiences of raising an infant, including tiredness, disturbed sleep and decreased libido.

The EPDS, on the other hand, was developed and normed for the adult population. With its norm established for adult mothers (Cox et al., 1987), the clinical threshold for detecting depressive symptoms may therefore be different in adolescent populations. Different clinical cut-off points were adopted across studies in identifying participants with symptoms of depression. Indication of AND symptoms is defined by a score of ≥ 14 on the EPDS as established by Murray and Carothers (1990), while Birkeland et al. (2005) used a clinical cut-off score of ≥ 13 to define postpartum depressive symptoms (Cox et al., 1987; Cox & Holden, 2003). With reference to a more recent study (Cox et al., 2008) where a cut-off of ≥ 12 on the EPDS was consistently shown to be associated with major depression, Meltzer-Brody et al. (2013) used a score of ≥ 11 as a positive screen for AND and PPD with an attempt to capture a significant degree of depressive symptoms including both minor and major depression.

Moreover, it is important to be aware that these measures, though commonly used as complementary instruments for AND and PPD screening, cannot be used to diagnose AND and PPD. Careful consideration is therefore warranted when generalising findings from these studies and this current review to clinical practice.

Measures of other factors

Information on ethnicity and age were mostly collected via interview or self-report demographic questionnaire at baseline, while support was measured using a combination of standardised and non-standardised measures.

Of measures of support, there is a lack of measures specific to the peripartum period and a major issue highlighted in this review is the lack of measures that capture the interactional and multifaceted nature of support. This relates to issues of conceptualisation in the PPD literature, where social support has tended to be categorized as a risk factor and assessed using one-dimensional measures. This lack of sophistication of social support measures used by reviewed studies affects the ability to gain a deep understanding of the nature of the relationship between support and PPD.

Limitations of the Current Literature Review and Current Evidence

The current review adds to the knowledge base about risk and resilience factors related to adolescent motherhood. The main limitation of the current review is, however, the use of broad search terms to cover the concept of “risk/ protective factors” exploded from review papers in the PPD literature. Despite reflecting closely the type of papers that were covered in the past systematic review on adolescent PPD (Reid & Meadows-Olivers, 2007), this may have excluded others studies that examined the factors of interest (Maternal age, Ethnicity, AND and support) in relation to PPD symptoms. The stringent exclusion criteria for this current review e.g. exclusion of retrospective and qualitative studies may also have resulted in some interesting research findings being missed.

Probably due to the same reason, as well as restricted funding and being a relatively novel area of research in this sub-sample group, almost half of the studies included (N=6) in this review extrapolated their data from affiliated treatment trials. There is a tendency for studies to establish a basic statistical association between a broad number of factors with adolescent PPD symptomatology and not many went beyond the initial analysis to enable a deeper understanding of mediating and moderating factors.

Many of the reviewed studies sought to control for the effects of other variables when examining different factors as predictor of PPD. There is however a large discrepancy in the type of variables assessed, often without a rationale for their selection.

Additionally, given the use self-report measures across studies, inclusion of a measure of social desirability should be considered as it may represent a confounding variable which requires control.

There is also a general problem with sampling bias across studies, where participants were recruited on a voluntary basis. It is therefore possible that recruited women with higher need of reassurance could have been favoured to be sampled. This may have increased the estimated prevalence of PPD and missing ones who are most severe detriments of social support.

Despite all these limitations, the strengths of the current review are that it has been conducted in a systematic way, with an analysis of quality methods performed before exploration of the results.

Future research and implications:

There are areas highlighted in this review that warrant future research to address the limitations in the current evidence as well as this review. These include further systematic reviews to look separately at the four factors addressed, as well as the need for more thorough analyses of risk/ protective factors studies to examine specificity of relationships among different factors and PPD symptoms.

The findings of this review have highlighted the need to develop a universally effective screening tool for adolescent peripartum (AND and PPD) depression, to address the variability in research of AND and PPD prevalence. This can also be used routinely as a

clinical screening tool to detect depression in pregnancy in order to identify women at risk and to minimise adverse effects of depression in prepartum and postpartum period.

Findings from this review also have implications in guiding the creation of more effective adolescent-specific interventions and support. This includes offering clinicians, schools and policy makers, the understanding of the importance of their support and thus to involve partners and parents in intervention programmes if possible. It is also imperative to monitor the interpersonal characteristic of co-residential living arrangements such as adolescent mothers' parental competence and be sensitive in any conflict between adolescent mothers and different people in her support network. Moreover, when necessary, provide adolescent mothers with alternative residential options such as group homes and independent living programmes if their mental health is in jeopardy. There is also a need to develop a more specific measure on support in relation to peripartum period to allow more thorough and transferrable understanding between support and PPD symptomatology in order to suit the need for this population.

Education campaigns for adolescent parents and/or parents on AND and PPD will also be useful to facilitate early interventions, help them prepare for the life changes associated with motherhood as well as helping them to acquire the skills and knowledge relevant to child birth and challenges of childcare.

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Part 2: Empirical Paper

**The Relationship between Parental Mentalization and Maternal Psychopathology:
During and After Postpartum Period.**

Abstract

Aims:

In the past decade, there has been a shift of focus with regards to parental mentalization when considering the influence of parenting on child development. Although poor parental mentalization has been linked with psychopathology and insecure attachment styles, there is a surprising lack of studies focusing on the relationship between parental mentalization and maternal psychopathology within the context of parent-infant relationships. Using maternal mind-mindedness (MMM) as a mentalizing construct, the current study sought to examine the association between symptoms of maternal psychopathology (during and after the postpartum period) and MMM. The effect of parent-infant psychotherapy in relation to maternal MM and psychopathology was also explored.

Methods:

120 parent-infant pairs were drawn from both clinical and normative samples included in either a parent-infant psychotherapy randomised-controlled trial or an affiliated normative study. Two standardised measures of maternal psychopathology were administered. Five minutes of mother-infant free-play interactions were also recorded at one year follow-up. The free-play videos were subsequently transcribed and coded by independent coders and mind-mindedness indices were obtained as measures of parental mentalizing capacity.

Results:

There was an association between postpartum maternal psychopathology and parental mentalization. However there was no association between concurrent maternal psychopathology and parental mentalization. The results showed that the two indices of MMM, appropriate mind-related comments and non-attuned mind-related comments, were

significantly related to different aspects of postpartum maternal psychopathology. Mothers with postpartum maternal depressive symptomatology (measured by CES-D) were more likely to comment in a non-attuned manner on their infants' internal states while mothers who reported a higher number of psychological symptoms on BSI measuring the mother's ported symptom of postpartum psychopathology were less inclined to comment appropriately on their infant's internal states. The latter relationship remained even when concurrent maternal psychopathology was controlled for.

Conclusions:

The results show that there is a possible link between postpartum maternal psychopathology and parental mentalizing capacity, rather than subsequent maternal mental state. Drawing on mentalization theory, the postpartum period might be a critical time window when the presence of appropriate parental mentalization would be crucial for the healthy development of a child's mentalizing capacity, which would in turn affect a mother's capacity to mentalize regardless of her subsequent mental state. This speculation however requires further investigations.

Introduction

Parental mentalization and Caregiver Mind-mindedness

Taking a relational perspective to early development, parental mentalization refers to a parent's ability and willingness to treat a child as an intentional and psychological agent (Fonagy, Gargely, Jurist & Target, 2002). This includes parents' appreciation and interpretation of their infant's states of mind including thoughts, intentions and feelings, a level of understanding regarding their management and regulation, as well a psychological perspective about their own and their child's behaviour (Fonagy, Gargely & Target, 2007).

According to the developmental theory driven by work of Fonagy and colleagues, secure attachment is fostered through appropriate parental mentalizing of the child, which facilitates a process of "hardwiring mentalization circuitries" which facilitates a child's insight into his/her own mind and others as psychological and intentional agents, which in turn increases the child's experience of self-efficacy (e.g. Fonagy & Bateman, 2008; Sharp & Fonagy, 2008; Laranjo, Bernier, Meins & Carlson, 2010; Meins, Fernyhough, Wainwright, Clark-Carter, Das Gupta, Fradley, & Tuckey, 2003; Meins, Fernyhough, Wainwright, Das Gupta, Fradley, & Tuckey, 2002). Parental mentalization, such as reflective functioning (RF) and mind-mindedness (MM), is therefore paramount in enabling a child to acquire a secure attachment with their parent, as well as in interacting and forming successful relationship with others (Slade, 2005; Meins, Fernyhough, Fradley, & Tuckey, 2001). On the contrary, failure in this process could lead to later psychopathology, particularly in relation to the development of borderline personality disorder (BPD: Fonagy, Gergely, Jurist & Target, 2004; Allen & Fonagy, 2006; Fongay & Luyten, 2009).

MM (Meins, 1997) is a relational and mentalizing construct that is believed to contribute to the inter-generational transmission of attachment security that is based on Vygotsky's

approach (Meins, 1997; Meins et al., 2001; Meins, Fernyhough, de Rosnay, Arnott, B., Leekam & Turner, 2012). It is built upon the acknowledgement that infants are able to have representations of the world and express desire through modes of communication. For instance, mothers of securely attached children are more likely to be aware of their child's zone of proximal development, and would tailor information and instructions to their child accordingly. MM shares commonalities with RF, another mentalizing construct, that is conceptualised as an individual's capacity to reflect on people's behaviour in the formation and transmission of attachment relationships (e.g., Fonagy, Steele, Moran, Steele, & Higgitt, 1991; Fonagy, Target, Steele, & Steele, 1998; Sharp & Fonagy, 2008).

Characteristics of Caregiver MM

Operationalised as an index of individual differences, caregiver MM was first studied from mothers' mental attributes when given an open-ended invitation to describe their child (Meins, Fernyhough, Russell, & Clark-Carter, 1998) and their tendency to attribute meaning to infants' early non-word utterances (Meins, 1998; Meins & Fernyhough, 1999). It was later evolved as an assessment of mothers' "online" parental mentalizing capacity via real-life interactions with their infants in the first year of life, and whether they comment in either an "appropriate" or "non-attuned" manner on infants' putative thoughts and feelings (Meins et al., 2012; Meins et al., 2001). Therefore, unlike other mentalizing constructs which involve an "off-line" assessment of an individual's mental representation of attachment relationships, such as the Adult Attachment Interview (AAI-RF; George, Kaplan, & Main, 1996) and the Parent Development Interview (PDI-RF; Slade, Aber, Bresgi, Berger & Kaplan, 2004; Slade, Bernbach, Grienberger, Levy & Locker, 2004), caregiver MM combines both representational and behavioural aspects of caregiver-child relationship.

Recent studies on the utility of caregiver MM also distinguished the use of appropriate mind-related comments from caregiver's general affect labelling (Meins, Fernyhough, Arnott, Leekam, & Turner, 2011; Dunn, Brown, Slomkowski, Tesla & Youngblade, 1991). Moreover, a child's gender, child's general cognitive ability, mother's socioeconomic status, mother's educational level and previous experience of motherhood were found to be irrelevant to maternal MM (MMM) in terms of their tendency to comment appropriately on their infants' putative internal states (Meins et al., 2002; McMahon & Meins, 2012; Meins et al., 1998). This suggests MM to be a stable and independent quality that could stem from a parent's own specific experiences and appraisal of his/ her relationship with his/ her child (Meins et al., 2011).

Maternal psychopathology and Its Impact on Child Outcome

Winnicott accentuated the unconscious process of "good enough" parenting, which involves a parent's ability to adequately mentalize, attune and respond to their infant's emotions, in order to provide the infant with a sense of safety, being understood and being contained. This is "an approximate process" that is believed to be related to security of attachment and positive social, emotional and cognitive and developmental outcomes (Fonagy et al., 2002). On the contrary, an infant's opportunity for "good enough parenting" and to experience and ultimately acquire an appropriate level of mentalizing skills could be jeopardised when his/her parents' state of mind is "preoccupied" by unresolved conflicts of their own (Baradon, Broughton, Gibbs, Joyce and Woodhead, 2005). This includes parents who struggle with mental health problems, and whose ability to be emotionally available to their baby, regulate their own emotion and scaffold their baby's experience may be disrupted (Marks, Hipwell and Kumar, 2002).

Given the well-researched theoretical links between mentalization and mental health difficulties, there is a surprising lack of studies that have focused on the relationship between parental mentalization and maternal psychopathology within the context of parent-infant relationships (Sleed, 2013). To date, only two studies have attempted to examine the relationship between MMM and maternal psychopathology. Interestingly, an inpatient study with a range of severe mental illnesses (depression, schizophrenia and mania) failed to detect any difference on MMM scores when compared to that of a healthy comparison group (Pawlby, Fernyhough, Meins, Pariante, Seneviratne & Bentall, 2010). Although a trend ($p=0.075$) was found indicating that depressed mothers were less likely to comment appropriately on their infants' thoughts and feelings, this relationship was less robust than predicted. A subsequent large community study also found mothers' postpartum depression scores were unrelated to MMM at three and seven months postpartum (Meins, Fernyhough, Arnott, Leekam & Turner, 2011).

Rationale for Current Study

Although there are implicit theoretical links between maternal psychopathology and mentalization in parent-infant relationships, there is thus far a lack of evidence to support any relationship between them. Possible limitations in this area of research include the use of cross-sectional study designs and a focus on MMM with young infants (under 12 months of age). By examining MMM with toddlers over 12 months of age and maternal psychopathology across two time points (during and beyond postpartum period), the current study seeks to explore the direct interplay between maternal psychopathology and MMM with a view to gain a better understanding of intergenerational developmental psychopathology.

Arguably, MMM capacity required for caring for toddlers over 12 months could be different from that for young infants under 12 months. For example, taking normal development into account, toddlers are physically more mobile and have developed the use of single words with meaning by 12 months of age. Building upon MMM capacity of commenting on infants' putative thoughts and feelings when interacting with their infants in their first year of life, mothers of toddlers are required to further their MMM capacity by attributing meaning to their child's early non-word vocalizations. It would thus be interesting in the current study to examine whether these developmental changes pose any extra demand on mothers with concurrent psychopathology, which could in turn affect their MMM capacity.

