The Relationship Between Maternal Experiences of Abuse and Maternal Sensitivity in Early Mother-Infant Interactions

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Abstract

Background: Sensitive parenting in early parent-child relationships predicts positive developmental outcomes for children. Maternal experiences of abuse may negatively impact on their ability to have sensitive interactions with their infant. Few studies have used observational measures of sensitivity, investigated maternal abuse across the lifespan, and included contextual explanatory variables such as socioeconomic status. This study aimed to address these gaps in the literature through a secondary data analysis of rich quantitative data from a diverse inner-London maternity service.

Research question: Is there an association between maternal experiences of lifetime abuse and maternal sensitivity in early mother-infant interactions, and what happens to this association when key contextual factors (social support, maternal mental health, socioeconomic and demographic factors) are accounted for?

Methods: 197 mother-infant dyads were recruited in early pregnancy at their antenatal booking appointment and followed up at 28-weeks gestation and 3-months postpartum as part of a cohort study. At baseline, detailed sociodemographic and mental health information was collected and history of childhood and lifetime abuse experiences. At 3-months postpartum, mother-infant interactions were filmed, and subsequently coded using the CARE-Index to measure maternal sensitivity.

Results: There was insufficient evidence to support the primary hypothesis that maternal experiences of abuse would be associated with decreased sensitivity in interactions with their 3-month-old infants. Trauma symptoms, social support, ethnicity and socioeconomic factors predicted maternal sensitivity.

Conclusion: Although abuse is unlikely to independently predict sensitivity, abuse is associated with socioeconomic disadvantage, poorer social support, trauma and mental health problems, all of which can impact on sensitive parenting. Interventions to support parent-infant relationships are important tools for tackling health inequalities and need to be trauma focused.

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Glossary of Acronyms and Abbreviations

AAI	Adult Attachment Interview
AUDIT	Alcohol Use Disorder Identification Test
BAME	Black and minority ethnic
BMI	Body Mass Index
CAS(S)	Composite Abuse Scale - short version
CI	Confidence interval
CSEW	Crime Survey for England and Wales
DAWN	Depression: an exploratory parallel-group randomised controlled trial of Antenatal guided self-help for WomeN
DSM	Diagnostic and Statistical Manual of Mental Disorders
DUDIT	Drug Use Disorders Identification Test
DV	Domestic Violence
EPDS	Edinburgh Postnatal Depression Scale
GAD-2	Generalized Anxiety Disorder Scale - two item
IPV	Intimate Partner Violence
IWM	Internal working model
NIHR	National Institute for Health Research
PD	Personality Disorder
PDS	Posttraumatic Stress Disorder Scale
PSI	Parenting Stress Index
PTSD	Post-traumatic stress disorder
ref	Reference category level for regression models
RF	Reflective functioning
SAPAS	Structured Assessment of Personality Abbreviated Scale
SCID	Structured Clinical Interview for DSM-IV
SD	Standard deviation

1 INTRODUCTION

In this chapter I explain why caregiver-infant relationships are important, outlining the constructs of attachment and sensitivity and reviewing their associations with child outcomes. I review the mechanisms proposed for how parental sensitivity influences child outcomes. Next, I consider the factors that affect the quality of parent-child interaction, with a focus on the evidence for factors associated with parental sensitivity. I then attend to one of the factors thought to influence parenting quality and the focus of this thesis: parental experiences of abuse. First, I review the epidemiology of abuse experiences, concentrating on childhood abuse and domestic abuse. I then review the evidence for associations between abuse experiences and parenting quality and sensitivity. I discuss the different mechanisms proposed for how abuse experiences impact on parenting. I then discuss some limitations of the research to date, particularly how studies have failed to sufficiently account for the context of the parent-infant relationship. Finally, I present the rationale for the current study; how it will address gaps identified in the literature, and the research questions and hypotheses to be tested.

1.1 The Importance of Caregiver-Infant Relationships

1.1.1 Overview

> "There is no such thing as a baby ...A baby cannot exist alone, but is essentially part of a relationship" (Winnicott, 1964, p. 88).

The importance of the environment in which an infant grows and develops is well established. The most important context for infant development is their experience of their relationship with their caregiver. A vast body of research has documented the importance of the quality of the caregiver-infant relationship and its impact on development. Positive qualities in the caregiver-infant relationship (e.g. warmth, attentive involvement and sensitive resolution of distress) are associated with better social, emotional and cognitive development (Rosenblum, Dayton, & Muzik, 2009). Problematic caregiver-infant relationships may increase the likelihood of maladaptive outcomes in children (McGoron et al., 2012; Scheering & Zeanah, 2001). There is growing evidence that infant-caregiver relationships moderate biological risk factors in infants (Martin, Brooks-Gunn, Klebanov, Buka, & McCormick, 2008). If caregiver environments are supportive, infants born prematurely or those that have difficult temperamental dispositions have better outcomes (Bergman, Sarkar, Glover, & O'Connor, 2008).

Other contextual risk factors, such as poverty, maternal mental illness and partner violence, are thought to primarily affect infants through their interaction with the infant-parent relationship. The relationship may buffer or exacerbate risks in the caregiving environment. Secure attachment relationships have been shown to moderate the relationship between parental stress and child aggressive behaviour (Tharner et al., 2012), and deprivation and psychopathology (McGoron et al., 2012). Psychopathology expressed in young children depends on the types of relationships they have with their caregivers (Sroufe, 1989; Zeanah & Lieberman, 2016).

> "Most problems in the early years, while often manifest poignantly in child behaviour, are best conceptualized as relationship problems" (Sroufe, 1989, p. 70).

1.1.2 Gender and Caregiving

This thesis will be focused on mother-infant relationships. The field of attachment and parenting research has been critiqued by feminist psychologists for its emphasis on mothers, and the development of attachment theory as linked to sociopolitical agendas to keep women in the home and as primary caregivers (Cleary, 1999). Although most now agree that the primary caregiver of a child need not be its mother, the vast majority of research into caregiver-infant relationships has focused on mothers. Partly, this is because it is still overwhelmingly the cultural norm (across many different cultures) for mothers to be the primary caregivers of children, *particularly* during the first year of life, when breastfeeding places a biological emphasis on maternal care. This norm has been reinforced through policies making it easier for women to take parental leave than fathers. Despite some changes in policies and measures to advance gender equality in the European Union and its member states (e.g. shared parental leave), women remain the main carers of children and the elderly and the main contributors to domestic chores, with 73% of Europeans affirming that women spend more time on housework and caring activities than men (European Commission, 2018). The status of women's working life is more likely to be affected by these responsibilities. In the latest report from the Labour Force Survey and Annual Population Survey in the UK, 28.5% of mothers with a child under 14 years said they had reduced their working hours because of childcare reasons, compared to 4.8% of fathers (Office for National Statistics, 2019). As well as the fact that women have more caregiving responsibility, for the purposes of research in infancy, many women are recruited during pregnancy, again biasing parental samples almost completely towards women as they are the parents accessing maternity services. Additionally, the research has largely ignored same-sex parenting couples, as well as parenting for transsexual individuals, although there may be unique caregiving issues faced by the LGBTQ+ population (Goldberg & Sweeney, 2019). These issues are beyond the scope of this thesis, but it is important to justify the focus on mothers here, and to consider in the discussion the part this plays in reproducing gender roles around caregiving.

1.1.3 Attachment

The most influential model in understanding how early infant-caregiver relationships predict outcomes for children later in life, is the theory of attachment (Bowlby, 1977). Bowlby suggests that evolution led children to become biologically pre-programmed to form attachments to their caregiver, due to the critical importance of attachment for survival. The child exhibits proximity-seeking behaviour to the caregiver because the caregiver provides protection and a sense of safety to the child. Once the attachment is formed, the child uses the caregiver as a secure base to explore the world and develop other relationships. Bowlby hypothesised that the child's attachment was built over the first year of life as the child forms internal working models (IWMs) of the self and environment based on its earliest relationship to its caregiver(s). A securely attached infant is likely to possess an IWM of attachment figure(s) as being available, responsive and helpful (Bowlby, 1977). For a brief overview of the Strange Situation Test (Ainsworth & Wittig, 1969), attachment classifications, and cross-cultural validity see Appendix 1.

1.1.4 Parental Sensitivity

Ainsworth's team examined the relationship between parental behaviour and security of attachment (Ainsworth, Blehar, Waters, & Wall, 1978). Through over 70 hours of observation in the homes of 26 middle-class mother-infant dyads in Baltimore throughout the first year of life, they assessed a range of dimensions of maternal behaviour. Four rating scales were found to be strongly correlated to attachment security: sensitivity, acceptance, cooperation, and accessibility. The authors concluded:

> *"The most important aspect of maternal behaviour commonly associated with the security-anxiety dimension of infant attachment is manifested in different specific ways in different situations, but in each it emerges as sensitive responsiveness to infant signal and communications"* (Ainsworth et al., 1978, p. 152).

'Sensitivity' is defined as a multistep process including the ability to (1) perceive and (2) interpret the infant's signals accurately and (3) to respond to the signals promptly and appropriately (Ainsworth et al., 1974). On Ainsworth's original

Sensitivity-Insensitivity to Infant Signals and Communications scale, mother's parenting was rated from highly sensitive to highly insensitive (see

Appendix **2**).

Ainsworth's Baltimore study showed that maternal sensitivity was associated with secure attachment in the infant, and a large meta-analysis found sensitivity to be an important (although, not exclusive) condition of attachment security (De Wolff & Van Ijzendoorn, 1997). This association has been further supported by meta-analytic data showing that improvements in parental sensitivity induced by parenting interventions improve child attachment quality (Bakermans-Kranenburg, Van Ijzendoorn, & Juffer, 2003).

Measuring parental sensitivity:

Although sensitivity is a multi-step process, it is only possible to measure the maternal *responses* in observations, which limits the ability to differentiate where problems may be occurring. Ainsworth's original coding of sensitivity was based on narrative accounts of naturalistic interactions during five home visits lasting 4 hours each for each dyad (Ainsworth et al., 1978). In recent research, such intensive and naturalistic observations are very rare, and sensitivity is usually observed in timeframes under half an hour, often in free-play scenarios.

A systematic review of observational instruments used to measure parental sensitivity found over 50 different instruments (Mesman & Emmen, 2013). They found eight measures most often used in research, including the CARE-Index (Crittenden, 2001), all of which included the main elements from Ainsworth's sensitivity scale. The main differences from the original scale were the use of composite scales instead of a global scale and inclusion of positive affect as an indicator of sensitivity. They found that most measures appear to be applicable to both Western and non-Western samples, although much less research has been conducted in the latter. Finally, they found growing evidence of the use of the measures in assessing fathers' sensitivity.

Although there will be further discussion of the CARE-Index in Section 2.3.1, it is important to note here that it classifies low-sensitivity behaviour in terms of control or unresponsiveness. Maternal unresponsiveness may include looking away, having an unchanging expression, talking in a monotonous tone of voice, or showing little warmth or attention, whereas control is described as having rigid facial expressions, strained or exaggerated tone of voice, intrusive poking

or manipulating the infant's body, or acting in covertly angry ways (Kemppinen, Kumpulainen, Raita-Hasu, Moilanen, & Ebeling, 2006). Anxiety and stress have been associated with increased maternal controlling behaviours in mother-infant interactions (Muller-Nix et al., 2004; Parfitt, Pike, & Ayers, 2013), whereas unresponsiveness may be more associated with depressive symptomatology (Beck, 1995).

Cross-cultural validity of sensitivity construct:

Ainsworth's sensitivity construct originated through her observations of parenting in Uganda, and was developed as universal, not limited to Western cultures. However, the universality of this construct across cultures and contexts is questioned. For example, Ainsworth's sensitivity construct reflects the valuing of children's autonomy, and it is clear from research investigating values related to parenting in other cultures, that these values are not universal (Quinn & Mageo, 2013). Although there is acknowledgement from even the staunchest critics of the cross-cultural validity of attachment theory that sensitive care of children in the first months and years of life is of great importance, the *form* that this takes is argued to vary greatly in different cultural contexts.

For example, among the Sinhala of Sri Lanka, verbalisations are greatly discouraged in babies and young children, they are encouraged to be patient, not to complain and to accept what they are given (Chapin, 2013). Ethnographic research has found that mothers and seniors are keenly attuned to the subtle signals of babies, out of a cultural urgency to respond to the babies needs before they might verbalise them (Chapin, 2013). Thus, there is an element to which sensitive or responsive care is of importance across different cultures, but what this looks like in terms of behaviour of both infant and caregiver may be quite different.

Indeed, research has compared parent-infant interactions across cultures to attempt to identify which aspects of sensitive caregiving may be more universal, and which may vary more by culture and context. Availability and proximity are considered the most basic components, as they ensure the child is kept safe and is fed when hungry (Keller & Otto, 2009). However, the level of availability

and proximity varies across cultures and contexts. In many cultures, ranging from Sundanese Indonesian infants (Zevalkink, 1997) to the !Kung San of northern Botswana (Konner, 2005) carrying infants constantly for the first two years of life and feeding in response to any crying is normal – levels of availability and proximity that are much higher than would be considered normal in Europe and North America. Similarly, because there is a universal human ability to detect contingencies between one's own behaviour and environmental events, prompt responding is regarded as a universal feature of sensitivity (Tarabulsy, Tessier, & Kappas, 1996). The *level* of contingency in mother-infant interactions appears to be very similar between cultures, even if the *type* of contingency may be different (Keller & Otto, 2009). Yet, correct interpretation of an infant's signals refers to the perceived needs of the child. The ideas parents have about what children need are not universal. If the construct of sensitivity is defined as positive responsiveness to the child's individual needs (as in Ainsworth's definition), this may favour more Western, individualistic norms and values (Keller & Otto, 2009).

Although there is increasing amounts of research into attachment in different cultures in countries outside of Europe and the United States, there has been little research on sensitivity outside of Western ethnic majority samples. Where research has been conducted, it has been studies examining parenting practices within one particular culture or country (Mesman, van IJzendoorn, & Sagi-Schwartz, 2008). However, in multicultural contexts, incorporating considerations of different cultural parenting practices in a meaningful way is very difficult as studies tend to use the same measures of sensitivity or attachment classification for the whole sample. A systematic review collated data from observational studies of parental sensitivity in ethnic minority families (Mesman, van Ijzendoorn, & Bakermans-Kranenburg, 2012). Parental sensitivity was generally lower in ethnic minority families, and the main cause of this discrepancy was family stress due to socioeconomic disadvantage. There was little evidence for cultural explanations of this difference and parental sensitivity was related to positive child development in ethnic minority families, suggesting the sensitivity construct is not culturally bound in its utility.

1.1.5 Child Outcomes

As described at the beginning of this chapter, the quality of caregiver-infant relationships, and the constructs of attachment and parental sensitivity, are considered to be so important due to the vast body of research that has associated them with later social-emotional, cognitive and physical outcomes for children (Ranson & Urichuk, 2008). See Appendix 3 for a brief review of the literature on attachment and child outcomes. Consequently, supporting secure attachment relationships may be seen as a key strategy for preventing difficulties in children. With all of this evidence it is important to note that studies often investigate attachment classification at one timepoint (e.g. in infancy) and outcomes later, without extensively controlling for potential contextual confounders. It is clear that variables such as poverty and maternal mental health, might not only predict parental sensitivity and attachment classification early in life, but also developmental and health outcomes later.

1.2 Hypothesised Mechanisms for the Relationship Between Caregiver-Infant Relationships and Later Outcomes

1.2.1 Internal Working Models

In attachment theory, the hypothesised mechanism for the association between parental sensitivity and child outcomes, is through the child's attachment status, primarily influenced through their IWMs, with some temperament factors taken into account as well (see Figure 1).

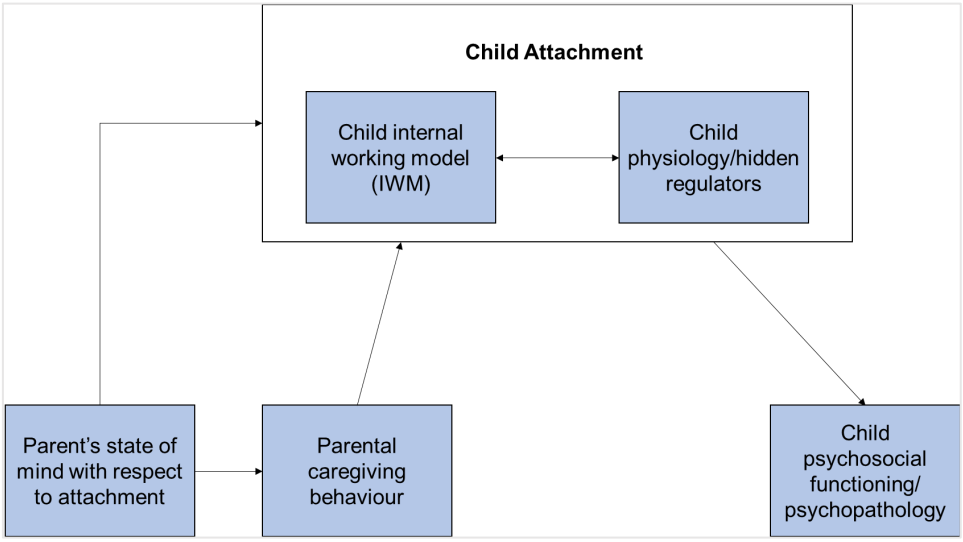


Figure 1: A simple model of attachment related processes; adapted from (Cassidy, Jones, & Shaver, 2013)

A primary criticism of attachment theory is the lack of research evidence for the IWM aspect. As mentioned in the summary of the child outcomes research, studies often measure attachment security in infancy, and later outcomes *assuming* the IWM to be operating in between.

1.2.2 Neurobiology

With the advance of neuroscience, the processes involved in infant-caregiver relationships, attachment and later child outcomes have been related to brain

development (see Appendix 4 for a brief overview). Care during infancy is seen as 'programming' behavioural responses to stress in the offspring (Caldji et al., 1998).

1.2.3 Attachment Stability

The idea of 'programming', and the stability of attachment is important, as a central tenet of the theory is that a person's attachment pattern in adulthood is a reflection of their earliest attachment relationship. It is the parent's own attachment that influences their caregiving behaviour (see Figure 1), and this is how the model explains intergenerational transmission of attachment styles. However, the stability of attachment representations (IWMs) is hotly contested (Fraley, 2002). The revisionist perspective is that early attachment representations are updated in light of ongoing experience and consequently may or may not correspond to attachment representations later in life. Thus, the IWMs developed in childhood are subject to change throughout life as people enter relationships that are incompatible with previous experience.