Furthermore, postpartum mental illnesses in mothers that occur within 12 months of birth such as postpartum depression, have consistently been found to have negative and longstanding effects on parenting behaviours, the mother-infant relationship, and children's behavioural, cognitive and emotional outcomes (Gelfand & Teti, 1990; Goodman & Gotlib, 1999; Lovejoy, Graczyk, O'Hare, & Neuman, 2000), even after taking concurrent maternal depression into account (Bureau, Easterbrooks, & Lyons-Ruth, 2009). Key characteristics of maternal depression, such as lack of energy, tiredness, loss of interest and difficulties in concentration are commonly believed to hinder caregivers' ability to "tune in" to their infants' internal states and hence be less likely to engage in MMM discourse. Whilst no difference in the complexity or syntax of languages was found between depressed mothers and their healthy counterparts during interactions with their young toddlers, depressed mothers were generally found to be less inclined to articulate their child's experience and to attribute meaning to their child's behaviour (Murray, Kempton, Woolgar & Hooper, 1993). Given all this, together with the developmental theory proposed by Fonagy and colleagues summarised above, it is possible that the presence of postpartum mental illnesses might undermine the quality of early parent-infant relationships where the opportunity for mothers to learn to

mentalize in relation to the infant is compromised during the first year. A failure in this process may in turn plant seeds of maladaptation that result in poor maternal mentalization beyond the postpartum period, even when any maternal mental illness no longer exists.

Aims and hypotheses

Using parent-infant pairs recruited from a combined sample of a community and clinical population, the current study aims to investigate the relationship of concurrent MM in reference to maternal psychopathology across the first two years of an infant's life. This study aims to test the following hypotheses:

Hypothesis 1: There will be relatively lower MMM capacity shown in mothers with concurrent maternal psychopathology caring for toddlers above 12 months of age, when compared to their healthy counterparts.

Hypothesis 2: Presence of postpartum psychopathology at baseline will be associated with lower concurrent MMM capacity at follow-up (when toddlers are above 12 months of age), even when concurrent maternal psychopathology is controlled for.

Methodology

Research Design

The current study is a joint project (Colbeck, 2014, see outline of joint working in Appendix E) that involves a longitudinal examination of 120 mother-infant pairs over two time points across a 12-month period. It adopts a 3 level factorial design; the primary outcome variable is the MMM at 12 months follow-up, while independent variables include presence or absence of maternal psychopathology.

Participants and Setting

The current sample is drawn from two studies. The first is a randomised-controlled trial (RCT) on the effectiveness of parent-infant psychotherapy (PIP) for clinical mother-infant pairs (Fonagy, Slead & Baradon, 2007), and the second is a related non experimental study looking at normative parent-infant pairs (Slead, 2009). This study also shared the same sample with another study on reflective functioning and attachment security (Colbeck, 2014).

Recruitment

Study one: PIP RCT (Fonagy et al., 2007). A total of 128 mother-infant pairs were initially recruited but only 111 were eligible for the PIP RCT study. Of the 111 mother-infant pairs, 35 refused to take part, while 10 were excluded due to missing data on the interested measures (A consort diagram of the current study sample can be found in Figure 1). The study took part across four sites; three hospital-based perinatal psychiatry units and one community Children's Centre that was identified as serving demographically diverse inner city populations with high levels of socio-economic deprivation. Mothers with a child less than 12 months of age were referred by health and social care professionals as requiring counselling or other mental health services due to psychiatric difficulties, meeting probable psychiatric caseness criteria based on the General Health Questionnaire ($> 4/5$; Goldberg & Williams, 1988). They were high-risk, disadvantaged and socially excluded mother-infant pairs who also met at least one of the following indicators of social exclusion: Low income household (eligibility for income support); Long term unemployment (>2 years); Temporary or overcrowded accommodation (more than 2 persons per room); Single or unpartnered; Presence of chronic physical illness or disability; Early childhood history of foster or institutional care; Social isolation associated with recent relocation; Less than 20 years of age; Previous diagnosis of non-psychotic psychiatric illness

Study two: Normative Study. The remaining 54 mother-infant pairs, were not identified by a professional as having mental health problems and they were not referred to the PIP RCT study. They were recruited face-to-face from children's centre and baby groups, with best effort to match the babies' age and gender to the PIP RCT sample.

Eligibility criteria

Prior to an initial baseline interview, participants were screened for eligibility. Mother-infant pairs were excluded due to the following: (1) non-English speaking; (2) current psychosis; (3) substance abuse disorders/chronic drug dependence; (4) IQ below 70; (5) children with sensory or motoric disability (e.g., blindness, hearing impairment, cerebral palsy).

Power Calculation

Using G*power and a conservative medium effect size (f^2 of 0.645), a priori power test for linear multiple regression, an estimated sample size of 59 participants was required to achieve a power of 0.9, at the significance level (α) of 0.05. Our current sample of 120 is thus statistically robust enough for the proposed investigation.

Procedures

Despite separate recruitment pathways, similar research procedure and assessments were administered to all participants across the samples. A brief telephone call was made to all potential participants to provide study information and to screen for eligibility. This initial screening involved a semi-structured interview with the mothers, administration of the General Health Questionnaire 28 (GHQ-28 Goldberg & Williams, 1988), and the Test of Nonverbal Intelligence (TONI-3; Brown, Sherbenou, & Johnsen, 1997). Researchers then met with all eligible participants to provide them with an information sheet (PIP RCT information sheet in Appendix F and normative study information sheet in Appendix G) and

obtained full informed consent for participation (PIP RCT consent form in Appendix H and normative study consent form in Appendix I).

Assessments which include completion of a number of questionnaires and a five minutes video-recording were made of mother-infant free-play interactions then took place at two time points over the course of the year (baseline and 12 months after entry into the study). This took place in the families' own home or at the research centre.

For participants in the PIP RCT study, baseline assessments were carried out with all families who consented to participate before they were randomly allocated to either a parent-infant psychotherapy (PIP; experimental group) or treatment as usual (TAU; control group) group. Randomisation was completed using the method of minimization which included use of a logistic regression based algorithm (Fultz, 2000). The mother's age-group, the child's gender and the mother's marital status were entered into the algorithm which allowed an assignment to be made to either treatment or control group while keeping the two groups balanced on these variables (Pocock & Simon, 1975; Treasure & MacRae, 1998). PIP is a manualized therapy that involves mother-infant pairs attending sessions over a six months period with an average of 10 sessions total and an average of a session every two weeks. TAU, on the other hand, was carried out as it would normally be provided, that is typically a standard care package which is determined by the local service provision. The researcher carrying out the randomization informed the research team, who then informed the participants of the group allocation. After the baseline assessments were completed and participants were randomly allocated, researcher and participant blinding was not possible, but all data coding was carried out by independent coders (see Appendix E Outline of Joint working). A small financial incentive was offered to all participants as part of the invitation to participate. The consort diagram in Figure 1 gives a breakdown of the sample included in the current study.

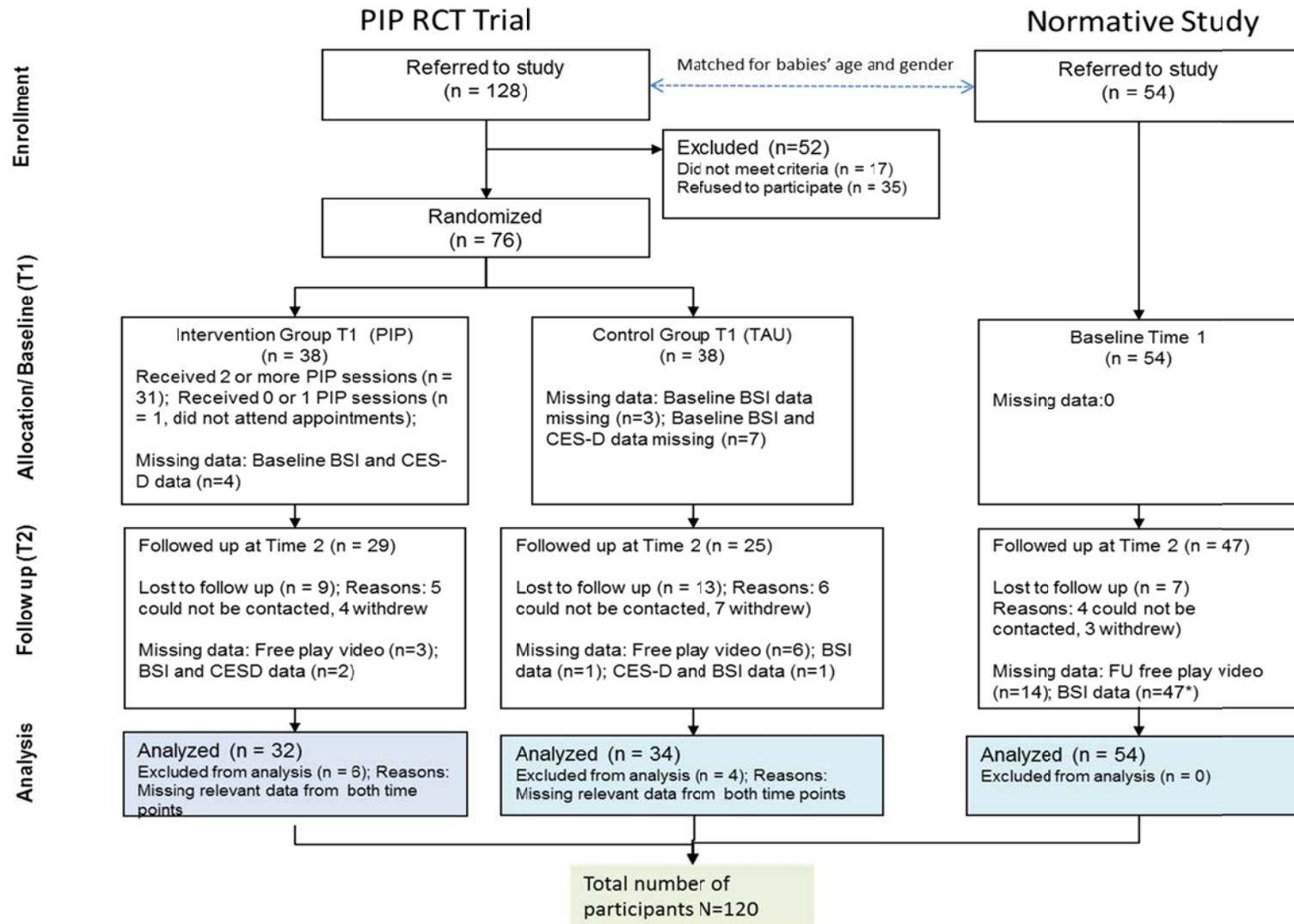


Figure 1. Consort diagram of current study sample. Note: BSI data was not administered to the normative sample at T2

Participant characteristics

Table 1 shows the differences between mothers recruited in the PIP and normative trials in their individual and sociodemographic factors. Chi-square was used for dichotomous variables and t-tests for continuous variables. Overall, significant differences were found among all sociodemographic factors between the groups, except mothers' ethnicity.

As a trial that aimed to recruit mother-infant pairs from a high-risk, disadvantaged and socially excluded background, mothers from the PIP trial are significantly younger, with lower non-verbal IQ, higher GHQ scores, less likely to be married or cohabited, likely to have a lower level of education background when compared to the sample from normative study. The infants included in the PIP trial are also likely to be older at baseline and are less likely to be their mothers' first child.

As illustrated by additional bivariate analyses, the PIP and normative samples were found to be distinctive across individual and sociodemographic variables. These variables were hence posed as confounding variables that required controlling for in subsequent statistical analyses.

As a combined sample, most of the mothers included in the sample are White (70.8%), with at least GCSE qualification (95.8%) and the mean age of mothers was 32.24 years (range 19.09- 43.69). Many of the mothers were either married or cohabiting with a partner (78.3%) at the time of baseline assessment (i.e. within the first year of a child's life) and most of the children included in this study were the mother's first child.

Table 1 A breakdown of participant characteristics. Difference between samples from PIP and Normative research trials

Variables	Combined sample	PIP RCT	Normative study	Difference PIP and normative groups
	%/ Mean (SD)	%/ Mean (SD)	%/ Mean (SD)	P value
Mother's age at baseline (years)	32.24 (5.28)	22.72 (5.78)	33.17 (4.48)	<i>P</i> < 0.05
Child's age at baseline (months)	5.43 (3.41)	10.93 (3.11)	7.41 (2.64)	<i>P</i> <0.01
Mother's nonverbal IQ based on TONI3	107.61 (11.74)	104.84 (11.28)	111.16 (11.45)	<i>P</i> <0.01
GHQ total	9.64 (7.14)	13.29 (6.11)	4.92 (5.43)	<i>P</i> <0.01
First child	72.25%	65.20%	79.30%	<i>P</i> <0.05
Marital status				
Married or cohabiting	78.30%	62.1%	91.4%%	<i>P</i> <0.01
Mother's Education				
None	4.2%	7.60%	0%	<i>P</i> <0.01
GCSE/ Basic high school level	11.7%	15.20%	7.40%	
A level or equivalent	14.2%	18.20%	9.30%	
Diploma/ NVQ or equivalent	10.8%	13.60%	7.40%	
Degree	38.3%	39.40%	37%	
Postgraduate degrees	20.8%	6.10%	38.90%	
Mother's ethnicity				
White	70.8%	66.70%	70.9%	<i>Not significant</i>
Black	6.7%	12.10%	0%	
Asian	10.8%	10.60%	11.1%	
Mixed race	7.5%	6.10%	9.3%	
Arabic/ Middle Eastern	4.2%	4.50%	3.7%	

Measures

Maternal Psychopathology

Center for Epidemiological Studies Depression Scale (CES-D; Comstock et al., 1976; Radloff, 1977) is a measure developed by the Center for Epidemiologic Studies at the National Institutes of Mental Health in the United States specifically to meet the need for a brief measure of depressive symptoms suitable in community settings. Using a cut off of ≥ 16 , the CES-D has high sensitivity and specificity for major depression. It consists of 20 items that were selected from other depressions scales, including the BDI, the SADS and the MMPI. Six major symptom areas were identified: depressed mood, guilt/worthlessness, helplessness/hopelessness, psychomotor retardation, loss of appetite, and sleep disturbance.