In contrast, the prototype perspective posits that representations developed in infancy are preserved, and although IWMs are updated as individuals encounter new events, they continue to influence interpersonal dynamics throughout life. As the early representations are preserved, they are reactivated in the context of new interactions, increasing the likelihood that attachment patterns in adulthood will reflect those observed in childhood. This stability is partly due to early IWMs influencing the quality of social environments in which a person exists. Through meta-analysis and modelling, longitudinal data indicate that attachment security is moderately stable across the first 19 years of life, and that patterns of stability are best accounted for by the prototype predictions (Fraley, 2002).

Although the prototype perspective proposes more of a 'critical period' (in line with neurobiological 'programming' evidence) in terms of how attachment operates, it is important to highlight the probabilistic nature of any causal relationships between early interactions, attachment and later outcomes. Insecurity in infancy and early childhood is thought to be a risk factor for later psychopathology in the *context* of other risk factors (e.g. poverty, parental psychopathology, abuse). Thus, insecurity can be seen as exacerbating, and

security buffering against emotional problems when later risks are present (Sroufe, Carlson, Levy, & Egeland, 1999).

An important critique of attachment theory is that predictive associations between early attachment and later development could be more a function of the caregiving environment at the time of later assessment than the early attachment classification (Lamb, Thompson, Gardner, & Charnov, 2013). As demonstrated by the nuances in the positions above, it has been argued that this is a false binary, there is an *interaction* between IWMs and/or brain functions for regulating stress, *and* the subsequent environment.

Importantly, studies have found that the predictive power of attachment security on later development was contingent upon the quality of maternal care children received *after* security was assessed and *before* the outcomes it predicted were measured. The developmental benefits of security and the developmental disadvantages of insecurity were dependent on the maintenance of the quality of care that initially promoted secure and insecure attachments in the first place (Erickson, Sroufe, & Egeland, 1985). An analysis of large, longitudinal data from the NICHD Study of Early Child Care, found that insecurely attached children who subsequently experienced high-sensitive mothering significantly outperformed secure children who subsequently experienced low-sensitive mothering on all outcomes (problem behaviour, social competence, expressive and receptive language, school readiness) (Belsky & Fearon, 2002). When they analysed why some infants who were classified as secure subsequently experienced low-sensitive mothering, and why some infants classified as insecure subsequently experienced high-sensitive mothering, they found that maternal and family stress were key factors (Belsky & Fearon, 2002). This suggests the critical importance of maternal sensitivity, as well as the contextual factors that might influence the quality of caregiving behaviours, which I will discuss in the next section.

1.3 Factors Affecting the Quality of Caregiver-Infant Relationships

1.3.1 Internal Working Models

Attachment theory suggests that when a child grows up and becomes a parent, their state of mind with respect to attachment (IWM) is one of the main influences on the quality of their caregiving behaviour. Attachment theory has been dominant in conceptualising this intergenerational transmission of relationships (Bretherton, 1990; Main, Kaplan, & Cassidy, 1985). This has been supported by research demonstrating that adults who are securely attached (often measured by the Adult Attachment Interview (George, Kaplan, & Main, 1996)) have been observed to engage in more sensitive caregiving practices and to develop secure attachment relationships with their own children (De Wolff & Van Ijzendoorn, 1997; Madigan et al., 2006; Van IJzendoorn, 1995). In contrast, adults with insecure states of mind with respect to attachment may be more likely to engage in various "insensitive" behaviours such as intrusive or unresponsive caregiving (Isabella & Belsky, 1991). Disorganised attachment style is associated with unresolved loss or trauma in the caregiver, and is a powerful predictor of social and cognitive difficulties and psychopathology in the child (Green & Goldwyn, 2002). Attachment theorists have argued that this transmission is supported by the neurobiological evidence (Schore, 2015), as these processes can be seen to operate at level of emotional brain development.

However, as robust as the research is in demonstrating the association between parent and infant attachment, equally robust evidence exists for the 'transmission gap', that a large amount of the variance in maternal sensitivity is not predicted by maternal attachment history (Van IJzendoorn, 1995).

1.3.2 Other Factors

As described earlier, sensitivity relies on a sophisticated and coordinated behavioural response; perceiving infant cues, appraising them as meaningful and requiring a response, and selecting a response of possible behaviours based on that meaning. The parent must also be able to monitor this response and adjust behaviour accordingly. The parent has to do this while also balancing other competing demands and her own internal and external cues

(George & Solomon, 2008). These behaviours are therefore incredibly complex, arising from an interplay between various factors: biological (e.g. hormones), social (e.g. marital relationship), interpersonal (e.g. attachment representations), cognitive (e.g. attention, executive functioning) and affective factors (Barrett & Fleming, 2011; Belsky, 1984; George & Solomon, 2008). In this more contextualised conceptualisation, a parent's mental state with regard to attachment would be just one of many factors influencing caregiving.

Belsky's (1984) ecological model of the determinants of parenting focuses on three general sources of influence on parental functioning; (1) the parents' ontogenic origins and personal psychological resources, (2) the child's characteristics of individuality, and (3) contextual sources of stress and support (see Figure 2). Parenting stress is often measured in studies, using the Parenting Stress Index (PSI), which focuses on three major domains of stress: child characteristics, parent characteristics, and situational/demographic life stress (Abidin, 1990); reflecting the components of Belsky's process model. Parenting stress has been associated with maternal maltreatment history and maternal sensitivity (Feldman, Eidelman, & Rotenberg, 2004; Pereira et al., 2012)

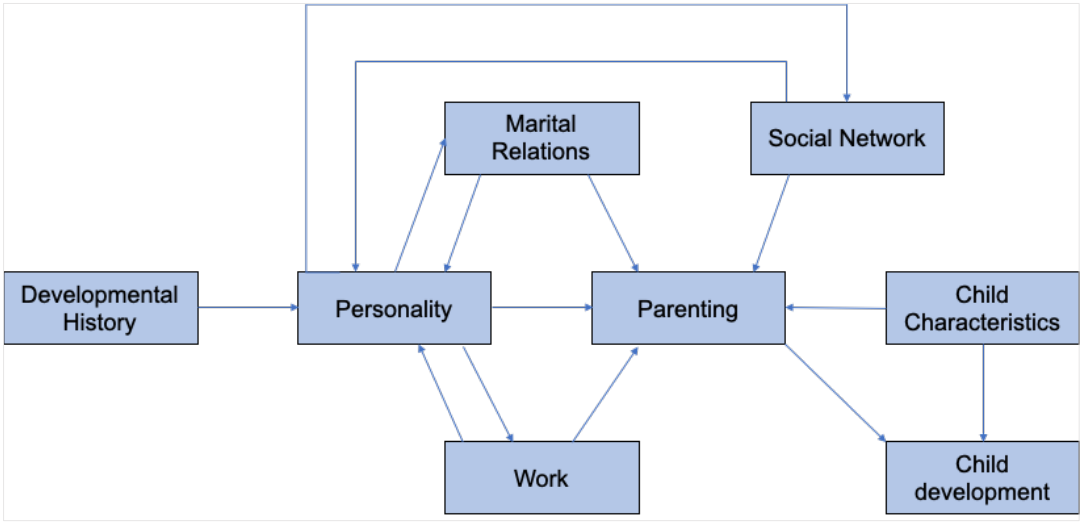


Figure 2: Belsky's (1984) process model of the determinants of parenting

Belsky discusses key components of the parent's contribution being their age, mental health (e.g. depression), and their own experiences of being parented. These hypotheses came from the literature around child abuse, and that adult depression has been linked to separations in childhood. The child's contribution consists of their temperament, which is conceptualised as being characteristics of children that make them more or less difficult to care for. Mothers of avoidant and resistant infants are more likely to rate their infants as having a difficult temperament (Fuertes, Santos, Beeghly, & Tronick, 2006), while prematurity of the infant has been associated with decreased sensitivity and more controlling behaviours (Forcada-Guex, Pierrehumbert, Borghini, Moessinger, & Muller-Nix, 2006; Muller-Nix et al., 2004). Finally, Belsky emphasises the impact of contextual sources of stress and support on a parent's caregiving capacity. The emphasis for Belsky is on social support. Belsky hypothesised that the marital relationship is key, and that the impact of unemployment operated through its deleterious effect on relationships. Indeed, the quality of the co-parenting relationship has been demonstrated to predict child outcomes (McHale & Rasmussen, 1998; Schoppe-Sullivan, Weldon, Claire Cook, Davis, & Buckley, 2009).

Other contextual sources of stress and support have potentially been underemphasised in research and theorising on parenting behaviour. This is likely in part to do with the fact that research has been traditionally conducted in White, middle-class families. Stressors associated with disadvantage; both economic and through discrimination, have been little researched. In a recent paper reviewing the empirical literature on parent-child attachment, the authors argue that when examining the antecedents of parent-child attachment alongside the macro, contextual socio-economic factors, attachment can be viewed as a mechanism of intergenerational disadvantage (Moullin, Waldfogel, & Washbrook, 2018). Therefore, when researching associations between parental sensitivity and variables hypothesised to predict it, it is critical to consider the contextual factors that may be confounding any associations.

I will now concentrate the rest of the chapter on considering one of the factors thought to impact on parenting behaviour: maternal experiences of abuse.

1.4 Abuse

In this section I will present the epidemiology of abuse experiences, and review the evidence linking childhood and domestic abuse to parenting outcomes. I will then consider the mechanisms proposed for how maternal experiences of abuse might impact on maternal sensitivity in mother-infant interactions, considering the limitations of the evidence base.

1.4.1 The Epidemiology of Abuse

Abuse experiences across the lifespan are highly prevalent, particularly for women. The 2015/16 Crime Survey for England and Wales (CSEW) for the first time asked adult respondents aged 16 to 59 whether they had experienced a range of abuse while a child (under 16) (Office for National Statistics, 2016). Abuse recorded was limited to psychological, physical and sexual abuse carried out by an adult and also having witnessed domestic violence/abuse (DV) in the home. In childhood, 9% of adults had experienced psychological abuse, 7% physical abuse, 7% sexual assault and 8% witnessed DV in the home. Apart from physical abuse, women were significantly more likely to report that they had suffered any form of abuse in childhood than men, with women 4 times as likely as men to be a survivor of sexual abuse during childhood. For more than 1 in 5 people who reported childhood sexual abuse, this continued into adulthood (over the age of 16).

In terms of adulthood experiences of violence, police records reported on in the CSEW show that a greater proportion of violent offences against women were committed by an intimate partner (34% vs 14% for men), or a family member (18% compared with 14% of men) (Office for National Statistics, 2018b). Therefore, nearly half of violent offences against women were categorized as DV (perpetrated by a partner or family member). The most common form of violence to be experienced on a repeated basis is DV, with 34% of DV victims

experiencing repeat victimization (victimization more than once in the past 12 months). See Appendix 5 for the definition of DV used in the CSEW, measured since the age of 16 and in the last 12 months (Office for National Statistics, 2018a).

In the CSEW ending in March 2018, 7.9% of women and 4.2% of men experienced DV in the past year (Office for National Statistics, 2018a). 21% of people (28.9% of women, and 13.2% of men) had experienced some form of DV since the age of 16. Some form of partner abuse was experienced by 17.4% of adults and 8.4% had experienced DV by a family member. All types of abuse were more likely to be perpetrated by a partner than a family member. Younger women, those who were divorced and in single parent households and on lower incomes, were more likely to be victims of DV. In 40.9% of cases of partner abuse there was at least one child under the age of 16 years living in the household. In terms of the effects of partner abuse, the category most likely to be reported was “mental or emotional problems” followed by “stopped trusting people or difficulty in other relationships”. Evidence suggests that the risk of DV increases during the perinatal period (Devries et al., 2010; Gazmararian et al., 1996), making it particularly relevant as a contextual factor that may influence mother-infant interactions.

The literature on the relationship between maternal experiences of abuse and parenting has almost exclusively focused on maternal experiences of child abuse and DV. This literature will now be reviewed, along with proposed mechanisms.

1.4.2 Child Abuse and Mother-Infant Interactions

A recent systematic review examined studies that measured maternal self-reported history of childhood abuse, and observational assessments of mother-infant interactions (Vaillancourt, Pawlby, & Fearon, 2017). Fourteen studies (12 independent samples) were included in the review. Nearly all studies were conducted in North America (75%), with one study each from the UK, Germany and Australia. The majority of studies were longitudinal cohort designs. Half of the studies were rated as “strong” in methodological quality, with five of these rated as strong across all domains. The main methodological limitations with studies were less generalizable samples, less rigorous assessment tools, lack

of blind assessors, failure to account for confounding variables, and insufficient analyses to draw conclusions.

Ten studies involved infants under 12 months of age, with the remaining studies involving infants between 12 to 18 months. Most observations of interaction took place in the home and averaged 30 minutes in length (range = 5-120 minutes). The most common domain of parenting measured was sensitivity although studies varied in their exact definition of the construct and coding scheme. Measurement of childhood abuse was self-report and was mostly restricted to physical and/or sexual abuse in childhood.

Ten of the 14 studies reported a direct or indirect relationship between self-reported abuse and observed caregiving. Six of these studies reported a direct association, however, several did not include depressive symptoms in analyses. One study that found a direct relationship between mother's report of abuse in childhood and observed maternal behaviours found that a self-reported history of mental illness and domestic violence were particularly significant in mediating the relationship (Dixon, Hamilton-Giachritsis, & Browne, 2005). When all three variables were controlled for the direct pathway between abuse history and caregiving behaviour was no longer significant. Similarly, in a study that found an association between overall Childhood Trauma Questionnaire (CTQ; (Bernstein et al., 2003)) scores and maternal sensitivity, the direct effect of maternal abuse history was no longer significant once the effect of parenting stress was taken into account.

Four studies reported an indirect or partial effect of maltreatment history on caregiving behaviour. One study found that mothers with greater experiences of childhood physical or sexual abuse displayed less warm-responsiveness in home interactions with their infants, but only if infants were male (Nuttall, Valentino, & Borkowski, 2012). In another study, childhood maltreatment was associated with psychosocial stress, depressive symptoms, and posttraumatic stress symptoms (Martinez-Torteya et al., 2014). In this study depressive symptoms accounted for the relationship between maltreatment and positive parenting. Two studies used path analysis to look at indirect relationships between history of abuse and caregiving. One study found a significant indirect effect of maternal self-report of early life experiences (maltreatment and/or inconsistency of care) on maternal sensitivity when hypothalamic-pituitary-

adrenal (HPA) function (higher level of diurnal cortisol) was tested as a mediator (Gonzalez, Jenkins, Steiner, & Fleming, 2012). This effect remained after controlling for depressive symptoms and household income (the variables significantly associated with sensitivity). The other study using path analysis found that the relationship between abuse and responsive maternal behaviours only existed via depressive symptoms, was specific to physical abuse in childhood, and remained after household income, child gender, maternal age, and sexual abuse history were controlled (Madigan, Wade, Plamondon, & Jenkins, 2015).

Finally, four studies found no association between history of childhood abuse and current caregiving behaviour. With one exception (Fuchs, Möhler, Resch, & Kaess, 2015), the studies with the highest quality reported an indirect effect of maternal history of maltreatment on later parenting behaviour through either psychological or biological maternal factors. The studies that found direct associations tended to be in the higher-risk samples (maternal mental illness, poverty) and potential indirect pathways were not analysed.

The mechanisms hypothesised to explain the observed associations between childhood abuse and maternal caregiving behaviour will be discussed after a consideration of the research evidence for the association between domestic abuse and maternal caregiving behaviour. Although some of the hypothesised mechanisms differ between the two timeframes of abuse, there are important overlaps.

1.4.3 Domestic Violence and Mother-Infant Interactions

A considerably smaller body of research has investigated the impact of DV on maternal parenting, although much has been written on child outcomes in the context of domestic violence, often assuming maternal parenting deficit as the mechanism (Greeson et al., 2014). Almost all research has focused on intimate partner violence (IPV), a slightly narrower definition of DV that refers only to violence perpetrated by a past or current intimate partner and does not include violence perpetrated by family members. A recent systematic review collated studies that measured the association between IPV and parenting (Chiesa et al., 2018). Of 13,038 studies identified, 33 were included. As there were no age

limits on the children in these studies, i.e. several studies included children aged 7-9 or 0-19 years old, I review here the studies that focused on infants. Six studies focused on infants, including studies with the widest age range of birth to 3 years old (Barrett, 2010; Casanueva & Martin, 2007; Dayton, Levendosky, Davidson, & Bogat, 2010; Lannert et al., 2014; Lannert, Levendosky, & Bogat, 2013; Levendosky, Leahy, Bogat, Davidson, & von Eye, 2006). The key characteristics and outcomes of these studies are summarised in Appendix 6.

All studies were conducted in North America. Of the studies that found a relationship between maternal IPV experiences and negative parenting, several found that maternal mental health (either distress, depression or trauma symptoms) mediated the relationship between IPV and negative parenting outcomes. This is a similar pattern to the results found in the literature on mothers who experience childhood abuse. Most of the studies used self-report questionnaires rather than observational assessments of parenting. An issue with this is that a mother's *perception* of her relationship with her infant is quite a different construct from the details of parental *behaviour* in interaction with the infant (e.g. sensitivity) that have been shown to predict outcomes in children. Hence why observational assessment is the gold standard for measuring parental sensitivity and other aspects of parenting behaviour. Indeed, within domestic violence research, it is plausible that abuse experiences may have a significant impact on a mother's perception of the bond with her child or her parenting ability, despite her behaviour maintaining a good enough level of sensitivity.

Two studies investigated the association between IPV experiences and maternal representations of the infant (Dayton et al., 2010; Lannert et al., 2014; Lannert et al., 2013), measured by the working model of the child interview (Zeanah, Benoit, Barton, & Hirshberg, 1996). In one study this was the only measure of 'parenting' (Lannert et al., 2013), however this measure assesses internalised cognitive representations, rather than caregiving behaviours. Maternal representations contain three primary elements: (a) representations of one's own past attachment and parenting experiences, (b) representations and expectations of the infant, and (c) representations of the self as mother (Benoit, Parker, & Zeanah, 1997). Maternal representations predict attachment security and parenting behaviours (Dayton et al., 2010; Zeanah, Benoit, Hirshberg,

Barton, & Regan, 1994), and so may be conceptualised as an indication of sensitivity. One study found no main effect for postnatal IPV on parenting, and no moderation of this association by maternal representations (Dayton et al., 2010). The other study found that prenatal partner abuse was significantly negatively correlated with balanced representations and significantly positively correlated with disengaged representations (Lannert et al., 2013). However, we do not know if these representations translated into differences in *behaviour* associated with partner abuse.

One key study included assessment of both childhood abuse and IPV and found that mothers with a history of childhood sexual abuse were significantly more likely to report having ever experienced IPV in adulthood than mothers who had not experienced sexual abuse in childhood (Barrett, 2010). In this study, a *recent* history of IPV mediated the relationship between childhood sexual abuse and parental warmth.

Only one study specifically looked at maternal sensitivity as part of the observed parenting outcome variable (Levendosky et al., 2006). They found that past and current IPV functioned similarly with respect to current maternal mental health, with a dose-response relationship observed between more IPV and poorer mental health. However, past IPV was not related to parenting, whereas current IPV was. The authors suggest that this supports the 'spillover' hypothesis, whereby current IPV limits the mother's ability to respond warmly and sensitively to her infant, either through the hostility in the partner relationship 'spilling over' into the mother's relationship with the infant, or through the stress associated with IPV inhibiting the mother's ability to be sensitively attuned to her infant.

The broader finding of the systematic review (not limited to studies focused on infancy) from meta-analysis and narrative summaries, was that IPV was associated with deleterious effects on parenting (Chiesa et al., 2018). However, effect sizes were moderate. This is likely due to the heterogeneity of studies included in the review, particularly that they measured and sampled different risk and protective factors that could not therefore be analysed in the review. The authors note that studies did not consistently measure maternal mental health, parenting stress, or community-level factors such as poverty which would elucidate the relationships more clearly. Similarly there was large

variation in the timeframes IPV was measured in, with some studies only examining current IPV, despite growing evidence that IPV during pregnancy or in the first year of life may be an especially vulnerable period due to the impact on mothers' representations of their infant (Casanueva & Martin, 2007; Lannert et al., 2014; Lannert et al., 2013).

1.4.4 Mechanisms for the Relationship Between Abuse and Maternal Sensitivity

Although the mechanisms proposed for the relationship between childhood and adulthood abuse and parenting behaviour differ, where relevant I review them together here as there are important overlaps.

Spillover hypothesis:

As described above, the spillover hypothesis suggests that hostility and conflict in one family system, the marital relationship, negatively influences another family system such as the parent-child relationship. Two meta-analyses have found a moderate association between interparental conflict and parent-child relationship (Erel & Burman, 1995; Krishnakumar & Buehler, 2000), however it has not been possible to sufficiently analyse the potential moderators or mediators of this relationship, and thus although there is substantial evidence for the association, *how* conflict spills over is not clear. This is also a theory particularly focused on *current* conflict and has less explanatory potential to examine the impact of earlier abuse histories.

Attachment representations and 'ghosts in the nursery':

As outlined earlier, attachment theory hypothesises a general mechanism between maternal experiences in childhood and their subsequent caregiving behaviour through their internal working models of attachment (see Section 1.2.1). In a seminal paper from the psychoanalytic tradition, Fraiberg described the 'ghosts in the nursery', that appear to condemn parents to repeating the tragedy of their own childhood with their baby (Fraiberg, Adelson, & Shapiro, 1975). Within the psychoanalytic field, this theory has been one of the primary

explanations for associations observed between childhood abuse and loss and maternal caregiving behaviour. Fraiberg uses case examples to illustrate that morbidity in the parental history does not in itself predict the repetition of the past in the present, but that there is something about the *memories* for the events of childhood abuse that discriminates between those who go on to have difficulties in their relationship with their child. Fraiberg hypothesises that it is the parent who cannot remember their childhood feelings of pain and anxiety who will need to inflict pain upon their child. She gives examples of parents who describe the events of childhood abuse in a matter-of-fact way, where the associated affective experience is missing. She aligns this with the psychoanalytic defense mechanism of 'identifying with the aggressor', whereby a victim adopts the behaviour of a person who is more powerful and hostile towards them (Freud, 1936). This repression and isolation of painful affect makes it difficult for the parent to perceive the painful affect in their own child, whereas access to childhood pain becomes a powerful deterrent against repetition in parenting (Fraiberg et al., 1975).

This theory has been further developed and supported by evidence. The Adult Attachment Interview (AAI; (George et al., 1996) examines subtle and transient signs of absorption in past trauma (Hesse & Van Ijzendoorn, 1999), and examines the degree to which past trauma or loss is unresolved, i.e. is exerting an ongoing influence on a person's present socioemotional experiences (Crittenden & Landini, 2011; Fearon & Mansell, 2001). Mothers who have unresolved states of mind regarding past trauma or loss, have been observed to engage in frightening, frightened or atypical behaviours when interacting with their infants, especially when the infant displays attachment behaviours (Lyons-Ruth, Bronfman, & Parsons, 1999). It is hypothesised that these mothers who remain unresolved in respect to experiences of loss or abuse in childhood, are challenged by the infant's displays of vulnerability and distress, due to the activation of disintegrated and powerful affect associated with their own experiences. These unresolved feelings, or the attempt to distance themselves from them, lead to caregiving behaviours that are frightening, or don't allow the mother to modulate the infant's stress response (George & Solomon, 2008; Lyons-Ruth et al., 1999). It is these types of behaviours that are associated with disorganized attachment, and are strongly associated with social and cognitive difficulties and psychopathology in the child (Green & Goldwyn, 2002). This has

been supported by neurobiological research; mothers who are unresolved in relation to childhood trauma as measured by the AAI show a blunting of amygdala response in relation to infant distress, which indicates disengagement from infant distress and disrupts maternal caregiving (Kim, Fonagy, Allen, & Strathearn, 2014).

Although the focus in attachment theory has been on the impact of childhood experiences on subsequent parenting behaviour, some research looking at domestic abuse experiences in adulthood has used the concept of attachment representations as a potential mechanism for these associations too. As mentioned in Section 1.4.3, maternal representations contain three primary elements: (a) representations of one's own past attachment and parenting experiences, (b) representations and expectations of the infant, and (c) representations of the self as mother (Benoit et al., 1997). Abuse experiences in adulthood can influence the representations of the infant and of the self as mother, which alongside the representations of one's own past attachment and parenting experiences, influence parenting behaviours and the parent-infant relationship (Dayton et al., 2010; Lannert et al., 2013).

Reflective functioning:

Mentalisation, or reflecting functioning (RF), refers to the socio-cognitive capacity to understand ourselves and other people in terms of intentional mental states, such as feelings, desires, wishes goals and attitudes (Fonagy, 2018). Mentalisation is thought to unfold in the context of early relationships. The attachment bond between infant and caregiver not only provides a sense of security, but the quality of parent-child interactions can promote or inhibit the development of mentalisation (Jurist & Meehan, 2009).Through the experience of a child having their mental states reflected upon by a caregiver who is able to consider and respond to the emotional states of the child, the child can discover about minds (including their own) and develop an understanding of mental and emotional life (Bram & Gabbard, 2001). Thus, the child's capacity to create a coherent image of their own mind and self is dependent on the experience of being perceived by the caregiver as someone with a mind.

Mothers' capacity to mentalize about their own early attachment experiences, measured using the Adult Attachment Interview (George et al., 1996), predicted infant attachment security more than 16 months later (Fonagy, Steele, & Steele, 1991). Therefore, mentalisation may play an important role in the intergenerational transmission of attachment. In another study, mothers who had experienced risk and deprivation, but had high reflective functioning, were much more likely to have securely attached infants, suggesting mentalisation as a potential mediator of the intergenerational transmission of risk (Fonagy, Steele, Steele, Higgitt, & Target, 1994).

Studies have found a range of deficits in mentalisation capacities among children who have been maltreated; poor mentalisation capacities (Ensink, Berthelot, Bernazzani, Normandin, & Fonagy, 2014), poor discrimination of emotions (Pollak, Cicchetti, Hornung, & Reed, 2000), theory of mind (Cicchetti, Rogosch, Maughan, Toth, & Bruce, 2003), and emotional understanding (Shipman & Zeman, 2001). This may be because maltreating parents have difficulties in mentalising and are unable or unwilling to adopt a mentalising stance towards their child.

Adults with childhood abuse and neglect histories are expected to have profound difficulties in mentalising regarding *trauma,* and there are several proposed mechanisms, summarised in Appendix 7. Although there is little research to date examining reflective functioning in parents with abuse histories, prospective mothers (pregnant) with histories of childhood abuse and neglect showed marked deficits in mentalizing in the specific area of *trauma* (Ensink et al., 2014). This was linked to commitment to pregnancy, positive feelings about the baby and motherhood, and the quality of relationship with their partner.

Although the capacity to mentalise is hypothesised to decline under situations of stress, little research has examined direct relationships between adulthood adversities and mentalizing. The ability to continue to mentalize under stressful circumstances is the hallmark of robust mentalization, which is associated with early relationships through secure attachment. Thus, there has been very little research examining maternal reflective functioning ability as directly affected by high levels of stress, i.e. in the context of DV. Reflective functioning capacity is linked to depression and other forms of psychopathology (Katznelson, 2014), so

reflective functioning may mediate associations between DV and parenting behaviour, as both violence and RF are associated with psychopathology. Parenting interventions that focus on increasing reflective functioning are growing (Cooper & Redfern, 2015; Sadler, Slade, & Mayes, 2006; Slade, 2007). If psychological interventions can change a parent's mentalizing capacity, then it is plausible that this capacity is influenced by current and contextual stressors (e.g. socioeconomic stressors and experiences of abuse in adulthood).

Neurobiology:

As summarised in Appendix 4, there is growing evidence that attachment relationships play a role in brain development, particularly in relation to emotion regulation (Schore, 2001). Similarly, research examining the neural substrates of different aspects of mentalisation is growing (Luyten & Fonagy, 2015). Consequently, the mechanisms reviewed here can also be seen to operate at a neurobiological level. The neurobiological research has focused on childhood experiences, as these are thought to have an impact on the brain while it develops; the 'programming' hypothesis. Thus, little research has looked at any neurobiological impacts of adulthood experiences of abuse on the brain, outside of traumatic brain injury (Farrer, Frost, & Hedges, 2012).

Psychopathology:

As demonstrated in the literature reviewed examining the relationship between childhood and adulthood abuse and caregiving behaviour, the evidence for the role of maternal mental health as a mediator of this relationship is significant. Both childhood and adulthood abuse are associated with a wide range of mental health difficulties which are known to impact on caregiving behaviour.

Adult women with a history of childhood sexual abuse show greater evidence of sexual disturbance, depression, anxiety, fear and suicidal ideas and behaviour (Beitchman et al., 1992). Among psychiatric outpatients, diagnoses of major depression were associated with reports of childhood emotional abuse (Gibb, Chelminski, & Zimmerman, 2007). Meta-analytic evidence supports the association between childhood sexual and physical abuse and high levels of

depression, anxiety and distress (Lindert et al., 2014). Similarly there is a large body of evidence demonstrating associations between domestic violence and depression, anxiety and post-traumatic stress disorder (PTSD) (Trevillion, Oram, Feder, & Howard, 2012), and these associations have been demonstrated in the perinatal period (Howard, Oram, Galley, Trevillion, & Feder, 2013). As childhood sexual abuse is associated with revictimization in adulthood (Beitchman et al., 1992), there are likely cumulative effects of abuse experiences across the lifespan on the mental health of women. Due to this chronicity, abuse is often associated with more pervasive psychological consequences such as "complex PTSD", or "personality disorder" diagnoses. Although some research tries to delineate the differences between constructs of complex trauma and diagnoses such as borderline personality disorder (MacIntosh, Godbout, & Dubash, 2015), both are associated with abuse and characterised by difficulties across a number of domains such as emotional regulation, interpersonal functioning, and identity (Herman, 1992). The term 'personality disorder' is contested, particularly by service-users, for example the group 'Personality Disorder in the Bin' (https://personalitydisorderinthebin.wordpress.com/). Indeed, the critique of the diagnosis of borderline personality disorder (BPD) is that it is applied predominantly to women and in particular, to survivors of childhood sexual abuse (Shaw & Proctor, 2005). If we conceive of the pattern of 'symptoms' associated with the BPD diagnosis as strategies that some women use to survive and resist oppression and abuse, then by labelling these strategies as pathology and symptoms of disturbed personality, we detract from the gendered inequalities of power in wider society (Shaw & Proctor, 2005). Because of these critiques, the construct of 'personality disorder' is not of interest in this thesis. However, the term 'personality disorder' is used to report research findings that have used this construct, and where measures have been used that purport to measure this construct.

A substantial body of evidence has demonstrated an association between depression or depressive symptoms and parenting. A recent meta-analysis reviewed studies examining the association between maternal depression and maternal sensitivity from birth to 12 months (Bernard, Nissim, Vaccaro, Harris, & Lindhiem, 2018). Across 48 studies and nearly 5000 mother-infant dyads, the aggregate effect size between depression and maternal sensitivity was r=-0.16,

p<.0001, indicating that mothers with higher depression levels were less sensitive than mothers with lower depression levels. Studies that compared between depressed and non-depressed/control groups showed larger effect sizes (r=-0.35, p<.0001) suggesting that clinical levels of depression pose a particular threat to sensitive parenting.

The impact of trauma symptoms on caregiving in infancy has been researched much less than depression. A recent systematic review of maternal PTSD in the perinatal period and child outcomes found contradictory evidence for associations between trauma symptoms and mother-infant interactions, the mother-infant relationship and child development outcomes (Cook, Ayers, & Horsch, 2017). The presence of depression and personality disorder (complex trauma) has been shown to have significant detrimental effects on infant care practices and maternal involvement with the baby (Conroy, Marks, Schacht, Davies, & Moran, 2010), and higher levels of dysregulated infant behaviour (Conroy et al., 2012).

Trauma and abuse may impact the quality of caregiving behaviours through depressive and trauma-related symptoms or associated psychological processes (e.g. emotion regulation). Nevertheless, there are many other factors that also contribute to maternal mental health and wellbeing, that are often forgotten when research is focused on particular types of experience, or particular mechanisms of transmission. Key factors include the socioeconomic and cultural context in which the parent-infant relationship sits, which I will discuss next.

1.4.5 Forgetting the Context: Issues with the Research

Lieberman and colleagues argue that Winnicott's (1964) "*There is no such thing as a baby*" dictum quoted at the beginning of this chapter, needs to be embedded within a broader ecological framework. They argue, "*There is no such thing as a family . . . A family cannot exist alone, but is essentially part of a social, economic, and cultural system*." (Lieberman, Chu, Van Horn, & Harris, 2011, p. 402).

As described in Section 1.3.2, Belsky highlights the importance of the multiple contexts in which the parent-infant dyad operates (Belsky, 1984). This can be

conceptualized using Bronfenbrenner's ecological model of human development adapted in Figure 3 (Bronfenbrenner, 1979). Research has demonstrated time and again, that social determinants of health and wellbeing are key, and affect relationships, including parental ones. Socioeconomic determinants have largely been either omitted from analyses or adjusted for, without serious consideration of their role (Moullin et al., 2018). However, there is evidence that the socioeconomic context outside of the family's home environment influences parenting sensitivity. Even after adjusting for income, education and age, residential crowding has been associated with lower maternal responsiveness (Evans et al., 2010). Similarly, features of poor neighbourhoods have been associated with poorer parenting practices (Pinderhughes, Nix, Foster, & Jones, 2001). Meta-analytic data has shown that the effects of depression on parenting interactions are larger in more disadvantaged samples, suggesting that socioeconomic factors at least moderate these associations (Lovejoy, Graczyk, O'Hare, & Neuman, 2000). Moullin and colleagues suggest thinking about parent-child attachment as a mechanism of intergenerational (dis)advantage, where a parents socioeconomic position influences their ability to parent sensitively, as well as the direct impact socioeconomic factors have on child development (Moullin et al., 2018). We know that aspects of disadvantage are correlated, i.e. poverty, childhood abuse, domestic abuse. It is therefore possible that socioeconomic contextual variables may confound observed relationships between abuse experiences and caregiving behaviours.

Figure 3: An ecological model of factors influencing the parent-infant relationship; adapted from (Bronfenbrenner, 1979)

There is increasing emphasis given not just to focus on the primary caregiver-infant relationship, but the multiple relationships that infants may have in their family context. And even beyond the family, the cultural context within which the infant develops. Cultural beliefs and value systems define the assumptions of the group about what is important and the rules about raising children (Ghosh Ippen, Harris, Van Horn, Guendelman, & Lieberman, 2009). In minoritised groups, these carry the influences of historical trauma (Ghosh Ippen, 2012). A parent's beliefs, explanations, and interpretations of infant behaviour are among the most important aspects of the cultural context of infant development. These can include subtle cultural assumptions about what facilitates infant development and the roles and relevance of parenting. These beliefs and

assumptions are clearly implicated in what is thought of as ‘sensitive’ parenting, although they have been little examined.

Without considering the wider context of the parent-infant dyad, we cannot unpick observed associations between maternal abuse and maternal sensitivity. We need to understand the complex interplay of factors that influence parental sensitivity, as many interventions designed to address intergenerational transmissions of disadvantage see supporting or increasing parental sensitivity as the key mechanism of change.

1.5 Rationale

Little research has investigated the relationship between maternal lifetime abuse experiences on early mother-infant interactions using direct, observational methods. Studies that have been conducted have either focused on one type of abuse (e.g. childhood abuse *or* domestic violence), used 'high-risk' samples (e.g. mothers with mental illness), and have included few contextual explanatory variables, particularly ignoring socio-economic factors. If maternal abuse experiences have a negative influence on the quality of early mother-infant interactions, understanding this relationship within its wider context may help us to develop trauma-focused early interventions for families, to support parenting, and ameliorate the intergenerational transmission of trauma. This study aimed to use rich quantitative data from a representative sample of women from a diverse London maternity service to investigate the impact of maternal experiences of lifetime abuse on the mother-infant dyad within the wider ecological context.

1.6 Research Questions and Hypotheses

Is there an association between maternal experiences of abuse and maternal sensitivity in early mother-infant interactions?