Brief Symptom Inventory (BSI; Derogatis, 1993) is a 53-item self-report measure of psychopathology. It is a brief version of the Symptom Checklist-90-Revised (SCL-90-R), with a reported correlation between BSI and SCL-90-R to range between 0.92 and 0.99 (Derogatis, 1993). The BSI is used in various clinical settings as a mental health screening tool to measure reduction in level of symptom during and post-treatment. It generates three indices of global distress: Global Severity Index (GSI), Positive Symptom Total Index (PST) and Positive Symptom Distress Index (PSD), determining current or past level of symptomatology, intensity of symptoms, and number of reported symptoms in the two weeks prior to the treatment, respectively. The GSI is an indicator of current overall symptomatology across multiple areas experienced during the preceding two weeks. The PST is determined based on the number of non-zero items endorsed and measures the number of symptoms reportedly experienced by the participant. The PSD Index is computed by aggregating the values of the items receiving non-zero responses divided by the PST,

measuring the average level of distress of the participant. Each participant must answer at least 40 questions with respect to the BSI and must not provide the same response for every question on the measure for the responses to be considered valid. The GSI had strong internal consistency reliability with a Cronbach's alpha coefficient of .97 (Derogatis, 1993). Good internal consistency reliability is supported by several other independent studies (Croog, Levine, Testa, Brown, Bulpitt, Jenkins, Klerman & Williams, 1986; Aroian & Patsdaughter, 1989; Derogatis, 1993). No alpha reliability is reported for the other two global indices. Good test-retest reliability for the three Global Indices from .87 (PSDI) to .90 (GSI) (Derogatis, 1993).

Maternal Mind–Mindedness (MMM)

The video–recorded interactions of approximately five minutes took place either in the family's home or research centre where mother-infant pairs were given the instruction to “spend time together as they would normally do”. These free play videos were then randomly assigned with a code which was carried out by an external researcher who was independent of the study and not involved in the assessment procedure. The mother's speech was transcribed verbatim then rated by two independent coders who were blinded to the participants' performance on other questionnaire measures, as well as allocated study and experimental groups.

The transcript was used to identify comments that contained a reference to an infant's internal state (“mind-related comments”) according to Meins and Fernyhough's (2010) manual. Meins and Fernyhough (2010) defined mind-related comments as: 1) comments on mental states such as desires/preferences (e.g. “You like the ball, don't you?”; “You think it is funny, don't you?”); 2) comments on the infant's cognition (e.g. “You remember this toy”); 3)

comments on the infant's emotional state; 4) comments on the infant's attempts to manipulate people's beliefs (e.g. comment on infants joking or teasing); 5) comments that appear to be a dialogue said or thought by the infant.

Once the mind-related comments were identified, each comment was then classified as either "appropriate" or "non-attuned" using criteria in Meins and Fernyhough's (2010) manual. Criteria for "appropriate comments" included: (1) the coder agreed with the mother's reference of the infant's likely internal state (e.g., If a mother's comment that her infant preference to a particular object was consistent with the infant's indicated behaviour); (2) the comment linked current activity with similar events in the past or future (e.g., while playing with a toy, asking if the infant remembered playing with a similar toy at home); (3) the comment served to clarify how to proceed if there was a lull in the interaction. Conversely, the comments were coded as "non-attuned" if: (1) the coder disagreed with the mother's interpretation of the infant's internal state (e.g., stating that the infant was interested in an object when the infant showed no interest towards it); (2) the comment referred to a past or future event that had no obvious relation to current activity; (3) the mother suggested that the infant engage in another activity when the infant is clearly already engaged in playing; (4) the mother attempted to attribute internal states to the infant when it is a projection of her own; (5) the reference of the mother's comment was not clear (e.g. commenting "you like that" when it was not clear which specific object or activity was being referred to).

Appropriate and non-attuned mind-related comments were then calculated as a percentage of the total number of comments made by the mother throughout the whole video-recorded session in order to control for verbosity as suggested by the manual (Meins and Fernyhough,

2010). A randomly selected 25% of mother-infant interactions were coded by both coders, with a minimum inter-rater reliability of 80% achieved across domains.

Ethics

Being part of the PIP RCT and a normative parent-infant study, ethical approval was granted by local NHS research committee and University College London ethics committee (REC reference number: 05/Q0511/47 Appendix J and 1603/001 Appendix K) respectively.

Analysis Plan

Analysis was conducted using SPSS Version 22. Preliminary analysis included using bivariate analyses (chi-square and t-tests) to evaluate the differences individual and sociodemographic factors between the two samples from PIP and Normative trials and any significant differences found in variables were controlled for in subsequent statistical analyses on combined sample. Normality checks were also conducted; As MMM variables were significantly skewed, these variables were square root transformed for statistical analysis. As the majority of the mothers did not use non-attuned mind-related comments, the distribution of this variable therefore warranted a dichotomous recoding where it was split into two groups of with and without use of non-attuned mind-related comments. The two time points, baseline (i.e. Postpartum period of within 12 months of child birth) and one year follow-up were illustrated as T1 and T2 respectively throughout. Pearson's, bi-serial and phi correlations were used to investigate the relationship of predictor variables (T1 and T2) and concurrent MMM at T2 according to date types. Should a relationship exist, partial correlation was used to control for effect of other variables. Baron and Kenny's (1986) test of

mediation using logistic regression was used to investigate if any potential mediating effects exist. If not mentioned otherwise, the significance level was 0.05.

Results

Descriptive statistics

Only 41 mothers had T2 free play video and complete data across two time points. Some mothers did not complete all questionnaire measures and the BSI was not administered to the normative group. The sample sizes therefore varied for each measure (a breakdown of missing data can be found in Figure 1 and sample sizes for each measure are shown on Table 2 below). At T1, data on CES-D and BSI were available on 116 and 59 mothers respectively. At T2, data on CES-D and BSI were available on 98 and 50 mothers respectively; this is due to 17 drop outs, as well as mothers failing to respond to all questions. A total of 83 mothers consented to video record their free-play interactions at T2. Five videos were however excluded due to either a unidentifiable languages or the free play interactions being significantly influenced by a father or sibling's presence in the video (a summary of the quality of free play videos is shown on Table 3).

The mean and standard deviation scores for the measures of MMM and maternal psychopathology are presented in Table 2. At T1, the sample showed an elevated mean CES-D score of 19.35 with a SD of 12.67 indicating large variability within the sample. When caseness of maternal depression was examined using a clinical cut off of ≥ 16 , just over half (52.5%) of the sample met caseness which is in keeping with expectations given the combined clinical and normative sample. When comparing maternal psychopathology across two time points, a drop in maternal psychopathological symptomatology was noticed on CES-D and on BSI. Moreover, as a measure of MMM, the mean percentage mind-related

comments made by the sample was 8.91% of total comments, while the percentage of MMM appropriate and non-attuned mind-related comments made by the sample were 9.26% and 0.58% of the total comments respectively.

Table 2

Descriptive statistic for current study

Variables	Mean/ %	SD	Range	N
<u>Baseline (T1)</u>				
CES-D total score	19.35	12.67	0-54	116
CES-D clinically significant (%) (cut-off score of ≥ 16)	52.5%	-	-	116
BSI Positive symptom total	49.24	10.88	22-68	59
BSI Positive symptom distress	45.12	11.35	25-68	59
BSI General Severity Index	47.73	11.34	19-70	59
BSI Positive symptom total caseness	15.3%	-	-	59
BSI Positive symptom distress caseness	8.5%	-	-	59
BSI General Severity Index caseness	13.6%	-	-	59
<u>12 months follow-up (T2)</u>				
MMM Total MRC (%)	8.91	6.84	0-27.96	78
MMM AMRC (%)	9.26	8.28	0-40	78
MMM NAMRC (%)	0.58	1.56	0-8	78
CES-D total score	14.50	11.47	0-52	98
CES-D clinically significant (%) (cut-off score of ≥ 16)	39.8%	-	-	98
BSI Positive symptom total	44.56	11.91	22-69	50
BSI Positive symptom distress	39.70	10.27	25-59	50
BSI General Severity Index	42.18	11.24	19-64	50
BSI Positive symptom total caseness	10%	-	-	50
BSI Positive symptom distress caseness	0%	-	-	50
BSI General Severity Index caseness	2%	-	-	50
PIP group: Number of PIP sessions attended	18.21	13.34	1-49	29

Note: MRC= mind-related comments; AMRC= appropriate mind-related comments; NAMRC= nonattuned mind-related comments; CES-D= Center for Epidemiological Studies Depression Scale; BSI= Brief Symptom Inventory. * $p < 0.05$, ** $p < 0.01$

Table 3

Summary of the quality of videos

Quality of videos	%	N
Fine and was used in current study	91.6%	76
Poor audio (was coded with best effort)	2.4%	2
Unidentifiable language	2.4%	2
Presence of father or sibling	3.6%	3

Preliminary Analysis

Normality Checks. Tests of normality were conducted to determine whether the concurrent (i.e. 12 months follow-up) MMM data was normally distributed. This was to ascertain if parametric tests would be suitable or if any data transformation would be required. Through examining the Kurtosis scores and inspecting the histograms, a significant positive skew was found (Field, 2009).

Computation of variables. Due to the skewness found amongst the MMM variables, a square root transformation was performed. However, the non-attuned MMM variable remained positively skewed following transformation. As highlighted by Meins et al. (2011), most MMM studies to date have ignored the correlates and consequences of non-attuned mind-related comments. This is perhaps due to the fact that it is unusual for mothers to initiate a mind-related yet non-attuned comment. This phenomenon was corroborated by our current study, where the median percentage of non-attuned comments was found to be zero and the mean and standard deviation reported at 0.58 and 1.45 respectively. Therefore the distribution of the variable warranted a dichotomous categorising into two groups: those who made non-attuned comments and those who did not made any non-attuned comments. This method of dichotomising data is widely used within psychological research to provide more meaningful and realistic measure of association among variables (DeCoster, Iselin & Gallucci, 2009).

Primary Analysis

The Pearson's, bi-serial and Phi correlations were used to test for any relationships between dependent variables (MMM variables) and several demographic variables, including maternal age, child's gender, mother's ethnicity, total social exclusion criteria and mother's non-verbal IQ. As summarised in Table 4 no significant relationships was found between MMM variables and any of the demographic variables. On the other hand, within MMM variables, mother's score for appropriate mind-related comments were highly related to scores of total mind related comments, $r = 0.932$, $p < 0.01$ yet unrelated to scores for nonattuned mind-related comments, $r = 0.075$, n.s, a finding that is consistent with previous research (Arnott & Meins, 2007; Meins et al., 2001, 2002, 2011).

Relationship between maternal psychopathology and MMM variables

To explore the associations between maternal psychopathology and MMM variables, Pearson's correlations were used. As shown in Table 5, scores of total mind related comments and appropriate mind-related comments (at T2) were significantly and negatively correlated with caseness of BSI Positive symptom total at T1 ($r = -0.426$, $p < 0.01$ and $r = -0.486$, $p < 0.01$ respectively). These significant relationships remains ($r = -0.573$, $p < 0.01$ and $r = -0.463$, $p < 0.05$ respectively) even when the effect of maternal marital status, maternal education level, child's age at baseline, maternal age at baseline, maternal non-verbal IQ, position of the child in the family, GHQ and concurrent (T2) caseness of BSI Positive Symptom Total were partialled out as shown in Table 6.

Table 4
Correlation Matrix between demographics and MMM variables.

	MMM variables T2		
	Total MRC	AMRC	NAMRC (Binary)
MMM variables T2			
Total MRC	-	-	-
AMRC	0.932**	-	-
NAMRC	0.075#	-0.162#	-
Demographics			
Maternal age	0.005	0.059	-0.33^
Child's gender	0.056^	0.004^	0.013#
Mother's ethnicity	-0.1^	-0.064^	-0.042#
Total social exclusion criteria	-0.048	-0.12	0.199^
Mother's non-verbal IQ	0.005	0.39	-0.1^

Note: Pearson's r correlation was used in all cases, except otherwise indicated with symbols # or ^. #= use of Phi correlation for dichotomous variables; ^= use of point bi-serial correlation for a combination of dichotomous and continuous variables; MRC= mind-related comments; AMRC= appropriate mind-related comments; NAMRC= Nonattuned mind-related comments, *p<0.05, **p<0.01

Table 5
Correlation matrix between MMM variables and maternal psychopathology measures.

		MMM variables T2		
		Total MRC	AMRC	NAMRC (Binary)
Maternal Psychopathology measures T1				
CES-D	Total	0.049	-0.093	0.271^
	Caseness	0.226	0.064	0.319**#
BSI Positive Symptom Total	Total	0.027	-0.027	0.17^
	Caseness	-0.426**^	0.486**^	0.02#
BSI Positive Depressive Symptom	Total	0.207	0.171	0.117^
	Caseness	-0.103^	-0.221^	0.194#
BSI Global Severity Index	Total	0.117	0.59	0.165^
	Caseness	0.067^	-0.024^	0.116#
Maternal Psychopathology measures T2				
CES-D	Total	-0.064	-0.159	0.217^
	Caseness	-0.036^	-0.149^	0.267#
BSI Positive Symptom Total	Total	-0.041	-0.072	0.17^
	Caseness	-0.042^	-0.048^	0.024#
BSI Positive Distress Symptom	Total	0.174	0.112	0.203^
	Caseness	0.277^	0.484^	0.247#
BSI Global Severity Index	Total	0.057	0.015	0.185^
	Caseness	-0.092^	-0.151^	0.298#

Note: Pearson's r correlation was used in all cases, except otherwise indicated with symbol # or ^. #= use of Phi correlation for dichotomous variables; ^= use of point bi-serial correlation for a combination of dichotomous and continuous variables. MRC= mind-related comments; AMRC= appropriate mind-related comments; AMRC= nonattuned mind-related comments; CES-D= Center for Epidemiological Studies Depression Scale; BSI= Brief Symptom Inventory *p<0.05, **p<0.01

Table 6

Pearson's correlation matrix for Caseness of BSI Positive Symptom Total at T1 with caseness of BSI Positive Symptom Total at T2 partialled correlation.

Correlation			Total MRC	AMRC
Full	BSI Positive Symptom Total T1	Caseness	-0.426**	-0.486**
Maternal marital status, maternal education level, child's age at baseline, maternal age at baseline, maternal non-verbal IQ, position of the child in the family, GHQ, group and BSI Positive Symptom Total Caseness T2 partialled	BSI Positive Symptom Total T1	Caseness	-0.573**	-0.463*

Note: T1= baseline, T2= concurrent 12 months follow-up, MRC= mind-related comments; AMRC= appropriate mind-related comments; BSI= Brief Symptom Inventory, *p<0.05, **p<0.01

Table 7

Pearson's correlation matrix for Caseness of BSI Positive Symptom Total at T1 with caseness of BSI Positive Symptom Total at T2 partialled correlation.

Correlation			NAMRC
Full	CES-D caseness Total T1	Caseness	0.319**
Maternal marital status, maternal education level, child's age at baseline, maternal age at baseline, maternal non-verbal IQ, position of the child in the family, GHQ, group and CES-D caseness Total T2 partialled	CES-D caseness Total T1	Caseness	0.296

Note: MRC= mind-related comments; AMRC= appropriate mind-related comments; CES-D= Center for Epidemiological Studies Depression Scale, *p<0.05, **p<0.01

On the other hand, using Phi-correlations, caseness of baseline (T1) depressive symptomatology (measured by CES-D) were significantly and positively correlated with the presence of non-attuned mind related comments at T2 as shown in Table 5 ($r=0.319$, $p<0.01$).

However, this relationship was no longer significant when various individual factors, sociodemographic factor and caseness of concurrent (T2) depressive symptomatology were partialled out as shown in Table 7 ($r=0.296$, n.s.). This suggests a possible mediating role that caseness of concurrent (T2) depressive symptomatology might play between caseness of baseline (T1) depressive symptomatology and caseness of non-attuned mind-related comments (T2).

In order to formally test out this suspected mediating effect of caseness of concurrent (T2) depressive symptomatology, Baron and Kenny's (1986) guidelines were implemented which indicate a need for the following criteria to be fulfilled: 1) The independent variable (caseness of baseline depressive symptomatology at T1) must be significantly associated with the dependent variable (caseness of non-attuned mind-related comments at T2); 2) The independent variable (caseness of baseline depressive symptomatology at T1) must be significantly associated with the mediating variable (caseness of baseline depressive symptomatology at T1); 3) The mediating variable must be significantly associated with the dependent variable; and 4) mediating variable must significantly reduce the association between the independent and dependent variable. A logistic regression was used to test these associations and confounding variables (maternal marital status, maternal education level, child's age at baseline, maternal age at baseline, maternal non-verbal IQ, position of the child in the family, GHQ, group) were controlled for. The first ($\beta= 1.9432$, $p=0.0167$) and second ($\beta= 0.4803$, $p<0.001$) criteria of Baron and Kenny's test were satisfied. The third criteria was disconfirmed as it failed to show any direct association between the mediator (concurrent caseness of depressive symptomatology) and dependent variable (caseness of non-attuned mind-related comments) ($\beta= 1.1257$, n.s.). The fourth stage was confirmed: caseness of

concurrent depressive symptomatology (T2) significantly reduced the association between caseness of baseline (T1) depressive symptomatology and concurrent (T2) caseness of non-attuned mind-related comments (the β for caseness of baseline depressive symptomatology reduce from 1.9432 to 1.4069). Although the current test failed to prove the mediating effect of caseness of concurrent depressive symptomatology, it provided evidence that caseness of baseline (T1) depressive symptomatology to be a stronger predictor of concurrent MMM ($\beta=1.9432$) that has almost double the tendency to adopt non-attuned mind-related comments than that of concurrent (T2) depressive symptomatology ($\beta=1.1257$).

Discussion

The current study is the one of the first to examine the relationship between parental mentalization and maternal psychopathology across two time points. A key finding of this study is that a relationship was found between indices of MMM and maternal postpartum psychopathology but not that of concurrent maternal psychological well-being.

The lack of relationship found between concurrent maternal psychopathology and parental mentalization echoes previous studies which suggest that the presence of maternal psychopathology may not necessarily imply poorer maternal mentalizing (Pawlby et al., 2010; Meins et al., 2011). This finding is somewhat surprising given the strong theoretical and empirical links between maternal psychopathology and mentalizing as described earlier (e.g. Fonagy & Luyten, 2009). One speculation is that mothers with concurrent depression may try harder in engaging with their children and therefore compensate with explicit mentalizing for their more limited implicit mentalizing capacity (Senju, Southgate, White & Frith, 2009; Apperly, 2011; Perner, 2010). Another possibility as proposed by Meins et al. (2014) is that

mind-mindedness could be a trait-like quality that is unrelated to experiential factors such as maternal mental health and possible extra demands require when parenting a toddler.

A different picture however emerged when postpartum (within the first 12 months of childbirth) psychological well-being was taken into account where a link was found between postpartum maternal psychopathology and later mentalization after the infant's first year. It would seem that the presence of postpartum psychopathology could have negatively impacted upon the parent-infant relationship, which in turn could lead to missed opportunities for new mothers to learn how to interact and appropriately mentalize with their infants. Developmental theories by Fonagy and colleagues further predict that such disruptions to maternal mentalization could undermine the healthy development of an infant's social cognitive capacities in terms of forming representation of mental states both to themselves and others (e.g. Fonagy & Bateman, 2008; Sharp & Fonagy, 2008; Fonagy & Luyten, 2009).

Moreover, the finding of the current study highlights that the mother's postpartum, rather than concurrent, mental state appeared to be more related to her capacity to mentalize. This key finding suggests the possibility of a "critical period" (i.e. within a child's first year) where presence of appropriate maternal mentalization could facilitate a child's development of mentalizing capacity, as young as seven months (Kovács, Téglás & Endress, 2010). Conversely, one could speculate that the absence of appropriate maternal mentalization in this "critical period" could cause disruptions to the "mentalization circuitries", whereby a child's opportunity to learn to appreciate him/herself and others as a psychological and intentional agents, as well as to build a secure attachment bond with his parent could be jeopardised (e.g. Fonagy & Bateman, 2008; Sharp & Fonagy, 2008; Laranjo, Bernier, Meins & Carlson, 2010; Meins et al., 2002, 2003). According to mentalisation theories, these

infants are theorised to be less likely to form a full self-structure that could in turn disrupt the parent-child interaction and cause subsequent challenges for the mother to be able to accurately mentalize with the child and thus further undermining the mother's opportunity to foster the development of the child's mentalizing capacity regardless of her concurrent mental state (Bateman & Fonagy, 2008). In other words, a mother's capacity to mentalize could be affected by both her sub-optimal postpartum mental state and/or the bi-directional nature of the mother-infant relationship where a mother's capacity to mentalize could partly be a reflection of a child's capacity to mentalize. These speculations could however be premature and further studies are therefore crucial to investigate these mechanisms proposed.

The current results also show that the two indices of MMM (appropriate mind-related comments and nonattuned mind-related comments at one year follow-up) are significantly related to different aspects of postpartum maternal psychopathology; mothers with postpartum maternal depressive symptomatology (measured by CES-D) were more likely to comment in a nonattuned manner on their infants' internal states, while mothers who reported a higher number of psychological symptoms on BSI were less inclined to comment appropriately on their infant's internal states. Although this could be a chance finding as the CES-D and the BSI are highly correlated ($r=0.265$, $p<0.001$), different correlates of the two indices of MMM may mean that these ways of being non-mind minded index different maternal behaviours and fewer appropriate mind minded comments and making nonattuned mind-related comments may reflect different underlying mechanisms. For instance, mothers with postpartum depression, possibly due to symptoms such as social withdrawal, were less likely to "tune in" to their infants' thought and feelings, and therefore result in lower level of appropriate mind-related comments (Murray, Kempton, Woolgar and Hooper's, 1993). On

the other hand, mothers who reported higher number of symptoms on BSI could be in any case more “preoccupied” by their own psychological experiences and were more likely to misinterpret their infants’ thoughts and feelings.

Limitations

As already mentioned, the main limitation in the current study was lack of statistical power. This was due to small PIP sample size, large numbers of dropouts and incomplete data collection. The current findings and interpretations are therefore only tentative suggestions and would need to be interpreted with caution. For instance, despite the longitudinal study design, the current data was analysed using cross-sectional methods (e.g. using partial correlations) and therefore cannot infer direct causal effects within the sample. This was due to the disappointingly low percentage (30%) of complete data (41 out of 120 mother-infant pairs) across all time points. For longitudinal data analysis (e.g. test of mediation and hierarchical log-linear analysis), the current sample size may have increased the chance of Type II error, where the lack of power may have attributed to the failure to detect a statistical relationship.

As a way to solve the issues of statistical power, the current sample combined participants from PIP RCT study and normative study. Although it offered a more reasonable number of mother-infant pairs within a certain infants’ age range required for the current study, this method of combining sample comes with serious limitations and requires careful considerations. As shown in the bivariate analyses, the two samples appeared distinctive when individual and sociodemographic factors were compared. This therefore posed risk to the current sample as being highly unrepresentative and the current finding can be undermined by numerous confounding variables that were difficult to account for.

The recruitment rate of 59% in a pool of 111 eligible participants of the PIP RCT study was disappointing (Figure 1). This could be explained by numerous factors such as refusal of psychotherapy and the wish of not being part of a research study. Unfortunately, there is no information on the demographics characteristics of participants who refused to participate as data was only collected after informed consent was sought and thus not possible to compare the non participants and those who were included in this study. This limited sample could have led to reduced variability within the data set due to self-section bias, causing the results to not be representative of the wider population who meet the eligibility criteria. Moreover, attrition and missing data could be due to individuals with current psychopathology not participating, resulting in a failure to follow up participants with more severe psychopathology and hence underestimating the effect of concurrent maternal psychopathology (Allot et al., 2006). Attrition analysis could therefore be useful in understanding the high rate of drop-out and refusal in the current study by identifying the level of postpartum psychopathology and demographics profile. Moreover, missing value analysis such as Missing Completely At Random test (Little, 1988) could have been useful in determining the nature and computing values for the missing data.

There are also other factors which have been related to the development of PPD that may be important when considering MMM. These factors were not included in the current study but may have contributed to the observed associations. This includes factors such as mothers' antenatal mental state and social support.

The current study relied solely on self-report measures in the assessment of maternal psychopathology. Although both CES-D and BSI are known to be acceptable measures of postpartum psychopathology, it is important not make direct inference towards diagnosed

postpartum illnesses such as postpartum depression. For example, as discussed in part one of this thesis, CES-D was developed for the use in general population; due to items that assess somatic symptoms of depression that resembles common experience of raising an infant, it is therefore susceptible to potential false positives when screening for depressive symptoms. Given the non-linear association found between maternal mentalization and psychopathology in the current study, it would appear that an association may only emerge with extreme scores, and more exploration is required in the future to clarify this. On the other hand, according to mentalization theory, participants with lower mentalizing capacity may score lower on measures of maternal psychopathology due to difficulties in identifying and labelling their own internal experiences (Fonagy & Luyten, 2009), masking the current analysis in understanding the actual differences between individuals with and without maternal psychopathology.

The MMM measured in this current study was based on free play videos where interactions took place in either the family's home or research centre. Although this lack of laboratory setting such as absence of use of standardised toys may more closely resemble real-life parent-infant interactions, it poses as an additional confounding variable of this study that was not considered in data analysis.

Future Research and Implications

Despite the limitations outlined above, the current study benefits from a longitudinal design with data collection across a one year period and a relatively large clinical and community sample size of mother-infant pairs including use of healthy controls. The current study therefore is a pilot longitudinal study in examining both postpartum and concurrent maternal psychological well-being in relation to parental mentalizing (MMM) capacity. It offers a

glimpse into the relationship of these variables and warrants further research to understand the role and consequences of the significance of maternal psychopathology in postpartum period. Further enquiry is warranted to understand the significance of what it appears to be a critical period for the presence of maternal mentalizing capacity period in order to examine the developmental psychopathology pathways and formation and transmission of attachment relationships as proposed by Sharp and Fonagy (2008).

Future longitudinal studies should seek for sufficient sample size across time points in order for casual effect of the relationship between postpartum maternal psychopathology and MMM to be explored and with more variables (e.g. attachment styles, maternal antenatal psychological well-being and social support) to be considered. Studies should also seek to include postpartum MMM data and multiple sources of information in studies of maternal psychopathology, such as use of formal diagnostic measures such as the Structured Clinical Interview with experienced clinicians, though this is not always feasible in research due to financial and time constraint.

The method of dichotomising data appeared to be useful in the current study and could be adopted in future research on MMM and/ or maternal psychopathology. For example, As mentioned previously, the use of nonattuned mind-related comments is possibly an uncommon phenomenon among mothers, where exceptionally skewed data often resulted in insignificant findings and hence consistently ignored by most MMM research to date (highlighted by Meins et al., 2011). The use of categorisation of nonattuned mind-related comments therefore appeared to be a meaningful and realistic way of capturing this MMM variable when compared to the use of percentage of total comments. Similarly, with significant results identified in only casenesses of maternal psychopathology but not that of

continuous variables (i.e. total scores) within the same measures of maternal psychopathology (CES-D and BSI), this suggests dichotomisation using clinical cut-offs scores of the measures may be more closely resemble the underlying conceptualisation of maternal psychopathology as being categorical and was therefore more sensitive in detecting a statistical effect.