> *Primary hypothesis:* Maternal experience of lifetime abuse (interpersonal trauma) will be associated with decreased maternal sensitivity in 3-month postpartum interactions with their infant.
>
> *Secondary hypothesis:* Maternal experience of childhood abuse will be associated with decreased maternal sensitivity in 3-month postpartum interactions with their infant.

Is there an association between maternal experiences of abuse and maternal unresponsiveness and maternal control in early mother-infant interactions?

> *Secondary hypothesis:* Maternal experience of abuse will be associated with increased unresponsiveness and increased control in 3-month postpartum interactions with their infant.

What happens to the relationship between maternal abuse and maternal sensitivity when contextual factors (social support, maternal mental health, socioeconomic and demographic factors) are included in the model?

2 METHODS

2.1 Epistemology

This study will adopt a critical realist position (Danermark, Ekstrom, & Jakobsen, 2005). The autonomous existence of a social reality that we can investigate the nature of (ontological realism) will be accepted, and observation, quantitative measurement and analysis will be used. The caveat that the knowledge we gain about reality is always situated in its historical, social, cultural and political context (epistemic relativism) will be held, with the constructs being used and their measurement scrutinised, and assumed to be fallible.

2.2 Study Design

This study is a secondary analysis of data collected as part of a National Institute for Health Research (NIHR) programme grant investigating perinatal mental health; the well-being in pregnancy in an inner-city maternity service (WENDY) study. The study was a cohort study, based on a random sample of women attending their first antenatal booking appointment at an inner-London hospital (around 10-weeks' gestation), stratified by their response to their midwife on the Whooley depression screening questions (Whooley, Avins, Miranda, & Browner, 1997). The purpose of the baseline study was to estimate the prevalence of common mental disorders in early pregnancy, and to evaluate the effectiveness of the Whooley questions at identifying women with depression.

All women who screened positive to the Whooley questions were invited to take part in the study. A random sample of the women who screened negative were identified by the Clinical Trials Unit to approach to take part. Women were given full information about the study, and written informed consent was obtained at the beginning of the interview. Women were interviewed on their own face-to-face either at the clinic or at women's homes, dependent on their preference.

Follow-up interviews were conducted either over the phone, or in person. Childcare and travel costs were reimbursed, and interpreters were provided for any languages spoken.

2.2.1 Setting

Inner-city London maternity service (7000 births per year), with an ethnically and socially diverse population.

2.2.2 Participants

Inclusion criteria:

- Women aged >15 who answered the Whooley questions at antenatal booking at the London hospital
- Women who took part in an observed mother-infant interaction recording at 3-month postpartum follow-up

Exclusion criteria:

- Women who lacked mental capacity to provide informed consent
- Women who had already undergone a comprehensive maternity booking in the UK
- Women who had a termination or miscarriage between booking appointment and baseline interview
- Women who had a miscarriage or stillbirth before the 3-month postpartum follow-up

2.2.3 Recruitment and sampling

All women having their antenatal booking appointment at the study hospital between 10th November 2014 and 30th June 2016 received an advert for the study in their pre-booking information pack. At their booking appointment, women were asked the Whooley questions (Whooley et al., 1997) and a help question by their midwife, and this was recorded via an electronic booking system:

1: During the past month have you often been bothered by feeling down, depressed or hopeless?

2: During the past month have you often been bothered by little interest or pleasure in doing things?

Help: Is this something you feel you need or want help with?

The Whooley questions are routinely asked of all women across England and Wales at their booking appointment. A positive response to either of the two Whooley questions is considered a positive screen for depression. Clinic lists for women attending booking appointments each day, including their Whooley screen status, were sent to the research team. All eligible women who screened positive for depression from the Whooley questions were approached to take part in the study. All women who screened negative were randomised by the Clinical Trials Unit (CTU) as to whether to approach to take part. Initially, the sampling ratio was 1/6 Whooley negative women. When recruitment was slower than expected later in the study, the sampling ratio was changed to 1/4 in order to increase the number of Whooley negative women randomised to approach.

The research team contacted women who were selected to be approached over the telephone, explaining the purpose of the study, and what taking part would involve (See Appendix 8 for WENDY participant information sheet and consent form). If the woman agreed to participate, an appointment was made to do the baseline interview, either at the hospital (Community Midwives' Centre or Clinical Research Facility) or at the participant's home. Interviews were conducted with women on their own with the researcher. For women who could not speak English, a face-to-face interpreter was provided. Validated versions of translated instruments were used where available so that self-complete questionnaires could be completed by participants in their own language. However, due to the breadth of languages spoken, and the scarcity of validated translations, many questionnaires were completed through the interpreter. The interviews generally took around one hour to complete, with longer times for women requiring interpreters.

545 women were recruited to the study at baseline, and women were followed up at 28-weeks' gestation and at 3 months following birth. The WENDY 3-month postnatal follow-ups were conducted between July 2015 – June 2017. The main

data collection for the mother-infant interactions started part way through the 3-month postnatal follow-up data collection period. This was because of funding restrictions, which meant that there were not enough resources to approach all women to conduct home visits. Between January 2016 – June 2016, the study team started approaching women to collect mother-infant interactions without funding. As the funding application was submitted by a researcher in the team interested in examining differences in mother-infant interactions for mothers with anxiety disorders, or personality disorder traits, at first the team prioritised women with high scores on a personality disorder screening measure and those who met diagnostic criteria for an anxiety disorder at baseline. Also, women that were challenging to follow-up over the telephone or those that required a home visit (e.g. women requiring interpreters, or those with mobility, transport or childcare issues) were also approached to take part in the mother-infant interaction to make efficient use of resources (researcher time and travel costs). Women who had a miscarriage or stillbirth were not approached for mother-infant interaction observation, and so were excluded from the present study. Once funding was secured covering the time period of July 2016 – June 2017, all women that remained in the sample to be followed-up were approached to take part in the mother-infant interactions.

2.3 Measures

A full table of the variables and data levels collected, alongside how these were coded for in analyses is included in Appendix 9.

2.3.1 Primary Outcome: Mother-Infant Interactions

At the 3-month follow-up after birth, mother-infant interactions were recorded in a 5-minute video clip taken during play at home. This was subsequently rated using the Crittenden CARE-Index (which can be used from birth to 15 months of age) by a trained and experienced independent rater, blind to the women's mental health status and the study research questions. The coder had Level II+ research coding reliability (the level required to code for research).

The CARE-Index is a play-based method for assessing dyadic synchrony; the quality of adult-infant interaction (Crittenden, 2013). The focus on the assessment of risk to relationships rather than individuals makes it distinct from other measures (Farnfield, Hautamäki, Nørbech, & Sahhar, 2010). This tool has been widely used in research with mothers with depression in the early postpartum period (Conroy et al., 2012), and validated for use with families from different social classes and cultural backgrounds (Farnfield et al., 2010).

The Infant CARE-Index has been validated in several studies of both low- and high-risk populations, showing convergent validity with maternal attachment representations and maternal psychopathology (Cassidy, Zoccolillo, & Hughes, 1996; Ward & Carlson, 1995). In prospective longitudinal studies, the CARE-Index has demonstrated predictive validity in terms of attachment security (Simo, Rauh, & Ziegenhain, 2000; Ward & Carlson, 1995). The CARE-Index has also been used to evaluate interventions aimed at increasing sensitivity, e.g. (Robert-Tissot et al., 1996). I did not find any studies where the CARE-Index was compared to another measure of sensitivity, thus demonstrating concurrent validity.

The CARE-Index has been used with an array of cultures, by researchers in Germany (Simo et al., 2000), Finland (Kemppinen et al., 2007), Russia (Pleshkova & Muhamedrahimov, 2008), North America (Ward & Carlson, 1995) and the United Kingdom (Conroy et al., 2012). However, I did not find any studies validating the CARE-Index in cultures outside of Europe or North America. The authors expect that there will be inter-cultural differences in parental sensitivity picked up in the CARE-Index, which reflect the history of dangers in the culture in question. Coders are, however, not meant to adapt the items to different cultures, but to apply the items similarly across cultures. If the results show a different pattern of scores, e.g. higher unresponsiveness in a particular culture (Hautamäki, 2010), the social and psychological meaning of the difference should be analysed in terms of how historical and current conditions of danger and safety have impacted on the culture's values, in particular, in regard to child rearing (Crittenden, 2003).

Coding comprises seven aspects of adult and infant dyadic behaviour: four aspects concentrate on affect (facial expression, verbal expression, affection and body contact) and three focus on temporal contingencies (turn-taking,

control and developmental appropriateness of chosen activity). Adult and infant are evaluated separately for each aspect of behaviour, and the scores are summed to generate seven scale scores. For adults these are sensitivity, control and unresponsiveness. For infants (new-born to 15 months) they are cooperativeness, compulsiveness, difficultness and passivity. The scores on each scale range from 0-14 (Crittenden, 2003). There is some guidance on cut-off scores for clinical use, although Crittenden argues against applying these rigidly or without additional assessment (Crittenden, 2003). On the adult sensitivity scale, a score of 7 or more is described as normally sensitive, whereas scores of 5-6 suggest the need for parental education, 3-4 suggests a parenting intervention is needed, and 0-2 suggests the parent may need psychotherapy (Crittenden, 2003). In research studies (Parfitt et al., 2013), the categories in Table 1 have been applied.

Table 1: Cut-off scores for maternal sensitivity categories

Maternal Sensitivity Score	**Category**	**Binary category**
11 – 14	Highly sensitive	Good enough
7 – 10	Adequately sensitive	
5 – 6	Ineptly sensitive	Needing intervention
0 – 4	High risk	

2.3.2 Primary Exposure: Maternal Experiences of Abuse

There were several measures used in the study that recorded experiences of abuse. Two measures of general traumatic experiences, and a measure of intimate partner violence were used to identify women who reported experiences of abuse in childhood and in adulthood.

Lifetime Traumatic Experiences: As part of the Structured Clinical Interview DSM-IV Axis I Anxiety Disorders Module interview conducted at baseline (First, Spitzer, Gibbon, & Williams, 2012), women were asked if they had ever experienced any traumatic events (see Appendix 10). The events were recorded, along with the ages at which they happened.

In addition, the Posttraumatic Stress Disorder Scale (PDS) was administered at baseline (Foa, Cashman, Jaycox, & Perry, 1997), in which women recorded if they had been exposed to traumatic events (see Appendix 11). The age at which the trauma happened was not included in the PDS question, and so it was not possible to differentiate between abuse at any age and childhood abuse*,* aside from sexual violence experiences as these were listed separately if they occurred under 18 years of age. As abuse experiences were taken from measures of PTSD, the types of traumatic events that were coded were specific. The diagnostic criteria for PTSD from the DSM-IV, on which both the SCID and PDS are based, requires that the traumatic event meet the "Criterion A"; that the event "involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others" (See Appendix 10). Therefore, the traumatic experiences captured by these measures are quite extreme, and abusive experiences are those that involve physical or sexual violence, and do not include experiences of emotional abuse, financial abuse or neglect.

Intimate Partner Violence: The Composite Abuse Scale – short version (CAS(S)) (Hegarty, Sheehan, & Schonfeld, 1999) was used at all three time-points. The CAS(S) is an 11-item self-administered questionnaire of physically and sexually abusive partner behaviours in the year before pregnancy and during pregnancy (Hegarty, Bush, & Sheehan, 2005; Hegarty et al., 1999). Each item responds to a behaviour from the partner e.g. "kicked me", and has six-point options for response 0= "never", 1= "only once" 2= "several times", 3= "monthly", 4= "weekly" or 5= "daily" (Hegarty et al., 2005; Hegarty et al., 1999). Two total scores, ranging from 0-55, are calculated for abuse prior to pregnancy and abuse during pregnancy; total scores are obtained by adding scores for all items (Hegarty, 2007). A cut-off score of three or more is indicative of abuse (Hegarty, 2007).

These measures were used in conjunction to assess lifetime experiences of abuse. The free-text descriptions of traumatic events recorded in the SCID were

analysed and coded where possible into categories of child abuse (sexual, physical and non-physical abuse by any person when under the age of 16 (including kidnapping; being held hostage; being locked in a room; emotional abuse)) and abuse (child abuse (sexual, physical, non-physical), partner abuse (sexual, physical, non-physical), sexual abuse at any age by any person, physical abuse by stranger (if defined as trauma in SCID module). The variables of 'childhood abuse' and 'lifetime abuse' were created using the combination of the SCID free-text coding of traumatic events, and items reported in the PDS and the CAS(S)

2.3.3 Socio-Demographic Characteristics

Data on age, ethnicity, immigration status, employment, income, education, relationship status and number of children were collected at baseline.

2.3.4 Obstetric/Medical

Smoking status and body mass index were collected at baseline. Whether the pregnancy was planned, and any previous miscarriages or terminations were collected at baseline.

2.3.5 Baby outcomes

If women consented for researchers to access their maternity notes, baby outcomes were collected from this database. Whether the pregnancy was a singleton, twins or triplets and the gestational age at delivery for each child were the variables of interest in this study.

2.3.6 Social Support

The Social Provisions Scale (Cutrona & Russell, 1987), a measure of perceived social support, was administered at all three time-points. It has been used in antenatal populations (Iapichino, Quartieri, Cauli, & Gala, 2012; Tzilos, Grekin, Beatty, Chase, & Ondersma, 2010). The SPS is a 24-item self-administered measure of perceived social support (Cutrona & Russell, 1987). Items are rated on a 4-point Likert scale ranging from 1= "strongly disagree" to 4= "strongly

agree" (Cutrona & Russell, 1987). Total scores are calculated by summing all of the responses; scores range from 24-96, with higher scores indicating more perceived social support.

2.3.7 Maternal Mental Health:

Mental disorder diagnosis:

At baseline, the Structured Clinical Interview for DSM-IV Axis I and II select modules were used to assess mood, anxiety, eating, and borderline personality disorders (First et al., 2012). The Structured Clinical Interview for DSM-IV (First et al., 2012) is a semi-structured diagnostic interview which has been widely used in psychiatric research (Spitzer, Williams, Gibbon, & First, 1992; Williams et al., 1992), including national epidemiological studies (Weissman et al., 1996; Williams et al., 1992). The interview consists of standardised diagnostic questions arranged in modules corresponding to each DSM-IV disorder (American Psychiatric Association, 2000).

Measures of target symptoms and behaviours:

- Depression: Edinburgh Postnatal Depression Scale (EPDS), a ten-item self-administered screen for perinatal depression, validated in 20 languages (Cox, Holden, & Sagovsky, 1987). The EPDS has a positive predictive value for postnatal major depression of 9-64% (cut-off score 9/10) or 17-100% (cut-off score 12/13) and for antenatal major depression 60-80% (cut-off score 14/15) (Gibson, McKenzie-Mcharg, Shakespeare, Price, & Gray, 2009). This measure was used at all time-points.

- Anxiety: Generalized Anxiety Disorder Scale (GAD-2) is a two-item self-administered screening questionnaire that measures the prevalence of core anxiety symptoms (Spitzer, Kroenke, Williams, & Lowe, 2006); it forms a sub-scale of the GAD-7 measure (Spitzer et al., 2006). The GAD-2 is scored on a range from 0 to 6, with a cut-off score of three indicative of anxiety symptoms; the measure demonstrates good sensitivity and specificity of 0.86 and 0.83, respectively (Kroenke, Spitzer, Williams, Monahan, & Lowe, 2007; Spitzer et al., 2006). This

measure was used at all time-points.

- PTSD: Posttraumatic Stress Disorder Scale (PDS®) is a 49-item self-administered questionnaire measuring lifetime exposure to traumatic events, as well as providing a diagnosis of PTSD and posttraumatic stress symptom severity in the past month (Foa, 1996). The measure is separated into four parts - part one contains 13 items and is completed by all respondents and parts two to four (containing a total of 36 items) are only completed by those reporting exposure to a traumatic event. The PDS has six components: (1) PTSD diagnosis, (2) symptom severity score, (3) number of symptoms endorsed, (4) specifiers related to onset and duration of symptoms, (5) symptom severity rating and (6) level of impairment in functioning; criterion must be met for each of the six components. The Symptom Severity Score ranges from 0 to 51 which is obtained by adding up the response weights of the individual's responses to items 22 to 38. Each item enquires on how often a particular PTSD symptom has bothered the subject in the past month. The cut-offs for the symptoms severity rating categories are listed below:

  ≤ 10 mild

  ≥11 and ≤ 20 moderate

  ≥21 and ≤ 35 moderate to severe

  ≥36 severe

  The PDS demonstrated strong internal consistency (Cronbach's α ≥ 0.78) and good sensitivity and specificity (0.89 and 0.75, respectively) with the SCID (Foa, 1996; Foa et al., 1997). This measure has previously been used in antenatal populations (Mezey, Bacchus, Bewley, & White, 2005).

- Hazardous alcohol use: The Alcohol Use Disorder Identification Test (AUDIT) is a ten-item self-administered questionnaire of alcohol use in the previous year (Babor, Higgins-Biddle, Saunders, & Monterio, 2008).

See Appendix 12 for further detail.

- Hazardous substance use: The Drug Use Disorders Identification Test (DUDIT) is an 11-item self-administered questionnaire of drug use and drug-related problems in the previous year (Berman, Bergman, Palmstierna, & Schylter, 2003). See Appendix 12 for further detail.

- Personality disorder screen: The Structured Assessment of Personality Abbreviated Scale (SAPAS) is an eight-item researcher-administered screening questionnaire which provides a validated measure of personality dysfunction (Moran et al., 2003). In the initial phase of recruitment for the mother-infant interactions, women who scored high on the SAPAS were targeted for sampling, and so the sample may be biased by this variable. The eight items correspond to a descriptive statement about the person and are scored either 0 = "no" or 1 = "yes"; the eight items are added together to produce a total score of between 0 and 8. A score of 3 or more on the SAPAS indicates probable personality disorder (Moran et al., 2003). The measure demonstrated good sensitivity and specificity (0.94 and 0.85, respectively) with the SCID (Moran et al., 2003).

2.4 Minimising Bias

2.4.1 Selection Bias

All observational studies are subject to the problem of selection bias. Here I outline the attempts to minimise selection bias through the design of this study.

Baseline:

Several attempts were made to contact women, as particularly women who are feeling low may be less likely to participate in research. Women were contacted at different times of the day and by different methods; phone calls, texts, emails and letters. However, there was a maximum number of contacts to ensure that women did not feel harassed. There were evening and weekend calls and appointments in order not to exclude women who were working. The research team were as flexible as possible to fit around women's schedules. Home visits were offered if it was easier for the women, particularly as many were caring for young children. Travel costs, as well as childcare costs were offered, in order to not exclude those that could not afford to participate.

Non-English speakers were contacted via a telephone interpretation services and face-to-face interpreters were arranged for any languages. Women were not excluded if the study instruments were not available translated, as interpreters were used instead. For asylum-seeking women staying in hostels, contact was made through the specialist migrant midwife for the hospital (in cases where the women had no access to a mobile phone), and interviews were conducted in the hostel so that women did not have to travel.

As the hospital collects some routine information about all women who have their booking appointment, a comparison between the maternity population and the WENDY sample allowed for some assessment of selection bias (See Appendix 13).

Follow-up:

A concerted effort was made not to lose women to the follow-up appointments at 28-weeks' gestation and 3-months postpartum. As described above for the baseline interview, several attempts and different strategies were used to try to contact women. As women with indicated anxiety disorders or personality dysfunction were prioritised for the mother-infant interactions initially, selection bias will have been introduced here. Furthermore, not all the women who took part in the 3-month follow-up consented to be filmed, and their reasons were recorded. A comparison analysis of the women who took part in the mother-infant interaction assessment to those who did not was possible using key

baseline characteristics (see Section 3.1.2) and allows for further assessment of selection bias in the sample.

2.4.2 Measurement Bias

Further discussion of measurement bias will take place in the discussion chapter, however here I discuss some attempts to reduce measurement bias of key variables in the study design.

Mother-infant interactions:

Observational measures of parent-infant interaction have been developed to provide a more objective assessment of behaviour, whereas self-reports may be biased by the parent's thoughts and feelings, language skills, and the influence of socially desired responses (Corcoran & Fischer, 2013). However, as the women were aware they were being filmed, there may still be the influence of social desirability on the way they behaved with their infants. As the video data was sent to an independent rater, blind to the research study aims and hypotheses, the influence of observer bias should be minimised.

Trauma and abuse:

Experiences of trauma and abuse were asked about by the researcher, for the PTSD module of the SCID, and women also self-completed the PDS and CAS(S) questionnaires on their own. There is always likely to be a large amount of underreporting of experiences of traumatic events, in particular interpersonal violence (intimate partner violence, abuse, childhood abuse) in research studies as simply recalling and reporting such experiences can be emotionally upsetting, and if someone is experiencing symptoms of trauma they may be avoiding thinking about or talking about the event. Indeed, it may be difficult for participants to remember abuse, particularly if it occurred in childhood (Briere & Conte, 1993). In addition, disclosure of this information may be potentially dangerous, embarrassing or incriminating to the participant (Rosenbaum & Langhinrichsen-Rohling, 2006). Particularly in the maternity setting, women may have fears about disclosure leading to enquiries about their capacity to care for

their children (Bacchus, Mezey, & Bewley, 2002). Women were assured that their responses were confidential, and that they did not have to answer any questions that they did not want to. However, the limits of confidentiality for safeguarding purposes mean that this may have remained an issue. The researchers were trained to ask about trauma experiences in a non-judgmental and empathic way, which women have described as helping with disclosure (Bacchus et al., 2002). As the PDS and CAS(S) were completed in private by the women, having two methods of disclosure – both face-to-face and self-complete – may have helped to encourage disclosures in the way that felt most comfortable for the women (Rosenbaum, Rabenhorst, Reddy, Fleming, & Howells, 2006).

Maternal mental health:

A gold-standard diagnostic tool, the SCID, was used at baseline to measure presence of different mental disorders. Maternal sensitivity was measured at 3-months postpartum, while most baseline interviews took place at around 3-months into pregnancy – thus there was a 9-month gap in the measures, a significant enough gap to assume mental disorders may not have remained constant, particularly with the life-changing event of the birth of a child occurring in between. Therefore, I decided to also include a measure of maternal mental health that was assessed at the 3-month postpartum interview, at the same time as the interaction was recorded; the EPDS. Information bias may have been introduced by women not wanting to endorse symptoms of mental health problems that they were experiencing for fears of the information being relayed to health services or social services. We attempted to minimise this information bias in the study design by reassuring women that information given was confidential, however, again the limits of confidentiality for safe-guarding purposes mean that this may have remained an issue.

2.4.3 Confounding

Observational studies cannot avoid the risk of confounding variables (those variables that are associated with both the exposure and the outcome, but do not lie on the causal pathway between hem) affecting the results. By measuring

as many potentially confounding variables, it is possible to include these variables in adjusted analyses and to control for some of the confounding that may be occurring. This issue is further discussed in Section 2.8.6.

2.5 Study size

As this was a secondary data analysis, there was no control over the sample size. The original, baseline sample size was calculated with the aim of the study being to estimate the effectiveness of the Whooley questions, taking into account the two-phase design with stratified sampling by Whooley status. The mother-infant interaction numbers were primarily determined by the opportunity for funding to collect these introduced later into the study timeline. While it would have been possible to detect the power I would have, with the number of women included in the sample size, using Cohen's *d* effect size conventions for a mean difference between two groups, the primary hypothesis was not testing a mean difference between two groups. For multiple regression analysis, a standardised measure of effect size that can be used is Cohen's f^2 statistic, which allows for an evaluation of local effect size within the context of a multivariate model (Selya, Rose, Dierker, Hedeker, & Mermelstein, 2012). Unfortunately, this measure is not available for STATA or SPSS, the software packages I had access to for this analysis. It is a complex calculation and in addition to the software I would require expertise to train me and support me in using it. Therefore, it was not possible to calculate a post-recruitment power calculation using standardised effect size conventions for this thesis but it is something I would like to include in future work with the appropriate training.

2.6 Ethical Issues and Service-User Involvement

Ethical approval for the original study was obtained from London Camberwell St. Giles NHS Research Ethics Committee. Further detail of ethical considerations and safety protocols are available for the original study. A Patient Advisory Group was set up for the original study to provide service-user

feedback on the study design, including the protocol and study instruments, including information sheets and consent forms.

Ethical approval for the secondary analysis of existing data was obtained from University of East London (UEL) (Appendix 14). The data export required for this study contained no personally identifiable data (the video interaction data had already been coded, and so video data was not accessed or used). As the original dataset included pseudo-anonymised sensitive data, the data protection guidance for the original study was followed, and the data was only accessed on the secure drives at the university where it was stored. I developed a Data Management Plan (Appendix 15), which was approved by UEL, to ensure that the research data was used and stored in line with UEL policy, General Data Protection Regulation (GDPR), and the data protection guidance for the original study.

2.7 Quantitative Variables

A description of the variables collected in the study, the data levels available for analysis, and the grouping used for the analyses used in this study are presented in Appendix 9. Some categorical variables were grouped into fewer levels, or into binary variables to ensure sufficient power to detect associations in analyses. For example, due to the small numbers of women who identified as ethnicities other than White or Black, I created a binary ethnicity variable of White or Black and minority ethnic (BAME).

2.8 Statistical Analysis

All statistical analyses were carried out using Stata 15 (StataCorp, 2017). I set the alpha level by convention to 0.05, so that *p*-values equal to or less than .05 were deemed statistically significant. However, as this is a somewhat arbitrary cut-off, confidence intervals were also reported for all relevant tests to provide information about the direction and strength of any associations (Du Prel,

Hommel, Röhrig, & Blettner, 2009). As there were many exploratory associations tested for before running the main hypothesis-testing analyses, the risk of Type 1 error is increased, and must be considered in the interpretation of these results. The study only tested one primary hypothesis, and a limited number of secondary hypotheses, so that these models could be examined with a limited number of tests, while the exploratory associations were used to inform model building but were not considered in the interpretation of the findings. Some studies use a strategy of lowering the p-value to reduce the risk of Type 1 error e.g. (Rose, Nice, Stenfert Kroese, Powell, & Oyebode, 2019). However, this has been objected to on the grounds that 1. This adjusted p-value is defined arbitrarily and variably and 2. Lowering the p-value increases the chance of making Type 2 errors (Feise, 2002). Rather, limiting the number of hypotheses to be tested, reducing the number of outcome measures, and reporting the magnitude and direction of any effect sizes has been suggested as a way of balancing the risk of Type 1 and 2 errors.

2.8.1 Data Checking

During the data entry phase of the study, data entered into the electronic database were checked against the hard copies of the completed interview packs twice. At this stage, any outliers were identified, and data points removed where appropriate.

2.8.2 Descriptive Statistics

Descriptive statistics were used to summarise the characteristics of the total study sample, stratified by those who took part in the mother-infant interaction recording and those who did not. Means and standard deviations were calculated for continuous variables and proportions for categorical variables. These estimates were calculated for the sample, not estimating to the population, and therefore population estimate weights (accounting for the over-sampling of Whooley positive women) were not used.

2.8.3 Comparison of Study Population to WENDY Population

Unadjusted univariate chi-squared tests for categorical variables, and two-tailed independent samples t-tests for continuous variables were carried out to test the significance of associations between the key variables and participation in the mother-infant interaction recordings. These analyses allow for consideration of the level of selection bias in the study sample.

2.8.4 Weighting

The study over-sampled women who screened positive for depression, and under-sampled those who screened negative for depression. As the research questions for this analysis did not include calculation of population prevalence estimates, there was no need to apply expansion weights to the data for the statistical analyses. Nonetheless, the weighting of the sample with potentially more depressed women must be taken into consideration in the interpretation of results, and in the generalisations that can be made from the sample to the population. Additionally, for the mother-infant interaction recording, the researchers oversampled women who met criteria for an anxiety disorder or screened positive for a personality disorder at baseline. As there was not a quantifiable, systematic approach to this over-sampling, it was not possible to apply weights to the data in analyses. Again, the impact on generalisability to the population is considered in the discussion.

2.8.5 Univariate Associations of Key Variables with the Exposure (Abuse) and the Outcome (Maternal Sensitivity)

Unadjusted univariate logistic regression analyses were carried out to test for associations between the variables of interest and maternal exposure to abuse. As well as testing for statistical significance of associations with the *p*-value, odds ratios with their 95% confidence intervals were calculated and presented to be able to assess the strength of association. Unadjusted univariate linear regression analyses were carried out to test for associations between the variables of interest and maternal sensitivity in the mother-infant interaction. Again, the regression coefficients along with their 95% confidence intervals were calculated and presented alongside the *p*-value to give indication of effect

size. The increased risk of chance associations resulting from multiple testing must be considered when interpreting these results (Feise, 2002).

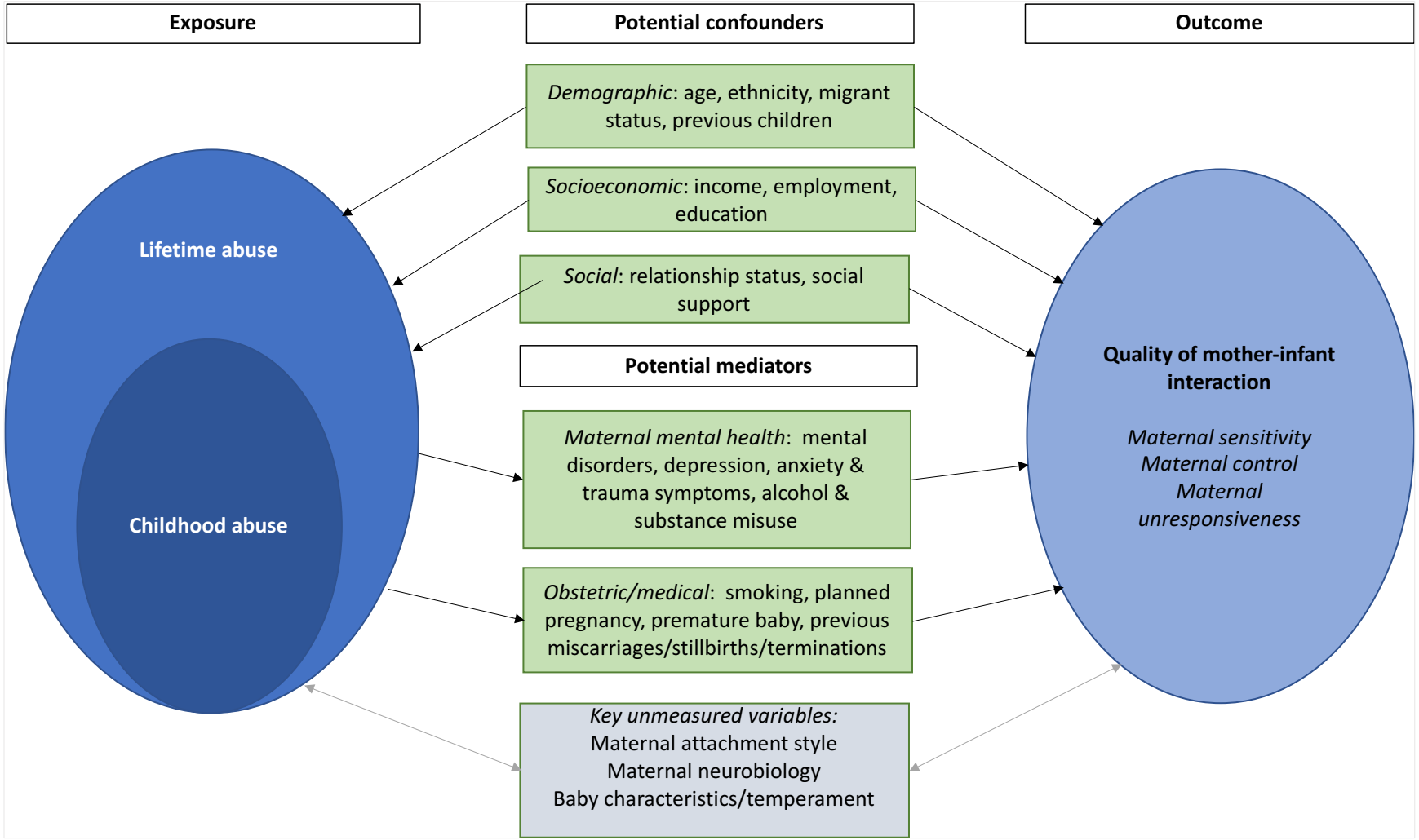
2.8.6 Hypotheses

Unadjusted linear regression was used to test the primary hypothesis of whether lifetime experience of abuse predicted maternal sensitivity in the 3-month postpartum mother-infant interaction. A further unadjusted linear regression model was run to test the secondary hypothesis of whether experience of childhood abuse (reported in pregnancy) predicted maternal sensitivity. Finally, unadjusted linear regression models were run to test the secondary hypotheses of whether lifetime experience of abuse would predict maternal control or maternal unresponsiveness in the 3-month postpartum mother-infant interaction.

Adjustment analyses:

Confounders are variables that are associated with both the exposure and the outcome, but do not lie on the causal pathway between them. Mediators are variables that are associated with both the exposure and the outcome but do lie on the causal pathway between them. As this study used two time-points, it was not possible to conduct formal mediation analysis. However, a theoretical model for how the variables may relate to one another causally is included in Figure 4, as it was used in decisions as to which covariates to include in analysis and is important for interpretation of the result.

Figure 4: Theoretical causal diagram of variables in analysis



Although in this model different variables are grouped into potential confounders and potential mediators of any association between trauma and mother-infant interactions, in reality the picture is likely more complicated. Many of the associations between the potential confounders and trauma are likely to be causally bi-directional. For example, although lower socioeconomic status and social support may increase risk of exposure to trauma and abuse, experiences of trauma and abuse are likely to negatively impact on socioeconomic status and social support. Thus, many of the variables considered as potential confounders may also be mediators of the association, lying on the causal pathway. There are also likely to be many associations between the different confounding/mediating variables, e.g. the very well-known associations between mental health and socioeconomic, social, and demographic variables.

For the adjusted analyses of the main association between maternal abuse and maternal sensitivity, variables were introduced into the regression analysis in their particular groups (socioeconomic, demographic, social, obstetric/medical and maternal mental health) in turn to evaluate the impact of each set of contextual variables individually. The maternal mental health model and the full model were both run twice, once including and once excluding "current" mental health symptoms as assessed by the 3-month postpartum EPDS. Both the effect on the strength of the primary association (the regression coefficient for maternal abuse on maternal sensitivity) and the amount of variance in maternal sensitivity explained by the models (through the R^2 statistic), were calculated and reported. A final multiple linear regression model was then run including all of the potential confounding and/or mediating variables.

2.8.7 Testing for the Assumptions of Linear Regression

I tested for the key assumptions for using multiple linear regression, following guidance for application to the behavioural sciences (Cohen, Cohen, West, & Aiken, 2013). This is often neglected in Clinical Psychology research (Ernst & Albers, 2017). As no assumptions were violated, I continued to use the planned multiple regression analysis. See Appendix 16 for the tests and their outcomes.

2.8.8 Missing Data

Numbers and proportions of missing data for all variables included in the analysis were reported. Where possible, scales with missing data (on particular items, not on the whole scale) were imputed. Person mean substitution is the preferred method for imputing cross-sectional missing data (Hawthorne & Elliott, 2005). Where an individual was missing up to 20% of data on a Likert scale measure, the missing values were imputed using their mean rating for their completed items (Downey & King, 1998). Imputation was used for individual cases with less than 20% missing items for the following measures: EPDS, PDS symptoms, AUDIT, DUDIT, SPS. A complete case analysis was conducted for the fully adjusted model. Sensitivity analyses were conducted to test for associations between missingness (not being included in the fully adjusted model) and key study variables, in order to evaluate any bias introduced.

3 RESULTS

3.1 Description of the Study Sample

3.1.1 Flow Diagram

Figure 5 presents a flow diagram for numbers of women included in this study. In total, 264 women were approached to take part in the mother-infant interaction video and 78% (n=206) agreed. Nine of these women were recruited directly to the DAWN trial that was being conducted alongside the WENDY study; Depression: an exploratory parallel-group randomised controlled trial of Antenatal guided self-help for WomeN (DAWN); (Trevillion et al., 2016), and therefore were not included in the current analysis, as they formed a parallel but separate study population. The total sample of mother-infant dyads for the current analysis was n=197.