In terms of clinical implications, the current findings propose an adverse effect of postpartum maternal psychopathology on parental mentalizing capacity. Early identification and intervention with mothers with postpartum mental illnesses is therefore paramount in improving long term parent-child relationship and child outcomes. This would include building upon existing postpartum routine screening during postpartum visits as recommended by NICE guidelines (2007) in primary care level through use of self-report measures such as the CES-D and BSI to inform onward referrals for assessments and interventions.

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Part 3: Critical Appraisal

Introduction

This section aims to consider in more depth the key issues raised in the literature review and empirical paper. Firstly, the background context of the choice of the thesis topic is presented. Secondly, some methodological issues that arose from joining two established research trials and conducting longitudinal studies are discussed. Lastly, broader issues relating to the research topic, including coding of maternal mind-mindedness (MMM) and the use of self-report measures in postpartum mental illnesses are discussed. In addition, personal reflections on the research process will be shared throughout the paper.

Background context

Prior to DClinPsy training, I worked as an honorary assistant psychologist in a mother and baby unit. This was an eye-opening experience that has given me invaluable insight into the experiences of mothers with severe and acute postpartum mental illnesses; the tremendous negative impact that the illness has on them, their loved ones and the early development of the child. It was particularly heart-wrenching to observe how postpartum mental illnesses can steal away some of the excitement and joy that a new mother feels and how mothers who were mentally ill could become so preoccupied and withdrawn that they are unable to interact and connect with their infant. This experience led me to reflect on Bowlby's (1969) attachment theory in terms of how our early experiences of relationships can leave a lifelong mark on our lives, guiding us to learn to appreciate others and ourselves as intentional agents whose behaviour is organised by thoughts, feelings, beliefs and desires (Sroufe, 1990). It was not until my DClinPsy training that I first came across the concept of mentalization; I was fascinated by Fonagy and colleague's developmental model on how individual difference in metacognitive capacity such as the parents' competences to interpret the mind of their own

infant could affect one's attachment security and the subsequent developmental trajectory (e.g. Fonagy, Gergely, Jurist & Target, 2004; Fonagy & Luyten, 2009). I was therefore thrilled to be given the opportunity to conduct my DCLinPsy research with the Anna Freud Centre with a hope that my thesis would facilitate a better understanding of the relationship between parental mentalization and maternal psychopathology.

Methodological Issues

Joining established research trials. As outlined in Appendix E Joint Working Statement, the current study adopted data and mother-infant free play videos from two larger research trials. There are numerous clear advantages of joining established research trials. First of all, through collaborating with researchers from an existing trial, I benefited from their expertise, approved ethics and access to a large and rich database. I have also saved time as the initial stages of literature searching, applying for research funding, ethical approval and recruitment can be a lengthy process. All these, together with the need to collect baseline and one year follow-up data as well as video codings, would not have been realistic and feasible within the timescale of a DCLinPsy project due to the amount of time and organisation required.

However, having my DCLinPsy project based on two larger established research trials also has its shortcomings. For instance, it took time for me to establish ownership over the project and to make sense of the existing research design. Given that elements of the designs and methodology were already fixed, a careful balance was required to weigh up my own research interests and to negotiate the boundaries between my study, the wider trial and the other trainee's research.

For example, in the first two years of my DCLinPsy training, I originally planned to investigate the relationship between maternal psychopathology and parent embodied mentalization (PEM; Shai, 2011; Shai and Belsky, 2011). Through my work experience mentioned above, I noticed that postpartum depressed mothers tended to have less physical contact with their infants. Even if they did, it was often displayed in a relatively cold and somewhat negative manner e.g. rough pulling, tickling and poking (Ferber, Feldman & Makhoul, 2008). I also observed that infants of depressed mothers tended to spend more time touching and exploring their own skin, an unusual phenomenon as research has suggested to be a way infants adapt to compensate for their lack of positive physical contact from their mothers (Hentel, Beebe & Jaffe, 2000; Herrera, Reissland & Shepherd, 2004). My research enthusiasm was hence fuelled by the recent neurological evidence that suggested of a distinction between implicit and explicit cognition in the field of mentalizing. Explicit mentalizing such as Reflective Functioning and Mind-Mindedness is typically an interpreted, conscious, verbal and active process, while implicit mentalizing, in contrast, is a faster process, that is perceived, nonconscious, nonverbal and unreflective (Lieberman, 2007; Fonagy and Luyten, 2009). Therefore, PEM as an exciting novel concept that focuses explicitly on the evaluation of the non-verbal quality of dynamic, moment-to-moment changes in kinesthetic mode, i.e. body movements during parent-infant interaction and focuses on the nonverbally determined implicit (automatic) mentalization appeared to be an exciting avenue to explore in my thesis topic.

Despite the seemingly brilliant set up and easy access to collected data, my project fell through due to my limited knowledge on the utility of PEM as a new measure as well as the culture of the team. Firstly, I initially had no direct contact with the research trial manager

and the originator of PEM, as the project was organised by another researcher within the Anna Freud Centre who preferred all enquiries to be initiated and screened by him. Secondly, being a DClinPsy trainee who is not a direct member of the research team or centre, I found it difficult at first to figure out the dynamics within the system and to assert my opinion on the inefficient communication style experienced. This way of working caused a lot of frustration and a lot of time was wasted on futile discussions. For example, it took my research partner and I 16 months with persistent effort to arrange training on PEM and by the time I was trained, I only then realised that each 10 minutes mother-infant free play interaction took both my research partner and I approximately six hours to code each initial video separately. Moreover, as a criterion set by the PEM originator, PEM required coders to get reliability by getting a certain percentage overlapping with the official coding on 10 practice videos and 10 reliability videos. However, perhaps due to the novelty of the measure, it seemed that the PEM originator was the only person who was proficient in the coding and therefore the process of waiting for feedback could yet again be another a lengthy process that was eventually felt to be impossible to achieve within the time scale of the DClinPsy thesis. On reflection, although it was perhaps rather difficult in this case as PEM remains a measure that is not published, I have learnt the need to have good time management and to be proactive in keeping track of my progress in accordance with a realistic research schedule. In some cases, this may include changing research topic. Moreover, just like working in any other workplace, it is important to spend time getting to know the research team, as well as their culture and structure to foster the most effective working relationship.

Data sharing. As previously mentioned, joining established research trials could include data sharing. This practice is cost-effective yet controversial as it is often criticised

for potential methodological and ethical concerns (Law, 2005). Using an existing database means that measures used in this current study were pre-determined and thus set the remit of the design of the current study. For example, the use of formal diagnostic tool such as DSM 5 to assess postpartum depression was not possible as only self-report measures were adopted. This limits the external validity of the study whereby results could only be generalised to postpartum depressive symptomatology as opposed to actual diagnosis. I was also unable to control for other variables such as antenatal depression and support which I discovered in my literature review as factors related to PPD and therefore could be possible mediators and moderators in the relationship between PPD and parental mentalization.

Another ethical concern that arose from data sharing was the issue of informed consent. The original consent and information form for both PIP RCT and normative studies were written with the main research focus on the effectiveness of parent-infant psychotherapy in mind. Participants from the two research trials were informed that their data would be handled by researchers in the team and to “help us in the future to provide the best services to other families with young children experiencing difficulties”(Appendix F) and understand “the nature and quality of early parent-infant relationships” (Appendix H). Whilst one could argue that the participants were not fully informed to what extent their data would be used, this is a dilemma commonly faced by researchers as it is often difficult to fully anticipate how the data may be used for secondary purposes and is especially difficult when relationships were not predictable at the time of original data collection (Dale, Arbor & Proctor, 1988). For instance, as stated in the empirical paper, there are only two papers to date that have examined the relationship between mind-mindedness and maternal psychopathology within the context of parent-infant relationships (Meins, Fernyhough, Arnott, Leekam & Turner,

2011; Pawlby, Fernyhough, Meins, Pariante, Seneviratne & Bentall, 2010) and both studies were conducted after the initial phase of the current research trials. Considering ethical practice's requirement for balancing use of data and protection of participations, the current study arguably improves the benefit/harm ratio by not bombarding participants with repeated assessments and therefore reducing burden on them, providing more opportunities to support these groups by allowing deeper, more accurate understanding of the interpretations of the data (Law, 2005; Hendrick, 1985; Dale et al., 1988).

Attrition rate. Attrition is one of the major yet common methodological problems in longitudinal studies (Fischer, Dornelas & Goethe, 2001). It poses as a significant problem in the current study as it reduces study power and generalizability. Given the large number of drop outs at follow-up, it was impossible to conduct within-subject statistical analysis meaning it was not possible to infer causal-effect in the current study. Although I have got a general idea of the possible reasons for the high attrition rate through my communications with the research trial manager, it was difficult to determine the actual reasons of missing data and/ or to conduct any attrition analysis to minimise any bias on the interpretation of the results due to limited qualitative records. This therefore accounts for possible sampling bias where participants took place and attended follow-up are more likely to be those with more stable lives (Fischer et al., 2001). On the other hand, maximising retention is a challenging issue, particularly for people with mental health issues (Davies, Evans, Fishman, Haley & Spielman, 2004). Studies on examining the determinants of improving completion rates in hard-to-reach population including participants with substance misuse and ex-prisoners had found continued and persistent contact via telephone calls to be the most useful in reducing attrition rate (David, Alati, Ware & Kinner, 2013; Kelschinsky, Bosworth, Nelson, Walsh &

Shaffer, 2009). This may include disproportionate time and effort involved in order to obtain follow-up data. Moreover, due to the nature of possible transient lifestyles of some participants, communication with collaterals could obtain the participants' most up-to-date information and/ or pass along messages could be one of the most useful ways to retain participants (Kelschinsky et al., 2009). Clearly, this way of improving retention rate requires considerations of confidentiality, while on the other hand more time and resources would be required to achieve an acceptable completion rate (70%). Future mother-infant studies that aim to improve rate of completion can therefore consider the budgeting and sample size issues in initial phase of research planning e.g. research proposal and funding application.

Wider Issues

MMM Coding. As detailed in the methodology in the empirical paper and statement of joint working (Appendix E), being independent coders who were not involved in recruitment and assessments also meant that my research partner and I could be truly blinded to the background of the participants to ensure objectivity of my coding and not influenced by my knowledge on their performance on other aspects of the assessments when watching videos of mother-infant interactions. There are however several points of consideration.

First of all, as discussed above, other parental mentalization measures such as reflective functioning, parent development interview and PEM may involve a requirement to be trained to obtain a certain percentage overlapping with the official coding to achieve independent reliability. This can take time and as mentioned, could be complicated with new measures where the originator's training availability might be limited. MMM, on the other hand, was disseminated on the internet and thus allows easy access for research use through detailed guidance in the coding manual (Meins & Fernyhough, 2010). Whilst this offers convenience

to fellow researchers, it may increase risk of reduced reliability when compared with the official coding of MMM. To address this, we attempted to resolve this issue by establishing inter-rater reliability with overlapping video codings by the two independent coders, a common practice that is acceptable in research field though some may argue for its labour intensive nature as two researchers is required.

Of the free play videos included in the current study, there were quite a number of English videos where my research partner and I felt that some mothers may not have been native English speakers. Nonetheless, I tried not to let this bias my coding. This however did not stop me from wondering if using a language that is not one's mother tongue could pose as a confounding variable to the measure of MMM. MMM is a parental mentalizing capacity that requires a mother's ability to understand and anticipate, thoughts, feelings and desires of her own and her child's mental state (Fonagy & Target, 1998). As a non-native English speaker myself, I would argue that it is one thing to be able to understand and interpret the underlying mental state of self and other, but it requires another set of skills and/or capacity to articulate the understanding into words in one's non-native language. As Fonagy and Luyten (2009) put it, MMM, as a type of explicit mentalizing capacity is an interpreted, conscious, verbal and active process and the difference between the native and non-native use of English would therefore be an area for exploration in future research.

Self-report measures. The use of self-report standardised measures of depression appears to be a common practice among studies of postpartum depression (PPD). This is in line with the current DSM-5 where PPD is defined as major depressive disorders with peripartum onset in pregnancy or within four weeks of delivery. Whilst sharing similarities to the clinical signs and symptoms of other variants of major depression, phenomenological

studies revealed unique aspects of PPD, such as the content of ruminations being found to be characterised by mothers' excessive concerns over the baby's health or feeding habits, their sense of inability to love, critical view of themselves as "bad", inadequate or unloving mothers, their ambivalence toward her infant, and contemplation of not only harming themselves but also their infants (Chalmers & Chalmers, 1986; Beck, 1992; Robinson & Stewart, 2001). Due to the distinct features of this group, it is important in research to continue to conceptualise PPD as a separate condition and as highlighted in the literature review, there is a generally lack of consensus in the use of measures in studies of adolescent PPDs. A thorough systematic review will therefore be useful to understand the utility of the different measures and to enable a universally effective screening tool for peripartum depression both for research and clinical use.

Concluding remarks

On a personal note, joining established research trials and research teams has facilitated my awareness of the possible role of organisational and cultural factors that shape the research process. Conducting the research alongside my DClInPsy training has reinforced my pre-existing interest in the subject area and I have learnt to appreciate the different challenges and rewards inherent in research including the need to flexibly adapt to research challenges.

Given the cost of running large research trials and developing large databases, this opportunity for me as a DClInPsy trainee to join these established research trials has broadened my research experience and the scope of my research questions while maximising resources by utilising data already collected. This has also given me a taster of what it might be like working as a qualified clinical psychologist in the NHS, where there is always a need

to legitimise spending by striking a balance between clinical practice and scientific research under the current financial climate.

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Appendices

Appendix A
Table of Summary of Studies in Literature Review

Table summary of studies in literature review

	Study, Country	Design	Setting, participants and sampling method	Factors examined (beyond demographics)
1.	Barnet, Joffee, Duggan, Wilson & Repke (1995), USA	Longitudinal: Third trimester of pregnancy, 2 weeks, 2 months and 4 months postpartum	125 adolescent mothers at third trimester of pregnancy; 114 adolescent mothers at 2 months postpartum; 108 adolescent mothers at 4 months postpartum; Volunteer sample from an adolescent pregnancy and parenting programme (Quasi-experimental design) Maternal age: 12-18 (Mean= 16.3, SD=1.3)	Maternal age, Antenatal depressive symptoms , Postnatal stress, Social Support
2.	Birkeland, Thompson & Phares (2005), USA	Cross-sectional: 2-12 months postpartum	149 adolescent mothers; Volunteer sample from 7 teen parent programmes in the greater Tampa Bay and St. Paul–Minneapolis areas (Quasi-experimental design) Maternal age: 15-19 (Mean: 17, SD: 1.03)	Ethnicity, Weight and appearance issues, maternal stress
3.	Caldwell , Antonucci, Jackson, Wolford & Osofsky (1997); USA	Cross-sectional: 3 months postnatal	48 first-time adolescent mothers and their mothers (N=48), adolescent mothers’ fathers (N=39) were interviewed based on availability; Volunteer sample from adolescent health clinics and three local high schools (Part of a study of the mental health consequences of family transitions to Early Childbearing Project) Maternal age: 14-19, Mean 17.4, SD: 1.49)	Ethnicity, Psychological closeness, perceived level of conflict
4.	Caldwell, Antonucci & Jackson (1998); USA	Longitudinal: 3 & 12 months postpartum	83 grandmother-teenage mother dyads; Volunteer sample from adolescent health clinics and three local high schools (Part of a study of the mental health consequences of family transitions to Early Childbearing Project) Maternal age: 14-19, Mean: 17.17, SD: 1.44	Ethnicity, Maternal age, Psychological closeness, Social network, Perceived conflict in mother-daughter relationship, Family economic status

5.	Cox, Buman, Valenzuela, Joseph, Mitchell & Woods (2008), USA	Cross sectional: 2 weeks postpartum	168 adolescent mothers; Volunteer sample (Part of a parenting programme (Teen Tot); Quasi-experimental design Maternal age range: <19, (Mean age= 17.6, SD=1.2)	Self-esteem, Caretaking ability, Perceived positive parenting, Social support
6.	deCastro, Hinojosa-Ayala & Prado (2011), Mexico	Cross-sectional data collection- up to 9 months postpartum	81 adolescent mothers, maternal age 14-19 years; 217 adult mothers, maternal age 20-43 years; Volunteer sample recruited in routine consultations in (postnatal) Paediatric Units in Mexico Two age groups: Adolescent mothers maternal age 14-19 years (Mean= 17.5, SD= 1.25); Adult mothers maternal age 20-43 years (Mean= 27.28, SD= 5.49)	Perceived social support, Gender of the baby
7.	Edwards, Thullen, Isarowong, Shiu, Henson & Hans (2012), USA	Longitudinal: third trimester of pregnancy and at 4, 12, and 24 months postpartum	248 adolescent mothers at third trimester, 221 adolescent mothers at 4 months, 219 adolescent mothers at 12 months and 197 adolescent mothers at 24 months postpartum; Volunteer sample from prenatal clinics (Part of Community-based- doula home-visiting intervention RCT) Maternal age range: 14-21 (Mean age: 18.3, SD=1.7)	Support from parent figure, Support from infant's father, Subsequent pregnancy, Current relationship status with infant's father
8.	Fagan & Lee (2010), USA	Longitudinal: Between 5 & 9 months pregnant, 3 months postnatal	100 adolescent mothers; Volunteer sample from OB/GYN hospital clinics (Part of the Adolescent Father Involvement Intervention Project [AFIIP] RCT study) Maternal age range: 13-19 (Mean age= 17.26, SD= 1.67)	Antenatal depressive symptoms, Competence, Stress, Perceived support of infant's father, Perceived conflict in couple relationship
9.	Figueiredo, Pacheco & Costa (2007); Portugal	Longitudinal: During pregnancy (gestational age 24-36 weeks); 2-3 months postpartum	54 adolescent mothers (≥ 18 years of age) and 54 (19-40 years of age) adult mothers; Stratified random sample recruited from routine medical appointment at the Julio Dinis Maternity Hospital (MJD, Porto, Portugal) Maternal age: ≤ 18 , (mean age & SD not reported)	Maternal age, Antenatal depressive symptoms , Socio-demographic data only

10.	Hudson, Elek an Campbell-Grossman (2000) USA	Cross-sectional: Demographic data at 9 months pregnancy, other measures administered at 3 months postpartum	21 adolescent mothers; Volunteer sample from primary health care practices (Part of New Parents Project) Maternal age: 15-19 (Mean= 18, SD= 11.4)	Self-esteem, Loneliness, Social Support
11.	Kalil, Spencer, Spieker & Gilchrist (1998); USA	Longitudinal data, cross-sectional data analysis: Pregnancy, 6months, 18months and 30 months	225 unmarried adolescent mothers; Volunteer sample via flyers advertisement in public and private hospital prenatal clinics, students from public school alternative programs, and clients social service agencies in three urban counties surrounding Seattle, Washington Maternal age: 15-17, Mean: 16.5, SD: not reported)	Maternal age, Family closeness, Adolescent-grandmother conflict, coresidence
12.	Logsdon, Birkimer, Simpson and Looney (2005); USA	Experimental, RCT Pamphlet treatment group; Video treatment group ; Pamphlet plus video group; control group Longitudinal: 32 to 36 weeks pregnant and 6 weeks postpartum	128 adolescent mothers at baseline (32-36 weeks pregnant), 109 adolescent mothers at 6 weeks postpartum telephone interview by a different research assistant; Volunteer sample from alternative public school for pregnant and parenting adolescents (Part of a social support intervention RCT study) Maternal age: 13-18 (mean= 16, SD= 1.3)	Support, Self-esteem
13.	Meltzer-Brody, Bledsoe-Mansori, Johnson, Killian, Hamer, Jackson, Wessel & Thorp (2013) , USA	Longitudinal: Pregnancy (second or third trimester) and 6 weeks postpartum	187 adolescent mothers with complete data across all time points; Volunteer sample recruited from 212 consecutive adolescent presenting for care at Public Prenatal Clinic (low-risk urban health department obstetrical clinic) in a 2-month period Maternal age range: 12-20 (mean age: 18.3, SD= not reported)	Antenatal depressive symptoms, Trauma history, Social support, Social adjustment, Social support from infant's father, Life stressors, Self-efficacy expectancies, Relationship with baby

14.	Nune& Phipps (2012); USA	Retrospective for prenatal factors- not used in this review due to exclusion criteria; Prospective for postpartum factors Cross-sectional data collection point at 4 months postpartum Longitudinal: Postnatal report average 4 months postnatal (range from 21 days postpartum to 10 months postpartum)	676 adolescents age 15-19; 1387 young adults age 20-24; 1735 adult age 25-29; 3161 adults age over30; Stratified random sample via postal survey (Retrospective cohort study using data from the Rhode Island Pregnancy Risk Assessment Monitoring System [PRAMS]) Four age groups: Adolescent maternal age range: 15-19 (mean age & SD not reported) Young adults age range: 20-24 (mean age & SD not reported) Adult age 25-29 (mean age & SD not reported) Adults age over30 (mean age & SD not reported)	Ethnicity, Maternal mobility (prior depression, hospitalisation and length of stay); Neonatal outcomes (birth defects, NICU, infant is alive, infant is living with mother, birth weight), social support, pregnancy intention,
15.	Panzarine, Slater & Sharps (1995); USA	Cross-sectional: 6 months postpartum	50 adolescent mothers; Volunteer sample (Part of a larger study on coping with the transition to motherhood among primiparous adolescents enrolled in a university-affiliated adolescent prenatal clinic) Maternal age: 13-18 (Mean: 15.5, SD not reported)	Maternal age, Social support, Coping with motherhood, Satisfaction with supportive behaviour, Conflicted social network, Feeling and enjoyment about new parenting role, Maternal confidence,
16.	Schmidt, Wiemann, Rickert and Smith (2006); USA	Longitudinal: 3, 12, 24 and 48 months postpartum	623 within 48 hours of delivery; N= 601 at 3 months follow-up; N= 592 at 12 months follow-up; N=593 at 24 months follow-up and N=554 at 48 months follow-up; Volunteer sample recruited (unspecified method) from the Obstetrics service at University of Texas Medical Branch-Galveston. (Part of a larger study of substance use among pregnant and parenting adolescents.) Maternal age: 13-18, (Mean 16.8, SD=1.17)	Ethnicity, Satisfaction of support received from family members, Economic resources, Intimate partner violence, Family violence, Tobacco or alcohol use

17.	Secco, Profit, Kennedy, Walsh, Letourneau & Stewart (2007), Canada	Longitudinal: Third trimester and 4 weeks postpartum	78 adolescent mothers with complete data across all time point recruited from Adolescent obstetric clinic in two teaching hospitals in Winnipeg, Manitoba over a 24 months period. Maternal age range: range of 5 years (mean age: 16.79, SD=1.79)	Enacted social support
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Appendix B
Assessment Criteria for Quality Assurance Checklist
(Kmet, Lee & Cook, 2004)

Assessment criteria of Quality Assurance Checklist (Kmet, Lee & Cook, 2004)

Item number	Criteria
1	Question / objective sufficiently described?
2	Study design evident and appropriate?
3	Method of subject/comparison group selection or source of information/input variables described and appropriate?
4	Subject (and comparison group, if applicable) characteristics sufficiently described?
5	If interventional and random allocation was possible, was it described?
6	If interventional and blinding of investigators was possible, was it reported?
7	If interventional and blinding of subjects was possible, was it reported?
8	Outcome and (if applicable) exposure measure(s) well defined and robust to measurement / misclassification bias? Means of assessment reported?
9	Sample size appropriate?
10	Analytic methods described/justified and appropriate?
11	Some estimate of variance is reported for the main results?
12	Controlled for confounding?
13	Results reported in sufficient detail?
14	Conclusions supported by the results?

Scoring: Yes = 2; Partial = 1; No = 0

Reference:

Kmet, L., Lee, R., & Cook, L. (2004). Standard quality assessment criteria for evaluating primary research papers from a variety of fields. *Alberta Heritage Foundation for Medical Research*.

Appendix C

Quality of Studies Analysis

Assessment of Quality of Studies using Quality Assurance Criteria (Kmet, Lee & Cook, 2004)

Reference	Quality Assurance Criteria											Total Score (%)
	1	2	3	4	8	9	10	11	12	13	14	
Barnet et al. (1995)	2	2	1	2	2	2	2	2	0	1 ^c	2	81.82%
Birkeland et al. (2005)	2	2	1	2	2	2	2	2	N/A	2	2	95%
Caldwell et al. (1997)	2	2	1	2	1	1	2	0	N/A	2	1 ^g	70%
Caldwell et al. (1998)	2	2	1	2	2	1	2	0	2	2	2	81.82%
Cox et al. (2008)	2	2	1	2	2	2	1 ^a	2	N/A	2	2	90%
deCastro et al. (2011)	1	2	1	2	2	2	2	2	2	2	2	90.90%
Edwards et al., 2012	2	2	1	2	2	2	2	2	2	2	2	95.45%
Fagan & Lee (2010)	2	2	1	2	1	2	2	2	2	2	2	95.45%
Figueiredo et al. (2007)	2	2	1	2	1	1	2	2	2	2	2	86.36%
Hudson et al. (2000)	2	2	1	2	2	1	2	0	N/A	2	2	80%
Kalil et al. (1998)	2	2	1	2	2	2	2	0	2	2	2	95%
Logsdon et al. (2005)	2	2	1	2	2	1	1 ^b	1	2	2	2	72.72%
Meltzer-Brody et al. (2013)	2	2	2	2	2	2	2	2	0	2	2	90.91%
Nune & Phipps (2012)	2	2	2	2	2	2	2	2	2	1 ^d	2	95.45%
Panzarine et al. (1995)	2	2	1	2	2	1	2	0	N/A	2	2	80%
Schmidt et al., (2006)	2	2	2	2	2	2	2	2	2	1 ^e	2	95.45%
Secco et al. (2007)	2	2	1	2	2	1	2	2	2	1 ^f	1 ^f	81.82%

Note: **Coding: 2= all specified criteria are met, 1= specified criteria are partially met, 0= none of the specified criteria was met**

^aCox et al. (2008)- Used hierarchical regression but named as stepwise regression in their statistical analysis for moderating effect. The statistical analysis was however conducted correctly.

^bLogsdon et al., (2005)- No description of how path analysis was conducted.

^cBarnet et al. (1995)- Missing statistics and data for some of the results presented on result section: association between increased PPD symptoms and reporting the receipt of material support from the infant's father was more pronounced if the teen mother reported high stress.

^dNune & Phipps (2012)- Some reporting of relevant statistics is not presented e.g. only odd ratios were reported in the association between different risk factors and PPD symptoms using weighted logistic regression .

^eSchmidt et al., (2006)- Cumulative depressive symptoms were described but data was not presented

^fSecco et al. (2007)- Lack of sufficient report of correlation results between different types of support and PPD symptoms. Significant relationship between enacted emotional and information support and PPD symptoms reported in discussion section were not presented in the results section.