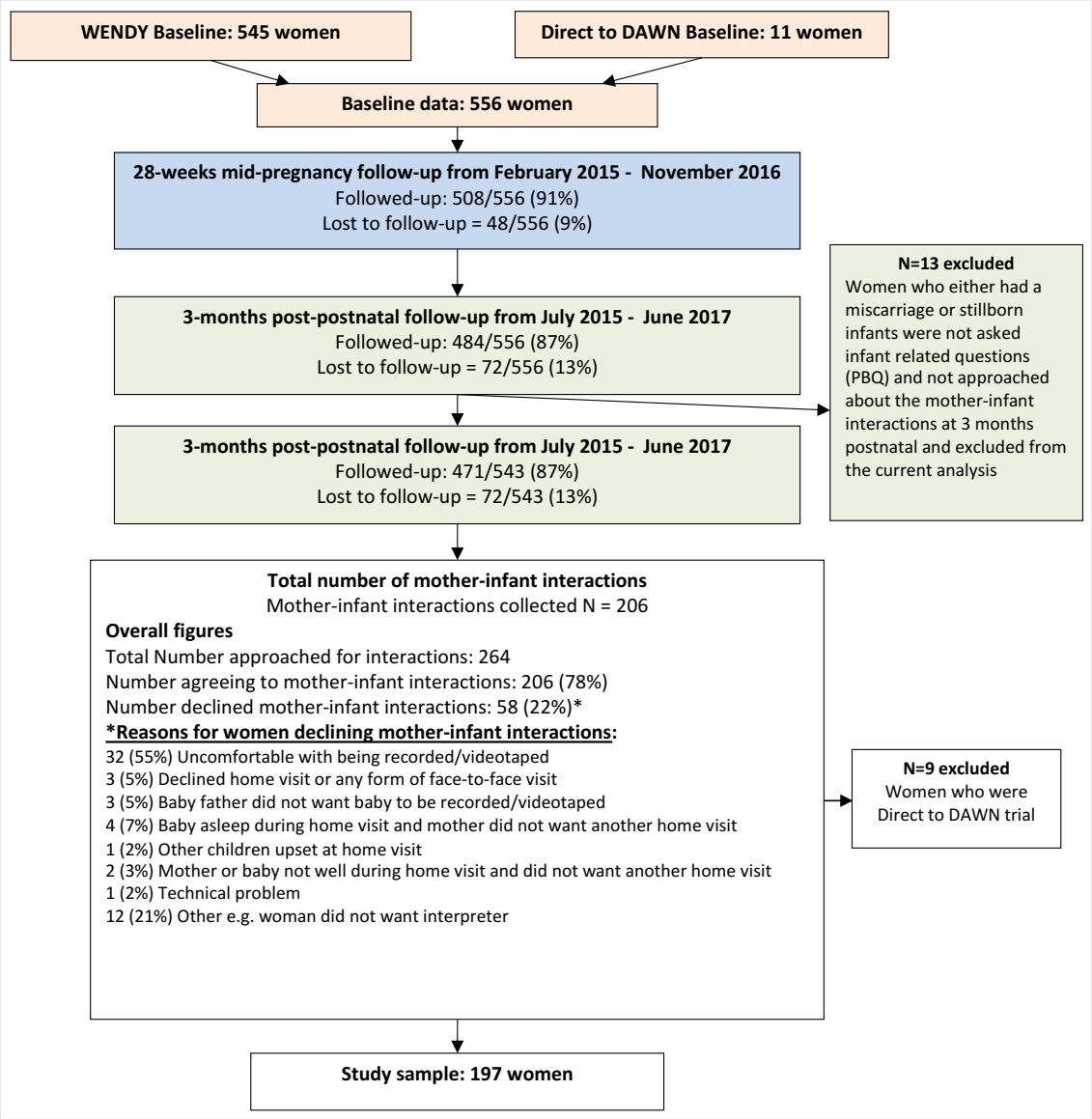


Figure 5: Flow diagram of women included in the study sample

3.1.2 Sample Characteristics and Comparison to Whole WENDY Sample

A comparison of the WENDY population with the wider maternity population is included in Appendix 13. Table 2 shows the comparison between the study sample and the WENDY participants that did not take part in the mother-infant interactions. Unadjusted univariate chi-squared tests for categorical variables, and two-tailed independent samples t-tests for continuous variables were conducted to compare samples on key variables of interest. Of the 545 WENDY participants who were not direct to the DAWN trial, 71 were lost to follow up. Therefore, for measures at 3 months, the sample who did not take part in mother-infant interactions totalled 277 participants. There were only significant differences between the samples on the maternal mental health variables. Women who took part in the mother-infant interactions were more likely to have screened positive on the Whooley questions at their booking appointment, and more likely to have met criteria for a mental disorder at baseline, or a probable PD with the SAPAS. They had higher depression, anxiety, trauma and substance misuse symptoms at baseline, and higher anxiety symptoms at 3-month follow-up.

Table 2: Comparison between the study sample and WENDY study participants that did not take part in mother-infant interactions (Unadjusted univariate chi-squared tests for categorical variables, and two-tailed independent samples t-tests for continuous variables)

Variable	**Level**	**Study sample (n=197)**	**Did not take part (baseline n=348, 3-month n=277)**	**Test**
		N (%)	**N (%)**	***p*-value**
Socio-demographic				
Age	*Mean (SD)*	32.07 (5.25)	32.47 (5.99)	.44
Ethnicity	White	112 (56.85)	172 (49.43)	.44
	Black	56 (28.43)	121 (34.77)	
	Asian	9 (4.57)	22 (6.32)	
	Mixed	8 (4.06)	15 (4.31)	
	Other	12 (6.09)	18 (5.17)	
Immigration status	UK National	119 (60.41)	214 (61.49)	.69
	EEA citizen	29 (14.72)	49 (14.08)	
	Indefinite leave to remain	17 (8.63)	34 (9.77)	
	Exceptional leave to remain or temporary admission	16 (8.12)	16 (4.60)	
	Awaiting initial decision or appealing initial refusal	8 (4.06)	14 (4.02)	
	Spousal/family/ancestral visa	4 (2.03)	12 (3.45)	
	Other	4 (2.03)	9 (2.59)	
Employment	Paid employment	131 (66.50)	218 (62.64)	.22
	Student/voluntary job	5 (2.54)	17 (4.89)	
	Not working	48 (24.37)	92 (26.44)	
	Other	11 (5.58)	21 (6.03)	
	Missing	2 (1.02)	0 (0.00)	
Income	0-15000	31 (15.74)	46 (13.22)	.21
	15000-45000	45 (22.84)	86 (24.71)	
	>46000	83 (42.13)	125 (35.92)	
	Rather not say/missing	38 (19.29)	91 (26.15)	
Education	GCSE/equivalent or less	21 (10.66)	44 (12.64)	.62
	A-level or equivalent	53 (26.90)	101 (29.02)	
	University degree or higher	123 (62.44)	203 (58.33)	

Table 2 (continued)

Variable	Level	Study sample (n=197)	Did not take part (baseline n=348, 3-month n=277)	Test
		n (%)	n (%)	*p*-value
Mental health				
Whooley status at baseline	Positive Negative	133 (67.51) 64 (32.49)	154 (44.25) 194 (55.75)	<.01
SCID disorder at baseline	Disorder present No disorder present *Missing*	82 (41.62) 113 (57.36) 2 (1.02)	107 (30.75) 231 (66.38) 10 (2.87)	<.01
Depressive symptoms at baseline	*Mean (SD)* *Missing*	9.87 (6.45) 3 (1.52)	7.95 (6.21) 3 (0.86)	<.01
Anxiety symptoms at baseline	*Mean (SD)* *Missing*	1.69 (1.64) 5 (2.53)	1.27 (1.61) 12 (3.45)	.01
PTSD symptoms at baseline[i]	*Mean (SD)* *Missing*	5.73 (10.13) 8 (4.06)	3.69 (8.30) 26 (7.47)	.01
PD screening status at baseline (SAPAS)	Likely PD Not likely PD	58 (29.44) 139 (70.56)	76 (21.84) 272 (78.16)	.05
Hazardous alcohol use	No Yes *Missing*	155 (78.68) 35 (17.77) 7 (3.55)	281 (80.75) 46 (13.22) 21 (6.03)	.19
Hazardous substance use	No Yes *Missing*	169 (85.79) 24 (12.18) 4 (2.03)	302 (86.78) 23 (6.61) 23 (6.61)	.01
Depressive symptoms at 3-months	*Mean (SD)* *Missing*	6.99 (5.25) 0	6.26 (5.13) 0	.13
Anxiety symptoms at 3 months	*Mean (SD)* *Missing*	1.17 (1.45) 33 (16.75)	0.88 (1.34) 7 (2.53)	.04

[i] *If a participant reported no traumatic events on the PDS their symptom score was coded as 0*

Table 2 (continued)

Variable	Level	Study sample (n=197)	Did not take part (baseline n=348, 3-month n=277)	Test
		n (%)	n (%)	*p*-value
Obstetric/medical				
Smoking	No	189 (95.94)	334 (95.98)	.98
	Yes	8 (4.06)	14 (4.02)	
Planned pregnancy	Planned	128 (64.97)	228 (65.52)	.90
	Unplanned	69 (35.03)	120 (34.48)	
Previous miscarriages/stillbirths	No	136 (69.04)	238 (68.39)	.90
	Yes	60 (30.46)	109 (31.32)	
	Missing	1 (0.51)	1 (0.29)	
Previous terminations	No	138 (70.05)	237 (68.10)	.69
	Yes	59 (29.95)	110 (31.61)	
	Missing	0 (0.00)	1 (0.29)	
Baby outcomes				
Pregnancy	Single	193 (97.97)	295 (84.77)	.98
	Twins	4 (2.03)	6 (1.72)	
	Missing	0	47 (13.51)	
Premature	No	188 (95.43)	280 (80.46)	.33
	Yes	9 (4.57)	20 (5.75)	
	Missing	0	48 (13.79)	
Social support				
Social support score at baseline	*Mean (SD)*	80.73 (11.59)	81.80 (10.64)	.29
	Missing	6 (3.05)	20 (5.75)	
Social support score at 3 months	*Mean (SD)*	82.72 (10.15)	83.64 (10.72)	.35
	Missing	2 (1.02)	3 (1.08)	
Relationship status	Single	20 (10.15)	42 (12.07)	.58
	Partner not cohabiting	31 (15.74)	51 (14.66)	
	Married/cohabiting	141 (71.57)	251 (72.13)	
	Separated/divorced/widowed	5 (2.54)	4 (1.15)	
Any children	No	94 (47.72)	177 (50.86)	.48
	Yes	103 (52.28)	171 (49.14)	

Table 2 (continued)

Variable	Level	Study sample (n=197)	Did not take part (baseline n=348, 3-month n=277)	Test
		n (%)	n (%)	*p*-value
Trauma and abuse				
Traumatic events reported	0	57 (28.93)	126 (36.21)	.19
	1	56 (28.43)	84 (24.14)	
	>1	80 (40.61)	125 (35.92)	
	Missing	4 (2.03)	13 (3.74)	
Experience of abuse at baseline	No	127 (64.47)	246 (70.69)	.23
	Yes	70 (35.53)	101 (29.02)	
	Missing	0 (0.00)	1 (0.29)	
Experience of childhood abuse	No	175 (88.83)	309 (88.79)	.43
	Yes	19 (9.64)	28 (8.05)	
	Missing	3 (1.52)	11 (3.16)	
Experience of any IPV between baseline and 3-month follow-up[i]	No	131 (66.50)	206 (59.20)	.14
	Yes	7 (3.55)	9 (2.59)	
	Missing	59 (29.95)	133 (38.22)	
Experience of abuse with IPV since baseline added[ii]	No	125 (63.45)	242 (69.54)	.24
	Yes	72 (36.55)	105 (30.17)	
	Missing	0	1 (0.29)	

[i] As measured by the CAS(S) at 28-week gestation and 3-month postpartum follow-ups

[ii] Any experience of abuse at baseline *and/or* experience of IPV between baseline and 3-month follow-up

Table 3 provides a description of the mother-infant interaction variables. In this sample only 17.26% of mothers would be considered adequately sensitive, or 'good enough' (scores of 7 and above), with 59.90% being considered high risk. Table 4 presents a correlation matrix of the relationships between the maternal mother-infant interaction variables. As expected with the CARE-Index, maternal sensitivity was negatively correlated with maternal control and maternal unresponsiveness.

Table 3: Description of the mother-infant interaction variables (n=197)

Variable	**Mean (SD)**	**Median (range)**	**Categorical**	**n (%)**
Maternal sensitivity	4.16 (2.88)	4 (0-13)	Highly sensitive	9 (4.57)
			Adequately sensitive	25 (12.69)
			Ineptly sensitive	45 (22.84)
			High risk	118 (59.90)
Maternal control	3.70 (4.12)	2 (0-14)	*No defined cut-offs*	
Maternal unresponsiveness	6.14 (3.57)	6 (0-14)	*No defined cut-offs*	

Table 4: Correlation matrix of the relationships between the maternal behaviour patterns as coded in the CARE-Index from the mother-infant interaction recordings

	Maternal sensitivity	**Maternal control**
Maternal control	-0.53*	
Maternal unresponsiveness	-0.20*	-0.73*

* $p<.05$

Univariate Associations Between Key Variables and Exposure and Outcome

The unadjusted univariate logistic regressions between key variables and maternal experience of abuse are shown in Table 5. Being older, earning over £46,000, higher social support and being in a relationship were all associated with decreased odds of reporting abuse experiences. Not working, positive PD screen, unplanned pregnancy, previous terminations, increased symptoms of trauma and depression were associated with increased odds of abuse.

Table 5: Univariate associations between experience of abuse and key variables

Variable	**Level**	**Odds Ratio**	***p*-value**	**95% confidence intervals**
Age	*Continuous*	0.93	.02	0.88 – 0.99
Ethnicity	White	*ref*		
	BAME	1.19	.56	0.66 – 2.13
Migrant status	UK-born	*ref*		
	Migrant	0.98	.93	0.55 – 1.74
Previous children	No	*ref*		
	Yes	0.95	.85	0.53 – 1.69
Income	0-15k	*ref*		
	15-45k	0.40	.06	0.16 – 1.02
	46k+	0.31	<.01	0.13 – 0.73
Employment	Paid work	*ref*		
	Not working	2.14	.02	1.16 – 3.95
Education	No degree	*ref*		
	University degree	0.58	.07	0.32 – 1.05
Relationship status	Single	*ref*		
	In a relationship	0.40	.04	0.17 – 0.94
Social support	*Continuous*	0.94	<.01	0.91 – 0.97
Mental disorder	No	*ref*		
	Yes	2.73	<.01	1.44 – 5.13
Positive PD screen (SAPAS)	No	*ref*		
	Yes	2.02	.03	1.08 – 3.77
Depression symptoms (3-month)	*Continuous*	1.08	<.01	1.02 – 1.15
Anxiety symptoms (3-month)	*Continuous*	1.13	.25	0.91 – 1.41
Trauma symptoms	*Continuous*	1.12	<.01	1.07 – 1.17
Hazardous alcohol use	No	*ref*		
	Yes	1.01	.97	0.48 – 2.17
Hazardous substance use	No	*ref*		
	Yes	2.20	.07	0.93 – 5.22
Smoking	No	*ref*		
	Yes	3.03	.14	0.70 – 13.1
Planned pregnancy	Planned	*ref*		
	Unplanned	2.53	<.01	1.38 – 4.65
Previous miscarriages/stillbirths	No	*ref*		
	Yes	1.71	.09	0.92 – 3.19
Previous terminations	No	*ref*		
	Yes	3.22	<.01	1.71 – 6.07
Premature baby	No	*ref*		
	Yes	0.48	.37	0.10 – 2.38

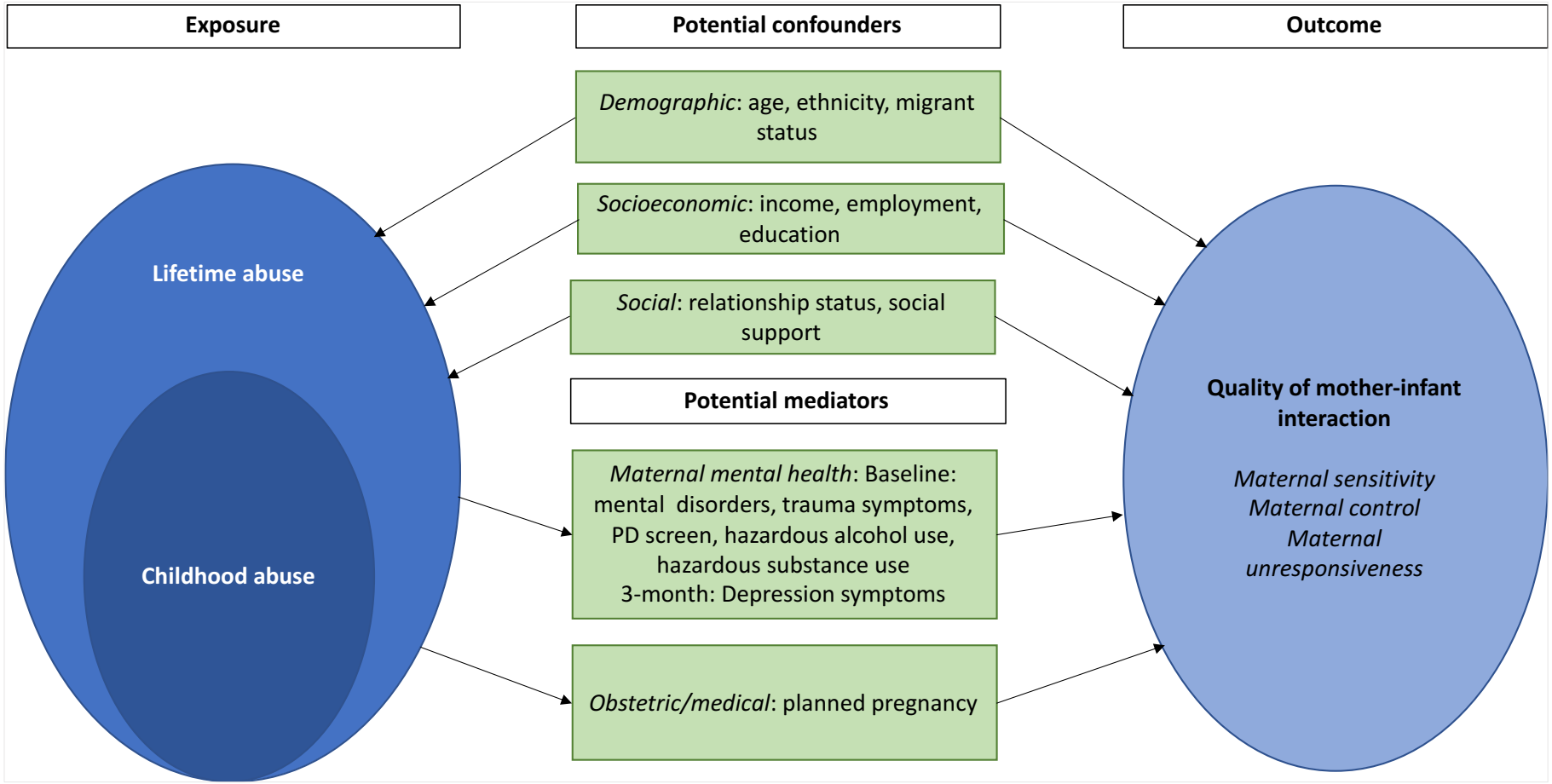
The unadjusted univariate linear regressions between key variables and maternal sensitivity are shown in Table 6. Being older, having a higher income and a university degree, being in a relationship, higher levels of social support and drug and alcohol use were all associated with higher maternal sensitivity. Being BAME, a migrant, unemployed, screening positive for depression and probable PD, and having an unplanned pregnancy were all associated with decreased sensitivity in the mother-infant interaction.

Table 6: Univariate associations of maternal sensitivity with key variables

Variable	**Level**	**Coefficient**	***p*-value**	**95% confidence intervals**
Age	*Continuous*	0.12	<.01	0.04 – 0.19
Ethnicity	White	*ref*		
	BAME	-2.56	<.01	-3.30 – -1.83
Migrant status	UK-born	*ref*		
	Migrant	-1.64	<.01	-2.42 – -0.86
Previous children	No	*ref*		
	Yes	-0.10	.82	-0.91 – 0.72
Income	0-15k	*ref*		
	15-45k	1.63	.01	0.38 – 2.87
	46k+	3.09	<.01	1.97 – 4.21
Employment	Paid work	*ref*		
	Not working	-1.87	<.01	-2.70 – -1.03
Education	No degree	*ref*		
	University degree	1.75	<.01	0.95 – 2.56
Relationship status	Single	*ref*		
	In a relationship	2.38	<.01	1.21 – 3.56
Social support		0.08	<.01	0.05 – 0.12
Mental disorder	No	*ref*		
	Yes	-0.41	.32	-1.24 – 0.41
Positive PD screen	No	*ref*		
	Yes	-1.06	.02	-1.94 – -0.18
Depression symptoms (3-month)	*Continuous*	-0.11	.01	-0.18 – -0.03
Anxiety symptoms (3-month)	*Continuous*	-0.27	.08	-0.58 – 0.04
Trauma symptoms	*Continuous*	-0.07	<.01	-0.11 – -0.03
Hazardous alcohol use	No	*ref*		
	Yes	1.46	.01	0.41 – 2.51
Hazardous substance use	No	*ref*		
	Yes	1.27	.04	0.04 – 2.51
Smoking	No	*ref*		
	Yes	0.48	.64	-1.58 – 2.54
Planned pregnancy	Planned	*ref*		
	Unplanned	-1.50	<.01	-2.32 – -0.67
Previous miscarriages/stillbirths	No	*ref*		
	Yes	-0.56	.21	-1.44 – 0.32
Previous terminations	No	*ref*		
	Yes	-0.50	.27	-1.38 – 0.39
Premature baby	No	*ref*		
	Yes	-1.21	.22	-3.16 – 0.72

As mental health at baseline was best represented by any mental disorder diagnosis from the SCID, trauma symptoms and PD screen, depression symptoms from the EPDS were only used for the 3-month time-point for further analyses. As the EPDS contains three items that measure anxiety (Brouwers, van Baar, & Pop, 2001), the GAD-2 was not included in subsequent analyses, as it only contains two anxiety items, and may have introduced multicollinearity. Having previous children, previous miscarriages or stillbirths, prematurity of baby, and smoking were all neither associated with experience of abuse or maternal sensitivity and were therefore removed from the model for further analyses. The variables included in subsequent analyses are outlined in Figure 6.

Figure 6: Variables included in analyses



3.2 The Association Between Maternal Abuse and Quality of Mother-Infant Interactions

As the variable of lifetime abuse also includes childhood abuse, two separate univariate regressions were run to predict maternal sensitivity.

3.2.1 Primary Hypothesis

Reporting experience of lifetime abuse was not statistically significantly associated with maternal sensitivity in the mother-infant interaction at the 3-month postpartum follow-up; $F(1, 195)=2.84$, $p=0.09$, $R^2=0.01$. The coefficient was -0.72 (95% CI -1.55 – 0.12), suggesting a potential decrease in maternal sensitivity associated with experience of abuse. The amount of variance in maternal sensitivity accounted for by the model including only maternal abuse was 1.4%.

3.2.2 Secondary Hypotheses

Maternal experience of childhood abuse will be associated with decreased maternal sensitivity in 3-month postpartum interactions with their infant:

Reporting experience of childhood abuse was not statistically significantly associated with maternal sensitivity in the mother-infant interaction at the 3-month postpartum follow-up; $F(1, 192)=0.55$, $p=0.46$, $R^2<0.01$.

Maternal experience of abuse will be associated with increased unresponsiveness and increased control in 3-month postpartum interactions with their infant:

Reporting experience of abuse was not statistically significantly associated with either maternal control $F(1, 195)=0.17$, $p=0.68$, $R^2<0.01$ or maternal unresponsiveness $F(1, 195)=0.77$, $p=0.38$, $R^2<0.01$ in the mother-infant interaction at the 3-month postpartum follow-up.

3.2.3 Adjusting the Main Association

As described in Section 2.8.6, the groups of variables considered to be potential confounders or mediators of the relationship between maternal abuse and maternal sensitivity were entered into the regression model in groups. The amount of variance in maternal sensitivity accounted for by abuse alone was 1.4% and so the amount of variance accounted for by the addition of groups of variables is compared to that statistic.

Demographic variables

A significant regression equation was found to predict maternal sensitivity based on abuse and demographic variables; $F(4, 192)=14.35$, $p<0.01$, $R^2=0.21$. Table 7 shows the individual associations of variables with maternal sensitivity, adjusted for the other variables in the model. Only ethnicity was a statistically significant predictor of maternal sensitivity, with being BAME reducing sensitivity by between 1.3 and 2.9 points. This model accounted for 21.41% of the variance in maternal sensitivity.

Table 7: Multiple linear regression predicting maternal sensitivity based on abuse and demographic variables

Variable	**Level**	**Coefficient**	***p*-value**	**95% Confidence intervals**
Abuse	No	*ref*		
	Yes	-0.51	.19	-1.27 – 0.25
Age	*Continuous*	0.06	.09	-0.01 – 0.13
Ethnicity	White	*ref*		
	BAME	-2.14	<.01	-2.94 – -1.33
Migrant status	UK-born	*ref*		
	Migrant	-0.69	.09	-1.48 – 0.10

Socioeconomic variables:

A significant regression equation was found to predict maternal sensitivity based on abuse and socioeconomic variables; $F(5,152)=6.48$, $p<0.01$, $R^2=0.18$. Table 8 shows the individual associations of variables with maternal sensitivity, adjusted for the other variables in the model. Only having a household income over £46,000 was a statistically significant predictor of maternal sensitivity, increasing sensitivity by between 1.2 to 4.2 points in comparison to the lowest income group. This model accounted for 14.87% of the variance in maternal sensitivity.

Table 8: Multiple linear regression predicting maternal sensitivity based on abuse and socioeconomic variables

Variable	**Level**	**Coefficient**	***p*-value**	**95% Confidence intervals**
Abuse	No	*ref*		
	Yes	-0.45	.33	-1.36 – 0.47
Employment	Paid work	*ref*		
	Not working	-0.33	.57	-1.49 – 0.82
Income	0-15k	*ref*		
	15-45k	1.35	.06	-0.06 – 2.77
	46k+	2.74	<.01	1.23 – 4.24
Education	No degree	*ref*		
	University degree	0.07	.90	-1.05 – 1.20

Social support variables:

A significant regression equation was found to predict maternal sensitivity based on abuse and social support variables; $F(3,179)=10.00$, $p<0.01$, $R^2=0.14$. Table 9 shows the individual associations of variables with maternal sensitivity, adjusted for the other variables in the model. Both social support total score and relationship status were significant predictors of maternal sensitivity. A one-point increase in social support score (large range, so small increment) increased sensitivity between 0.03 to 0.1 points and being in a relationship increased sensitivity between 0.2 and 2.7 points. This model accounted for 12.16% of the variance in maternal sensitivity.

Table 9: Multiple linear regression predicting maternal sensitivity based on abuse and social support variables

Variable	**Level**	**Coefficient**	***p*-value**	**95% Confidence intervals**
Abuse	No	*ref*		
	Yes	-0.08	.85	-0.92 – 0.76
Social support	*Continuous*	0.07	<.01	0.03 – 0.10
Relationship status	Single	*ref*		
	In a relationship	1.43	.03	0.15 – 2.70

Mental health variables:

A significant regression equation was found to predict maternal sensitivity based on mental health measures; $F(7,176)=3.32$, $p<.01$, $R^2=0.12$. Table 10 shows the individual associations of variables with maternal sensitivity, adjusted for the other variables in the model. Trauma symptoms were a significant predictor of maternal sensitivity, although the coefficient was small; an increase of one point on the PDS was associated with a 0.1 point decrease on maternal sensitivity score. This model accounted for 8.14% of the variance in maternal sensitivity. There was little difference in the model when the 3-month depression symptoms were excluded; $F(6,177=3.53$, $p<.01$, $R^2=0.11$ (see Table 11 for individual adjusted associations).

Table 10: Multiple linear regression predicting maternal sensitivity based on abuse and mental health measures

Variable	**Level**	**Coefficient**	***p*-value**	**95% Confidence intervals**
Abuse	No	*ref*		
	Yes	-0.11	.82	-1.06 – 0.85
Mental disorder	No	*ref*		
	Yes	0.25	.60	-0.69 – 1.19
PD screen	No	*ref*		
	Yes	-0.60	.24	-1.59 – 0.40
PTSD symptoms	*Continuous*	-0.05	.04	-0.10 – -0.01
Hazardous alcohol use	No	*ref*		
	Yes	0.81	.18	-0.37 – 2.01
Hazardous substance use	No	*ref*		
	Yes	1.03	.14	-0.33 – 2.40
Depression symptoms (3-months)	*Continuous*	-0.06	.16	-0.15 – 0.02

Table 11: Multiple linear regression predicting maternal sensitivity based on abuse and mental health measures excluding 3-month depression symptoms

Variable	**Level**	**Coefficient**	***p*-value**	**95% Confidence intervals**
Abuse	No	*ref*		
	Yes	-0.19	.69	-1.14 – 0.75
Mental disorder	No	*ref*		
	Yes	0.11	.81	-0.81 – 1.04
PD screen	No	*ref*		
	Yes	-0.69	.18	-1.68 – 0.31
PTSD symptoms	*Continuous*	-0.06	.02	-0.11 – -0.01
Hazardous alcohol use	No	*ref*		
	Yes	0.83	.17	-0.36 – 2.02
Hazardous substance use	No	*ref*		
	Yes	1.11	.11	-0.25 – 2.48

Planned pregnancy:

A significant regression equation was found to predict maternal sensitivity based on abuse and planned pregnancy; $F(2,194)=6.89$, $p=0.01$, $R^2=0.06$. Table 12 shows that unplanned pregnancy significantly decreased maternal sensitivity between 0.5 and 2 points, adjusted for experiences of abuse. This model accounted for 5.67% of the variance in maternal sensitivity.

Table 12: Multiple linear regression predicting maternal sensitivity based on abuse and obstetric measures

Variable	**Level**	**Coefficient**	**p-value**	**95% Confidence interval**
Abuse	No	*ref*		
	Yes	-0.41	.33	-1.25 – 0.42
Planned pregnancy	Yes	*ref*		
	No	-1.41	<.01	-2.23 – -0.56

Full model with all variables added:

A significant regression equation was found to predict maternal sensitivity based on the full model including all key variables; $F(17,128)=2.99$, $p<0.01$, $R^2=0.28$. Table 13 shows the individual contributions of each variable to predicting maternal sensitivity, adjusted for all the other variables in the full model. The only significant independent predictor of maternal sensitivity in the full model was ethnicity, with being BAME decreasing maternal sensitivity by between 0.5 and 2.9 points. Although the confidence intervals crossed 0 (not significant), being in a relationship and earning in the higher income brackets appeared to increase sensitivity up to over 2 points, and 3-month depression symptoms decreased sensitivity. The full model accounted for 18.90% of the variance in maternal sensitivity. There was very little difference to the model when the 3-month depression symptoms were excluded; $F(16,129)=2.97$, $p<0.01$, $R^2=0.27$ (see Table 14 for individual adjusted associations).

Table 13: Full model linear regression to predict maternal sensitivity

Variable	**Level**	**Coefficient**	***p*-value**	**95% Confidence intervals**
Abuse	No	*ref*		
	Yes	-0.30	.58	-1.38 – 0.78
Age	*Continuous*	-0.01	.91	-0.13 – 1.03
Ethnicity	White	*ref*		
	BAME	-1.69	<.01	-2.86 – -0.52
Migrant status	UK-born	*Ref*		
	Migrant	-0.27	.62	-1.36 – 0.81
Employment	Paid work	*ref*		
	Not working	-0.10	.88	-1.33 – 1.14
Income	0-15k	*ref*		
	15-45k	0.91	.27	-0.71 – 2.53
	46k+	1.26	.18	-0.61 – 3.15
Education	No degree	*ref*		
	University degree	-0.56	.37	-1.79 – 0.67
Social support	*Continuous*	<0.01	.99	-0.05 – 0.06
Relationship status	Single	*ref*		
	In a relationship	1.21	.20	-0.70 – 3.10
Mental disorder	No	*ref*		
	Yes	-0.09	.85	-1.12 – 0.93
PD screen	No	*ref*		
	Yes	-0.21	.73	-1.38 – 0.97
Trauma symptoms	*Continuous*	-0.02	.50	-0.08 – 0.04
Hazardous alcohol use	No	*ref*		
	Yes	-0.17	0.80	-1.46 – 1.13
Hazardous substance use	No	*ref*		
	Yes	0.85	0.29	-0.72 – 2.42
Depression symptoms (3m)	*Continuous*	-0.09	0.11	-0.19 – 0.02
Planned pregnancy	Yes	*ref*		
	No	0.28	0.67	-1.02 – 1.58

Table 14: Full model linear regression to predict maternal sensitivity excluding 3-month depression symptoms

Variable	**Level**	**Coefficient**	***p*-value**	**95% Confidence intervals**
Abuse	No	*ref*		
	Yes	-0.40	.46	-1.48 – 0.67
Age	*Continuous*	-0.02	.69	-0.14 – 0.09
Ethnicity	White	*ref*		
	BAME	-1.66	<.01	-2.84 – -0.49
Migrant status	UK-born	*Ref*		
	Migrant	-0.35	.53	-1.44 – 0.74
Employment	Paid work	*ref*		
	Not working	-0.16	.80	-1.39 – 1.08
Income	0-15k	*ref*		
	15-45k	0.80	.33	-0.82 – 2.43
	46k+	1.22	.20	-0.67 – 3.11
Education	No degree	*ref*		
	University degree	-0.60	.34	-1.83 – 0.63
Social support	*Continuous*	<0.01	.90	-0.05 – 0.06
Relationship status	Single	*ref*		
	In a relationship	1.35	.16	-0.54 – 3.24
Mental disorder	No	*ref*		
	Yes	-0.25	.63	-1.26 – 0.77
PD screen	No	*ref*		
	Yes	-0.36	.54	-1.53 – 0.80
Trauma symptoms	*Continuous*	-0.02	.41	-0.08 – 0.04
Hazardous alcohol use	No	*ref*		
	Yes	-0.25	.71	-1.55 – 1.05
Hazardous substance use	No	*ref*		
	Yes	0.93	.25	-0.65 – 2.51
Planned pregnancy	Yes	*ref*		
	No	0.14	.83	-1.15 – 1.44

Exploring associations with ethnicity:

As there were so few participants who identified as an ethnicity other than White or Black, ethnicity was used in analyses as a binary variable. However, after ethnicity came out as the only significant predictor of maternal sensitivity in the full model, I ran an exploratory univariate regression analysis to examine the effect of different ethnicity categories on maternal sensitivity; see Table 15. All ethnicities other than White were associated with reduced maternal sensitivity.

Table 15: Univariate regression model with multiple levels of ethnicity predicting maternal sensitivity

Variable	**Level (n)**	**Coefficient**	***p*-value**	**95% Confidence intervals**
Ethnicity	White (112)	*ref*		
	Black (56)	-2.79	<.01	-3.62 – 1.95
	Asian (9)	-2.71	<.01	-4.49 – -0.94
	Mixed (8)	-2.64	.01	-4.52 – 0.77
	Other (12)	-1.35	.09	-2.91 – 0.20

3.3 Missing Data Sensitivity Analyses

In the full model there were 146 participants included, as there were 51 people with missing data on one or more of the variables included in the model; 44 of these participants were missing on only one variable, 3 on 2 variables and 3 on 3 or 4 variables, and 1 on 5 variables. I ran a series of univariate logistic regression analyses, to explore whether key variables predicted being not included in the full model due to missing data (See Appendix 17 for details). Missing data on one or more of the key study variables was associated with reduced maternal sensitivity as well as being BAME or a migrant. Being unemployed was associated with 5 times the odds of having missing data and having a university degree significantly decreased the odds. Hazardous alcohol use appeared to lower the odds, while smoking at baseline and having an unplanned pregnancy were associated with increased odds of having missing data. The implications this has for biasing the results will be discussed in Section 4.3.3.

4 DISCUSSION

4.1 Summary of Findings

4.1.1 Primary Hypothesis

There was insufficient evidence to support the primary hypothesis of an association between maternal lifetime experiences of abuse and maternal sensitivity in 3-month postpartum interactions with their infant. The coefficient and confidence intervals suggested a decrease in sensitivity associated with experience of abuse, although this was not statistically significant, and the model accounted for under 2% of variance in sensitivity.

4.1.2 Secondary Hypotheses

There was insufficient evidence to support the hypothesis that maternal experiences of childhood abuse would be associated with decreased maternal sensitivity in 3-month postpartum interactions with their infant. There was insufficient evidence to support hypothesised associations between maternal experiences of abuse and maternal control or maternal unresponsiveness in 3-month postpartum interactions.

4.1.3 Adjusted Analyses

In adjusted analyses, the model that accounted for the largest amount of variance in maternal sensitivity was that including demographic variables (21.41%). In this model, ethnicity was the only significant predictor, with being BAME reducing sensitivity by around 2 points. The model including socioeconomic variables accounted for the next largest amount of variance in maternal sensitivity (14.87%), and in this model being in the highest household income bracket was the only significant independent predictor. The model including social support variables accounted for 12.16% of the variance in maternal sensitivity, and both social

support score and relationship status were significant predictors. The model including mental health variables accounted for only 5.61% of the variance in maternal sensitivity, and only symptoms of PTSD were a significant independent predictor of maternal sensitivity, albeit with a very small effect size. Additionally, unplanned pregnancy was a significant predictor of maternal sensitivity. In all adjusted models, and in the full models with all variables included, experiences of abuse were not independently associated with maternal sensitivity. In the full model, the only independent predictor of maternal sensitivity was ethnicity, with being BAME decreasing maternal sensitivity by 1.5 points. The full model accounted for 18.84% of variance in maternal sensitivity.

Before providing potential explanations for these results in comparison with previous research, I will present the strengths and limitations of the study. These are presented first, as they have implications for the interpretation of the results.

4.2 Strengths

4.2.1 Study Design

As the study was a cohort design, exposure to abuse was measured temporally prior to the outcome; maternal sensitivity. This is a strength, as it is enables stronger inferences about causality in interpreting the results (Weich & Prince, 2003). Nevertheless to infer causality, there would need to be several other Bradford Hill criteria met, e.g. finding a dose-response relationship (Lucas & McMichael, 2005). As exposure status was recorded before the outcome had occurred, the study design minimizes information bias (Weich & Prince, 2003). This was further minimized, as the outcome of sensitivity was coded from recorded video by an independent rater, unknown to the research team and blind to the study questions; another strength of the study design. Similarly, as the study design was not developed to address the questions here, it is unlikely that information bias was a significant issue.

4.2.2 Sample

Another strength of the original study design was the large sample size, especially considering the observational measurement of mother-infant interactions. This is a strength of conducting a secondary data analysis, as it was not within my capacity to collect video observations of 197 mothers and babies, followed-up from their pregnancy for a doctoral thesis. Although there was significant selection bias introduced in this sample (Section 4.3.2), a strength of the study was the ability to make comparisons to the representative WENDY baseline sample on key characteristics, and therefore it was possible to assess *in which ways* the sample was biased. The sample, reflecting the population of an inner-London maternity service, was very diverse. This is important as women often not included in research, such as those who do not speak English, those without secure accommodation or immigration status, were included in this study. This means that generalizations of findings to the population are more valid.

4.2.3 Measurement

Use of an observational assessment of the quality of mother-infant interaction is an important strength of this study, although limitations will be considered (Section 4.3.3). Measures do exist to assess through self-report, a mother's *perception* of her relationship with her infant, and identify issues with bonding, such as the Postpartum Bonding Questionnaire (Brockington et al., 2001). However, the construct of sensitivity concerns the details of parental *behaviour* in interaction with the infant, and therefore an observational assessment is the gold standard.

The use of what is considered by some, a 'gold standard' diagnostic assessment for mental health problems, the SCID (First et al., 2012), at baseline could be considered another strength of this study, although limitations of this measure will be discussed (Section 4.3.3). Being able to use these classifications, in addition to the symptom measures, was a strength, as I was able to examine symptom levels at follow-up in addition to diagnosis at baseline. Previous studies have examined depression symptoms as a potential mediator between abusive experiences and

maternal sensitivity, but very few have examined other mental health problems or symptoms of trauma, making this a novel element of the current study.

A critique of many of the studies discussed in the literature review was that they did not include measures of many of the important contextual variables of interest in this study, such as demographic, socio-economic and social support variables. A strength of this study was the richness of information collected at baseline.

4.3 Limitations

4.3.1 Study Design

The first limitation of this study is that it was a secondary data analysis. The study design, sampling and measurements were not chosen to address the specific question of the impact of maternal abuse experiences on maternal sensitivity in mother-infant interactions at 3-months postpartum. Nevertheless, this dataset was selected on the basis that it would be possible to examine the research questions and test the hypotheses. Although the original cohort design confers many strengths, particularly in being able to examine temporal sequencing, the issue of confounding remains a limitation (Weich & Prince, 2003).

4.3.2 Sample

While the sample size was large, multiple regression analysis with the many variables examined in this study requires very large sample sizes, and it is likely that there was insufficient power to estimate the effect of all variable levels in the multivariate models (Maxwell, 2000).

As with all observational studies, the issue of selection bias is a limitation. As described in Section 2.4, many attempts were made to reduce bias through the study design. The sample used in this study were more biased than the WENDY baseline sample, firstly due to loss to follow-up. There is a socioeconomic patterning to taking part in research, with more educated and wealthy individuals

more likely to take part. Similarly, there is further socioeconomic patterning of loss to follow-up. An analysis of a large UK prospective birth cohort concluded that considerable attrition (>50%) from cohort studies may result in biased estimates of socioeconomic inequalities (Howe, Tilling, Galobardes, & Lawlor, 2013). As only 13% of study participants were lost to follow-up it is unlikely this introduced significant biasing of the sample. Although we were able to compare the WENDY baseline sample to the hospital maternity population on the basis of age, ethnicity and other children, we were unable to assess the extent of selection bias on the basis of educational and economic variables. As detailed information was collected at baseline, it would have been possible to compare characteristics of women who were followed-up and those who were lost to follow up. As there was more extensive biasing of the mother-infant interaction sample included in this study, the comparisons of characteristics were conducted comparing this sample to the WENDY baseline.

The funding to collect the mother-infant interaction data was only obtained after 3-month follow-up appointments had commenced, and so an inconsistent approach to sampling was used, introducing a significant amount of selection bias. At first the approach was to prioritise women who screened positive for a probable personality disorder on the SAPAS (Moran et al., 2003), those who had an anxiety disorder at baseline as measured by the SCID, and those who required a face-to-face follow-up appointment (e.g. due to needing an interpreter). Comparison analysis of the study sample to the WENDY population showed that there were only significant differences on the maternal mental health variables, with the study sample more likely to have met criteria for a mental disorder at baseline, and having higher symptom measures of depression, anxiety, trauma and substance misuse. This, and the WENDY weighting towards women who screened positive for depression on the Whooley questions, must be taken into account in interpreting the findings and generalizing to the population; this was a sample of women with higher levels of distress than the general maternity population.

An additional element of selection bias is that women were recruited who attended their booking appointment with the midwife. The sample therefore excludes the small number of women who neither attend for their booking appointment with the

midwife nor receive antenatal care, and represent the most high-risk, vulnerable mothers (Downe, Finlayson, Walsh, & Lavender, 2009).

4.3.3 Measurement: Abuse

The measurement of experiences of abuse was one of the greatest limitations of this study. The construct of adulthood abuse used was a legal one and was based on the Crime Survey for England and Wales definition of domestic abuse (Appendix 5). This did not include "coercive and controlling" behaviour which was introduced as an offence in 2015 under the Serious Crime Act, and may be difficult to measure as well as evidence (Bishop & Bettinson, 2018; McMahon & McGorrery, 2016). Although this is a relatively broad definition, the measurement is unlikely to have captured such a broad range of experiences. The composite measure used in this study pooled information from the CAS(S) (measure of partner violence), the SCID and PDS (measures of traumatic experience exposure). The version of the CAS(S) adapted for pregnancy that was used in this study has not been validated (Hegarty, 2007). Measurement of partner violence in the CAS(S) was limited to certain abusive behaviours (e.g. did not measure coercive, controlling and non-physically abuse behaviours such as emotional and financial abuse). Additionally, for a traumatic event to be recorded in the SCID or the PDS, it should have met the DSM-IV Criterion A (Appendix 10), again limiting abuse experiences to those involving physical or sexual violence, and to those that are the most severe. The CAS(S) recorded abuse experiences from the year before pregnancy, whereas the SCID and PDS recorded events that happened at any time. For the SCID, the age at which the event happened was recorded, thus allowing us to code whether abuse was in childhood or adulthood. However, the PDS did not specify the age at which abuse occurred, other than the specific childhood sexual abuse item. For lifetime experiences of abuse, this was not an issue, as abuse experiences at any age were included.

The measurement of childhood abuse in this study was particularly problematic. Abuse experiences taken from the PDS and SCID were included if it was documented that they took place under the age of 16; there were no questions that

asked specifically about experiences during childhood, other than the sexual abuse item in the PDS. There are many validated measures of experiences of childhood abuse and maltreatment, e.g. Childhood Trauma Questionnaire, CTQ (Bernstein & Fink, 1998) or the Adverse Childhood Experiences (ACEs) Questionnaire (Dube et al., 2003; Felitti, 1998), however none were used in this study. This will likely have underestimated the prevalence of childhood abuse experiences, and again abusive childhood experiences thought to influence attachment patterns and therefore sensitivity, such as neglect and emotional abuse (Murphy et al., 2014), will not have been captured.

Finally, quantifying experiences of abuse is in itself troubling, both conceptually and methodologically. Due to the limitations of the measurement of abuse, it made most sense to categorise lifetime and childhood abuse experiences as binary variables, grouping those who did and did not report these experiences. However, this means that in the group who experienced abuse, there is likely to be a wide range of experiences, from women who perhaps experienced one-off less serious violent incidents, to those who experienced repeated and more serious abuse. Evidence suggests a cumulative effect of abusive experiences on physical and mental wellbeing (Chartier, Walker, & Naimark, 2010; Follette, Polusny, Bechtle, & Naugle, 1996; McNutt, Carlson, Persaud, & Postmus, 2002; Suliman et al., 2009), and many measures use frequency of behaviours as an indicator, such as the CAS(S) (Hegarty et al., 1999) used in this study . However, there are still some events, e.g. a rape, that may happen on one occasion and yet have an enormous impact. To complicate things further, the same category of experience, e.g. a rape, can have a vastly different impact on different individuals. Attempting to differentially quantify experiences of abuse by severity and frequency both have their limitations. However, not differentiating between types and frequencies of experience may similarly pose limitations; in this study the lack of association between abuse experiences and maternal sensitivity may be due to the lack of specificity in the abuse variable.

4.3.4 Measurement: Maternal sensitivity

Crittenden argues that from the perspective of attachment theory, sensitivity is best defined as the 'ability to determine when protection and comfort are needed' (Claussen & Crittenden, 2000). However, in this study using Crittenden's CARE-Index, and in many observational studies of maternal sensitivity, 5 minutes of play were observed; a non-threatening circumstance where protection is a minor issue. In these contexts, instruments focused on sensitivity to attachment needs may not be directed towards appropriate behaviour (Claussen & Crittenden, 2000). Indeed, Ainsworth's original observations were based on much longer observations, over a longer period, in more naturalistic settings. It is questionable whether 5 minutes of observation could accurately represent the relationship between a mother and infant, or that this would give sufficient time for the coder to incorporate crucial contextual information into their interpretation of an interaction, as a clinician may want to do with a family. This may be a particularly detrimental limitation to using brief observational methods within a diverse, multicultural sample.

Parents know that they are being observed, and this is likely to introduce bias into the way they interact with their child; the observation may not be representative of their usual behaviour. Parents may experience increased anxiety as they are being filmed interacting with their infant and change their behaviour as they want to conform to imagined expectations of the observer. This could affect all parents, and therefore would not bias associations. However, it is likely that the anxiety of being filmed in interaction with your infant, and potentially judged, is not equal. Parents from Black and minority ethnic (BAME) backgrounds are more likely to have social work involvement and BAME children are disproportionately represented in child protection and out-of-home care (Bywaters, Brady, Sparks, & Bos, 2016; Bywaters, Kwhali, Brady, Sparks, & Bos, 2017; Stokes & Schmidt, 2011) and therefore parents who are BAME may be more fearful of judgments of parenting capacity.

Parents with mental health problems, similarly, may fear involvement with social services and having their children removed (Smith, Lawrence, Sadler, & Easter,

2019), and so the meaning of an interaction with their child being filmed and coded may be more threatening.

This increased threat associated with observation would likely affect parenting. If a parent's mind is focused on what the observer might be looking for, or thinking about them or about their child, they may be less able to attend to the infant's signals, respond accurately and timely, and adjust their behaviour in line with the infant's cues – the components of sensitive parenting. This inequality in experience of the context introduced during the measurement of sensitivity may have acted to increase inequalities in the outcome.

It is a time-consuming and expensive process to become trained and reliable on coding the CARE-Index, and although two members of the research team attended training, they did not reach reliability in sufficient time to code the study videos. Therefore, the video data was sent to an anonymous, independent rater who returned the scores. Although I have discussed this as a strength, as it would have reduced information bias, racial and socioeconomic bias may have operated. The ethnicity of the mothers and their infants would have been visible to the coder. Additionally, as participants were filmed in their homes, the toys they had access to, and clues about the state of their housing would have been visible too. We do not know any details of the ethnicity, socioeconomic status, or other important elements of difference (Burnham, 2018) of the independent rater of the videos, however it is possible that discrimination on the visible aspects of difference in the videos may have operated in their coding of the quality of parent-infant interaction.

As the training content and coding manuals of the CARE-Index are only available once you have attended the training course, and are not publicly available, it is difficult for researchers or for people reading research using this measure to examine the face validity of the construct, and whether or not it may be culturally biased. This is a limitation of using this measure, as it limits both the scrutiny of the tool, but also the ability to link particular aspects of coding to particular patterns in the results, which could help to explain findings.

Finally, all of these methodological limitations of the CARE-Index, result in ethical limitations, as it could be hurtful or distressing to parents were they to find out that

their parenting ability had been rated on the basis of that 5 minute observation, removed from any context. Although not used in this analysis, classifying parents as 'ineptly sensitive' as the CARE-Index scores have been categorized in previous research (Parfitt et al., 2013) could be particularly harmful.

4.3.5 Measurement: Other variables of interest

Mental health:

Although the measurement of mental disorder using a gold-standard diagnostic instrument (the SCID (First et al., 2012)) may be considered a strength of the study, the conceptual problems of using the construct of mental disorder remain. The symptom measures used in this study; of depression, anxiety and PTSD, are based on the same constructs of mental disorders, and so the same conceptual issues apply. The SCID uses the DSM-IV definition of mental disorder, whose authors assert that "there is no assumption that each category of mental disorder is a completely discrete entity with absolute boundaries dividing it from other mental disorders or from no mental disorder" (American Psychiatric Association, 2000, pp. xxi-xxii). There are issues of validity and reliability in using binary mental health outcomes where someone is classified is either having or not having disorder (Boyle, 1999; Craddock & Mynors-Wallis, 2014). Indeed, the use of a medical, diagnostic framework for mental health problems is challenged not only on the basis of validity and reliability, but ethically – that it pathologises individuals and disconnects distress from the contexts surrounding a person that may cause distress and harm. Service users and advocates of trauma-informed healthcare services have demanded a shift in moving from asking what is wrong with people seeking support from mental health services, to asking what has happened to them (Sweeney, Filson, Kennedy, Collinson, & Gillard, 2018). As the focus of this thesis was examining the impact of abuse experiences, with symptoms of distress as a potential mediator of the impact on parenting behaviour, I hope to have retained the focus on what happened to mothers, rather than what was 'wrong' with them.

Despite these issues, as mental health services in the UK are mostly structured around diagnostic categories, the SCID gives a good indication of those with a

level of distress that would meet criteria for intervention. For analyses I generalized the different categories of SCID diagnoses into the presence of 'any mental disorder' in the hope of capturing a more general indication of psychological distress, rather than focusing on particular psychopathology within a medicalized framework (Rapley, Moncrieff, & Dillon, 2011). The use of the different symptom measures in conjunction with diagnoses should have captured a more global assessment of maternal mental health.

However, as only depression and anxiety symptoms were assessed at follow-up, the different timings of measures introduced another limitation to the conclusions that could be drawn. It is possible that many other factors may have changed in the time between baseline and 3-month follow-up that would influence depression and anxiety symptoms, as well as influencing sensitivity. One obvious change is that all women became a carer for a small infant, and the temperament of this infant may have made them more or less difficult to soothe and care for, in turn affecting mothers' mental health symptoms. However, it is also possible that in this timeframe some of the other key variables may have changed; e.g. physical health changes, relationship status, socioeconomic circumstances and alcohol use. This means that any conclusions regarding *causality* or *mediation* of particular variables between the association of abuse, mental health and sensitivity are hypothetical, as it was not possible to conduct formal mediation analyses, or to control for all possible confounders and mediators.

Considering the diversity of the sample, it is also important to consider issues of the cross-cultural validity of diagnostic categories that have been developed in the USA and Europe, which has been described as a category fallacy (Kleinman, 1977; Summerfield, 2013). A large World Health Organisation (WHO) collaborative study across numerous countries found a consistent and dose-respondent relationship between psychopathology and disability across cultures, despite cultural variations in presentation, understanding and solutions (Ormel et al., 1994). In order to meet SCID criteria for a diagnosis, you must meet the threshold of symptoms *and* the 'Feature B'; that these symptoms cause distress or impairment. Because of this criterion of distress or impairment, the SCID may be a

better cross-cultural indicator of distress than simple symptom measures of mental health.

Although the Whooley questions demonstrated comparable utility as a screening tool to the more widely used and longer EPDS in the primary paper from the original WENDY study (Howard et al., 2018), they have been designed as a screening tool, not a measure of mental health status. Women were oversampled in the study on the basis of their Whooley status, and this has been considered in terms of sample bias. However, the measure was not used in any analyses in this thesis study and so its limitations as a measure of mental health will not affect the results.

Socioeconomic status:

There are always difficulties in measuring socioeconomic status (SES) or position (Cirino et al., 2002). SES was of interest to this study as a contextual variable that may influence parenting quality, and also known to be associated with experiences of abuse. I used multiple measures of SES (income, education, employment), as it has been demonstrated to be more effective than using one (Hatch et al., 2