^gCaldwell et al., (1997)- Estimate of variance was not reported but was mentioned in discussion as a possible explanation of mother-daughter relationship

Appendix D
Measures of social support used in studies

Measures of social support used in studies

Measures N= number of studies using measure	Type of Social support	Number of items	Domains, description and/or example of items	Population on which originally developed	Adaptation
Standardised measures of social support:					
Paternal Childcare Scale (Hossain and Roopnarine 1994) N=1	Perceived support	15	Mother's perception of the extent to which fathers instrumental support e.g, holding the baby during play and changing the baby's diaper.	Originally developed for American-African fathers, it was subsequently validated with adolescent parents by Fagan et al. (2007)	Fagan & Lee (2010) used 13 out of 15 items of the scale, as deemed age inappropriate
Duke-UNC Functional Social support (Broadhead et al., 1988) N=2	Perceived social support	7	Mother's perception of access to functional and emotional support, rated in a scale from "I get much less than I would like" to "I get as much as I would like" Social support was classified as present if the mean value was 4.27 This measure has been well tested in multiple	Family practice populations	DeCastro et al. (2011) used translated and validated Mexican version (Pina & Rivera, 2007)
Medical Outcomes Surveys (MOS) (Sherbourne & Stewart, 1991) N=1	Perceived social support	50	Focus on perceived functional support (e.g. the degree to which interpersonal relationships serve particular functions)	Medical doctors	N/A
Social Adjustment Self-	Perceived social functioning and	9	6 domains of social support; work/school; social/leisure;	Psychiatric patients	Meltzer-Brody et al. (2013) used social/Leisure subscale only

report (SAS-SR) Scale (Weissman & Bothwell, 1976; Weissman et al., 1978) N=1	satisfaction with support in the last 2 weeks		relationship with extended family; marital relationship' parenting role, family unit function		
Dads' Active Disease Support scale (DADS) (Collins et al., 1993; Turner, Grindstaff & Philips, 1990) N=1	Received and perceived support Satisfaction with support	24	Mother's ratings of their male partner's involvement in specific illness management tasks, such as provision of instrumental and emotional support Additional questions address how often the father had disappointed the mother or was critical or short tempered, and the final item assesses overall satisfaction with support from the baby's father.	Adolescent population	Meltzer-Brody et al. (2013) used only 8 items.
Perceived Social Support From Family (PSS-Fa) (Procidano & Heller, 1983) N=1	Perceived support	20	Measure perception of adequacy of support, information, and feedback from family; questions such as "My family enjoys hearing about what I think. "	College students	N/A
Perceived Social Support from Friends (PFF-Fr) (Procidano & Heller, 1983) N=1	Perceived support	20	Measure perception of adequacy of support, information, and feedback from friends; questions such as "My friends give me the moral support that I need".	College students	N/A
Inventory of	Received support	40	Frequency of instrumental and	College students	N/A

Socially Supportive Behaviours (ISSB) (Gottlieb, 1978)	during the previous month		emotional support received		
N=1					
Postpartum Support Questionnaire (Logsdon, 2002)	Perceived and received support	34	The instrument is used in pregnant women to predict what type of support they anticipate will be important to them in the postpartum period and what support they predict they will receive. In the postpartum period, women indicate what support actually was important to them and what support they received. 4 domains of support: instrumental, emotional, informational and comparison support	Pregnant women	N/A
N=1					
Social Support Questionnaire (SSQ) (Sarason, Levine, Bashan & Sarason, 1983)	Perceived number of social support Satisfaction with support	6	List the people they can rely on for support in a given set of circumstances, and indicate overall level of satisfaction with the support provided	College students	Hudson et al. (2000) used a 6-item short form
N=1					

Non-standardised measures of social support

Rhode Island Pregnancy Risk Assessment Monitoring System (RI PRAM), modified version of Patient Health Questionnaire-2 (Nune& Phipps, 2012)	Received support	5	“Since you delivered your baby, would you have the kinds of help listed below if you needed them?” Areas of social support that were assessed in the PRAMS questionnaire included “someone to loan \$50”, “help when sick and needed to be in bed”, “someone to talk to about problems”, “someone to help if I were tired and feeling frustrated with my new baby”, and “someone to take me and my baby to the doctor’s office if I had no other way of getting there”	N/A	N/A
Received support from parent figure and father of the baby (Edwards et al., 2012)	Received support on the past 3 months	5	Frequency of parents and father of the baby provided informational, instrumental and emotional support	N/A	N/A
Questionnaire based on Barerra’s Arizona Social Support	Source of support and conflict Perceived support	Unclear	Perceived support in 4 domains: emotional, tangible and cognitively supports, and social reinforcement.	N/A	N/A

Interview Schedule (ASSIS) (Barnet, Joffe, Duggan, Wilson & Repke, 1995)	and conflict Satisfaction of these supportive behaviour		Conflicted social network was measured using Barrera's method of ascertaining conflicted network size. This consisted of the number of people named by the adolescent as having provided a supportive activity during the past month who were also identified as sources of conflict during this time.		
N=1					
Perceived positive support from family members (Schmidt et al., 2006)	Perceived positive support	Unclear	Type of support: unclear	N/A	N/A
N=1					
Coparental Cooperation Measure (Ahron, 1981)	Perceived support prenatally and 3 months postpartum	4	Mothers' perception of father's emotional and instrumental support, e.g. "Did he comfort you," "Did he help you get to the baby's doctor", "Did he help you solve your problems as a new parent"and "Did he buy things for the baby?"	Divorced couples	N/A
N=1					
"How involved are you during the pregnancy" instrument (Fagan et al. 2007)	Satisfaction with support Received support	7	Mother's satisfaction with father's prenatal involvement, by indicating father of the baby participation in various prenatal activities such as OB/GYN visits, planning for the baby and interacting with the baby prenatally	N/A	N/A
N=1					

Mother's satisfaction with the amount of time her partner spends with her prenatally and at follow-up (Fagan & Lee, 2010)	Satisfaction with father's involvement	4	Assess mother's satisfaction with the amount of time her partner spends with her and/or the baby prenatally and postnatally	N/A	N/A
N=1					

Appendix E
Outline of Joint Working

Outline of Joint Working

As stated on the overview and methodology section on Volume 1 Part 2, this project was conducted as part of two larger studies. Study 1: A randomised-controlled trial considering the effectiveness of Parent-infant Psychotherapy (PIP) for a clinical sample of mother-infant pairs and Study 2: An affiliated normative study with mother-infant pairs with matching demographic profile. This project was also carried out jointly with another Trainee Clinical Psychologist, Katie Colbeck, who examined reflective functioning and attachment security. The bullet points below outline the nature of the relationship between the current study and these three projects:

PIP RCT Trial (2007) and Normative Study (2009)

- A relationship was established with the Anna Freud Centre where the both research trials took place
- Supervisors agreed that trainees' research projects were covered under ethics approval already granted for both research trials and therefore a new ethics application was not required.
- Data was recorded on the research trials' SPSS databases and copied onto on separate databases for each trainee's individual use.
- Videos were recorded by researchers working on the studies and copied onto a secure portable hddisk for trainees' coding under confidentiality agreement (Appendix L).

Work in conjunction with other trainee (Colbeck, 2014)

- Video coding and data recording for the current study were conducted jointly with another trainee sharing the same sample. Both trainees were equally involved in each of these stages.
- All theoretical conceptualisation, data analysis and write-up were conducted independently and the focus of the studies was different.

References:

Colbeck, K. (2014). Maternal mentalization: do online and offline measures independently predict attachment security? Unpublished manuscript.

Fonagy, P., Sled, M. & Baradon, T. (2007). Randomized controlled trial of parent infant psychotherapy. Unpublished research protocol. The Anna Freud Centre, London.

Sled, M. (2009). Understanding early parent infant relationships. Unpublished research protocol. The Anna Freud Centre, London.

Appendix F

Parent-infant Psychotherapy Randomised-controlled Trial Information Sheet for Participants

Participant Information Sheet

A study of psychological help for mothers with young babies

You are being invited to take part in a research study. This information sheet is to answer some of your questions and to help you decide if you want to take part.

1. What is the purpose of the study and why have I been chosen?

We understand that you and your doctor/ health visitor/ or other professional have spoken about some concerns about how you are feeling, or how your baby is doing. This study will compare a service called parent-infant psychotherapy with the services that are normally offered in your area. Parent-infant psychotherapy is a psychological service for mothers and babies together. We would like to see how well it works compared to the services that are usually available. This study will help us to find out in what ways these different services will benefit different families.

2. Do I have to take part?

No, it is up to you to decide whether or not to take part. If you decide to take part you are still free to change your mind at any time and without giving a reason. A decision to pull out of the study at any time will not affect the standard of care you receive. If you would like to receive treatment but not take part in the study, the person who has referred you (such as your GP or health visitor) can discuss the treatment options with you.

3. What will I have to do if I take part?

If you decide to take part in the study, a researcher will see you and your baby together. This can be done either at the place where you were referred from, at the Anna Freud Centre, or in your home, whichever you prefer. During these interviews, you will be asked some questions about how you think you and your baby are doing and you will complete some questionnaires with the researcher.

Sometimes we might find out from this first interview that the study is not quite right for some mothers and babies. If this happens, the researcher will discuss this with you and you will not be included in the study. If you do still wish to receive some kind of help, you can discuss other options with the person who referred you to the study.

If you the study is suitable for you and it's something you are interested in doing, you will either receive parent-infant psychotherapy or you will receive what we call "treatment as usual". If you are placed in the "treatment as usual" group, you will continue to receive the care/treatment you have from your GP, health visitor, mental health team, psychiatrist, etc. If you are in the "parent-infant

psychotherapy group”, you will be offered appointments with a parent-infant psychotherapist in addition to the services you already use.

Because we don't know which of the two types of treatment is better for which people, we need to place people to both types of treatment and then compare the groups. The type of treatment group you are placed in will be done by a computer and you have a 50:50 chance of being in either group. You will not be able to choose which treatment group you go to. Once you have been placed in one of the two groups, the research psychologist will let you know which one you will be receiving.

By taking part in the study you and your child will be seen by a researcher 3 times in one year. The researcher will complete a set of questionnaires with you about how you are feeling, what it's like for you to be a parent, and about your experience of services you have used. We will also do a simple assessment of your baby's development by playing some games with him or her, and we will video-record you and your baby spending time together for a little while. At the 12 month follow-up we will ask you and your child if you would be willing to do an experiment which involves you and your child being together and then separating for short time periods so that we can see how these separations are for your child. This is voluntary and it will be up to you if you would like to do it or not. These research assessments will probably take between one-and-a-half to two-and-a-half hours at each time point.

4. Will it be difficult to do?

Parents usually find the questionnaires quite interesting, and talking over their relationship with their baby is often enjoyable or helpful. Finding that problems have improved in later assessments is good to know. The babies enjoy the simple tests (which are like the ones doctors use in Well Baby Clinic checks), and their parents enjoy seeing what their baby can already do.

5. What are the possible disadvantages and risks of taking part?

Sometimes the questionnaires and interviews used in this study can be a bit upsetting because they include asking about any problems you are having. However, this would probably be no more difficult than when you discussed the same things with your doctor or health visitor. It does take some time (about two hours at three different time points), and that might be difficult if you are very busy.

6. What are the possible benefits of taking part?

The study gives you the chance to be offered help with any problems you have for yourself and your baby. Both parent-infant psychotherapy and the community services that are normally offered have been very helpful for many parents and children. Also, the information we get from this study will help us in the future to provide the best services to other families with young children experiencing difficulties. So if you take part you will know that you are making a difference for others like you.

7. **What if something goes wrong?**

If you are not happy with anything about the research or if you want to talk to somebody about the study, you may contact any of the people listed at the end of this information sheet.

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

The information you give will be kept very private. We make sure of this by keeping the questionnaires and videotapes locked away, and we will not write your name or any other personal details on any of these. All personal information you give us will remain locked away and then destroyed after 5 years. When we report the results of the study, we will not include any personal details about any of the families that took part so that they can be recognised. Only the research staff will be able to look at the information you give us. Your General Practitioner will be sent a letter saying that you have agreed to take part in the study and which treatment group you have been put in. However, your doctor and practice staff will not need to be told about your assessments or what is discussed in the therapy, except in very rare cases if there is serious risk to you or your baby, which is not already known to your doctor. If that happened, of course we would talk to you about this as well as to your doctor.

9. **Who is organising and funding the research?**

This study is being conducted by the Anna Freud Centre and has been funded by the Big Lottery Fund. The study has been approved by a local research ethics committee.

10. **Contact for Further Information**

If you would like further information about the study, you can contact the Research Psychologist:

Michelle Slead

Anna Freud Centre

21 Maresfield Gardens

NW3 5SD

Telephone: 020 74432216 Email: Michelle.Slead@annafreud.org

Or you could contact the Chief Investigator of the study:

Prof Peter Fonagy

Anna Freud Centre

21 Maresfield Gardens

NW3 5SD

Telephone: 020 76795960 Email: P.Fonagy@ucl.ac.uk

Thank you for your time.

Appendix G

Normative Parent-infant Relationship Trial Information Sheet for Participants

Information Sheet for in Research Studies

(define target group i.e. Parent/Guardian/Child/Teacher)

You will be given a copy of this information sheet.

Title of Project:

The nature and quality of early parent-infant relationships in a normative population.

This study has been approved by the UCL Research Ethics Committee [Project ID Number]:

Name, Address and Contact Details of Investigators:

Prof Peter Fonagy

Anna Freud Centre

21 Maresfield Gardens

NW3 5SD

Telephone: 020 76795960

Email: P.Fonagy@ucl.ac.uk

Michelle Slead

Anna Freud Centre

21 Maresfield Gardens

NW3 5SD

Telephone: 020 74432216

Email: Michelle.Sleed@annafrued.org

We would like to invite to participate in this research project.

(i.e. you or your child)

You should only participate if you want to; choosing not to take part will not disadvantage you in any way. Before you decide whether you want to take part, it is important for you to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information.

Details of the Study:

This research will be carried out to examine in more detail the nature and quality of early parent-infant relationships in a normative population. We are currently collecting data from high risk and clinical populations of mothers and babies. This project will allow us to collect data from a non clinical population in order to compare. We are recruiting a sample of mothers and babies from mother-baby groups, clinics and children's centres and those mothers that chose to take part will be interviewed and asked to complete a set of questionnaires about how they are feeling, about their baby and about the relationship between them. We will also video record the mothers and babies playing together to assess the quality of parent-infant interaction.

It is entirely up to you to decide whether or not to take part. If you decide to take part you are still free to change your mind at any time and without giving a reason. A decision to pull out of the study at any time will not affect the standard of care you receive and you may withdraw your data from the project at any point up until it is transcribed for use in the final report. If you would like to access services but not take part in the study, the researcher you are in contact with can discuss the service options with you.

If you decide to take part in the study, a researcher will see you and your baby together. This can be done either at the Anna Freud Centre, or in your home, whichever you prefer. During these interviews, you will be asked some questions about how you think you and your baby are doing and you will complete some questionnaires with the researcher.

By taking part in the study you and your child will be interviewed by a researcher 3 times in one year.

The researcher will complete a set of questionnaires with you about how you are feeling and what it's like for you to be a parent. We will also do a simple assessment of your baby's development by playing some games with him or her, and we will video-record you and your baby spending time together for a little while. At the 12 month follow-up we will ask you and your child if you would be willing to do an experiment which involves you and your child being together and then separating for short time periods so that we can see how these separations are for your child. This is voluntary and it will be up to you if you would like to do it or not. These research assessments will probably take one-and-a-half to two hours at each time point. If you decide to take part you will be given this information sheet to keep and be asked to sign a consent form.

There are some disadvantages and risks of taking part, for example the questionnaires and interviews that will be used may be a bit upsetting because they include asking about any problems you are having. However the researchers carrying out the interviews will be trained and supervised in carrying out the interviews in a sensitive manner. The research team will also be able to put you in touch with the services and supports available in your area, should you need further support. In addition, it does take some time (about two hours at three different time points), and that might be difficult if you are very busy.

However, many parents find the opportunity to talk about their feelings about their baby and parenthood very helpful. Also, they often find the developmental assessments with their baby very interesting as they learn what the expected developmental milestones are. As we will be following these families up for a year, they find it interesting to see how things change for them over time.

The information you give will be kept very private. We make sure of this by keeping the questionnaires and videotapes locked away, and by only writing your assigned identity number not your name or any other personal details on these. Videos of mothers and infants will also be labelled with identity numbers and will be stored in a locked cabinet. All electronic data will be strictly anonymous and password protected. When we report the results of the study, we will not include any personal details about any of the families that took part so that they can be recognised. Only the research staff will be able to look at the information you give us.

It is up to you to decide whether to take part or not. If you decide to take part you are still free to withdraw at any time and without giving a reason.

All data will be collected and stored in accordance with the Data Protection Act 1998.

Appendix H

Parent-infant Psychotherapy Randomised-controlled Trial Consent Form for Participants

Patient Identification Number:

CONSENT FORM

A study of psychological help for mothers with young babies

Name of Researchers: Peter Fonagy, Mary Target, Michelle Slead

Please initial box

1. I confirm that I have read and understand the information sheet dated 11/2008 (version 5) for the above study and have had the opportunity to ask questions.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.
3. I understand that I will be videotaped with my baby as part of the research.
4. I agree for myself and my baby to take part in the above study.
5. I agree for the video of play with my baby to be used for teaching professionals about baby development and behaviour (optional).

Name of Parent

Date

Signature

Name of child

Researcher taking consent

Date

Signature

1 for patient; 1 for researcher; 1 for referring professional

Appendix I

Normative Parent-infant Relationship Trial Consent Form for Participants

Informed Consent Form for in Research Studies

(define target group i.e. Parent/Guardian/Child/Teacher)

Please complete this form after you have read the Information Sheet and/or listened to an explanation about the research.

Title of Project: **The nature and quality of early parent-infant relationships in a normative population.**

This study has been approved by the UCL Research Ethics Committee [Project ID Number]:

- Thank you for considering to take part in this research. The person organising the research must explain the project to you before you agree to take part.
- If you have any questions arising from the Information Sheet or explanation already given to you, please ask the researcher before you decide whether to join in. You will be given a copy of this Consent Form to keep and refer to at any time.
- I understand that if I decide at any other time during the research that I no longer wish to participate in this project, I can notify the researchers involved and be withdrawn from it immediately without penalty and without affecting the standard of care I receive.
- I consent to the processing of my personal information for the purposes of this research study. I understand that such information will be treated as strictly confidential and handled in accordance with the provisions of the Data Protection Act 1998.

Participant's Statement

Iagree that the research project named above has been explained to me to my satisfaction and I agree to take part in the study. I have read both the notes written above and the Information Sheet about the project, and understand what the research study involves.

Signed:

Date:

Researcher's Statement

I confirm that I have carefully explained the purpose of the study to the participant and outlined any reasonably foreseeable risks or benefits (where applicable).

Signed:

Date:

Appendix J

Parent-infant Psychotherapy Randomised-controlled Trial Ethical Approval

Camden & Islington Community Local Research Ethics Committee

Room 3/14
Third Floor, West Wing
St Pancras Hospital
4 St Pancras Way
London
NW1 0PE

25 May 2005

Prof Peter Fonagy
Chief Executive
Anna Freud Centre & University College London
21 Maresfield Gardens
London
NW3 5SD

Dear Prof Fonagy

Full title of study: *Helping parents with mental health problems to parent young infants: A randomised controlled trial of Parent-Infant Psychotherapy (PIP)*

REC reference number: 05/Q0511/47

Protocol number:

Thank you for your letter of 13 May 2005, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair and Ms Gillian Miles.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised.

The favourable opinion applies to the research sites listed on the attached form.

Conditions of approval

The favourable opinion is given provided that you comply with the conditions set out in the attached document. You are advised to study the conditions carefully.

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document Type:	Version:	Dated:	Date Received:
Application	1	23/02/2005	25/02/2005
Investigator CV	1	23/02/2005	22/03/2005
Protocol	1	23/02/2005	25/02/2005
Covering Letter	1	23/02/2005	25/02/2005
Summary/Synopsis	2	13/05/2005	17/05/2005
Compensation	1	20/07/2004	25/02/2005

Arrangements			
Interview Schedules/Topic Guides	1 - Family Background Interview	23/02/2005	25/02/2005
Interview Schedules/Topic Guides	1 The Therapy Experience Interview	23/02/2005	22/03/2005
Copy of Questionnaire	Social Support Questionnaire		22/03/2005
Copy of Questionnaire	GHQ-28		22/03/2005
Copy of Questionnaire	Pearlin and Schooler Mastery Scale		22/03/2005
Copy of Questionnaire	Appendix N CES-D		22/03/2005
Copy of Questionnaire	BSI 18		22/03/2005
Copy of Questionnaire	BSI		22/03/2005
Copy of Questionnaire	PSI		22/03/2005
Copy of Questionnaire	1 - Child Health Record Review	23/02/2005	25/02/2005
GP/Consultant Information Sheets	1	18/02/2005	25/02/2005
Participant Information Sheet	2	13/05/2005	17/05/2005
Participant Consent Form	2	13/05/2005	17/05/2005
Response to Request for Further Information		13/05/2005	17/05/2005
Referrer Information Sheet	2	13/05/2005	17/05/2005
Inclusion/Exclusion	2	13/05/2005	17/05/2005
Referral Consent Form	1	23/02/2005	25/03/2005
GP letter	1	23/02/2005	22/03/2005
Grant Offer Letter		20/07/2004	23/03/2005

Management approval

The study should not commence at any NHS site until the local Principal Investigator has obtained final management approval from the R&D Department for the relevant NHS care organisation.

Membership of the Committee

The members of the Ethics Committee who were present at the meeting are listed on the attached sheet.

Notification of other bodies

The Committee Administrator will notify the research that the study has a favourable ethical opinion.

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

05/Q0511/47

Please quote this number on all correspondence
--

With the Committee's best wishes for the success of this project,

Yours sincerely,

Stephanie Ellis
Chair

E-mail: kathryn.simpson@camdenpct.nhs.uk

Enclosures Standard approval conditions

Site approval form (SF1)

Camden & Islington Community Local Research Ethics Committee					
<u>LIST OF SITES WITH A FAVOURABLE ETHICAL OPINION</u>					
<i>For all studies requiring site-specific assessment, this form is issued by the main REC to the Chief Investigator and sponsor with the favourable opinion letter and following subsequent notifications from site assessors. For issue 2 onwards, all sites with a favourable opinion are listed, adding the new sites approved.</i>					
REC reference number:	05/Q0511/47	Issue number:	1	Date of issue:	25 May 2005
Chief Investigator:	Prof Peter Fonagy				
Full title of study:	Helping parents with mental health problems to parent young infants: A randomised controlled trial of Parent-Infant Psychotherapy (PIP) and Counselling				
<i>This study was given a favourable ethical opinion by Camden & Islington Community Local Research Ethics Committee on 25 May 2005. The favourable opinion is extended to each of the sites listed below. The research may commence at each NHS site when management approval from the relevant NHS care organisation has been confirmed.</i>					

Principal Investigator	Post	Research site	Site assessor	Date of favourable opinion for this site	Notes ⁽¹⁾
Professor Peter Fonagy		Children and Families Directorate, City & Hackney Teaching Primary Care Trust.	East London & The City HA Local Research Ethics Committee 2	25/05/2005	
Approved by the Chair on behalf of the REC:					
..... (Signature of Chair/Administrator*)					
(*delete as applicable)					
..... (Name)					

⁽¹⁾ The notes column may be used by the main REC to record the early closure or withdrawal of a site (where notified by the Chief Investigator or sponsor), the suspension or termination of the favourable opinion for an individual site, or any other relevant development. The date should be recorded.

Appendix K

**Normative Parent-infant Relationship Trial Ethical
Approval**



Professor Peter Fonagy
Psychoanalysis Unit
Department of Clinical, Educational and Health Psychology
UCL

01 December 2008

Dear Professor Fonagy

Notification of Ethical Approval
Ethics Application: 1603/001: A study of early parent-infant relationships

I am pleased to confirm that your project has been approved by the UCL Research Ethics Committee for a period of 12 months from the commencement of the project, i.e. 1st December 2008.

Members made a minor comment in relation to the Informed Consent Form which should contain an additional bullet point relating to consent for video-recording. It was recommended that participants, who initially consented to being video-recorded, should be re-contacted at a later stage and given the option to withdraw their consent if they so wished. Participants should also be told how long the videotapes will be held and when they will be destroyed.

It was suggested that the stock phrase 'will not affect the standard of care you receive' should be removed from the Information Sheet as it was deemed to be inappropriate in the context of this project.

Members were also concerned about the negative and repetitive nature of the questionnaires which might lead the mothers to believe that they have a problem. It was recommended that the mothers involved in the research should be reassured that they have been recruited from a normative, non-clinical population and that this should be emphasised in the Information Sheet.

Approval is subject to the following conditions:

1. It is a requirement of the Committee that research projects which have received ethical approval are monitored annually. Therefore, you must complete and return our 'Annual Continuing Review Approval Form' PRIOR to the 1st December 2009. If your project has ceased or was never initiated, it is still important that you complete the form so that we can ensure that our records are updated accordingly.
2. You must seek Chair's approval for proposed amendments to the research for which this approval has been given. Ethical approval is specific to this project and must not be treated as applicable to research of a similar nature. Each research project is reviewed separately and if there are significant changes to the research protocol you should seek confirmation of continued ethical approval by completing the 'Amendment Approval Request Form'.

The forms identified above can be accessed by logging on to the ethics website homepage: <http://www.grad.ucl.ac.uk/ethics/> and clicking on the button marked 'Key Responsibilities of the Researcher Following Approval'.

3. It is your responsibility to report to the Committee any unanticipated problems or adverse events involving risks to participants or others. Both non-serious and serious adverse events must be reported.

Reporting Non-Serious Adverse Events.

For non-serious adverse events you will need to inform Ms Helen Dougal, Ethics Committee Administrator (h.dougal@ucl.ac.uk), within ten days of an adverse incident occurring and provide a full written report that should include any amendments to the participant information sheet and study protocol. The Chair or Vice-Chair of the Ethics Committee will confirm that the incident is non-serious and report to the Committee at the next meeting. The final view of the Committee will be communicated to you.

Reporting Serious Adverse Events

The Ethics Committee should be notified of all serious adverse events via the Ethics Committee Administrator immediately the incident occurs. Where the adverse incident is unexpected and serious, the Chair or Vice-Chair will decide whether the study should be terminated pending the opinion of an independent expert. The adverse event will be considered at the next Committee meeting and a decision will be made on the need to change the information leaflet and/or study protocol.

On completion of the research you must submit a brief report (a maximum of two sides of A4) of your findings/concluding comments to the Committee, which includes in particular issues relating to the ethical implications of the research.

Yours sincerely



Sir John Birch
Chair of the UCL Research Ethics Committee

Cc: Michelle Steed, The Anna Freud Centre

UCL Research Ethics Committee, c/o The Graduate School, North Cloisters, Wilkins Building
University College London Gower Street London WC1E 6BT
Tel: +44 (0)20 7679 7844 Fax: +44 (0)20 7679 7043
h.dougal@ucl.ac.uk
www.ucl.ac.uk/gradschool

Appendix L
Data Protection and Confidentiality Agreement for
Independent Data Coders

Confidentiality Agreement

I understand that in having access to the Anna Freud Centre's data I am completely responsible for safeguarding the information that I am working with. This means that I will not discuss any of the confidential information disclosed to me with anyone, under any circumstances. I will not make copies of or share any confidential material from the Centre. I will ensure that all confidential data will be securely locked away when not in use, will not be used/viewed in public, and will be returned to the Anna Freud Centre when the work is complete.

Should I come across personal information relating to somebody whom I know or would be likely to have dealings with, I will avoid reading or viewing it, and will inform my Anna Freud Centre contact of the connection.

I realise that these restrictions are essential to protect the privacy of patients and research participants who have trusted the Centre to do this, and that the restrictions continue even after I have completed my work here at the Centre.

Print Name:

Signature:

Date: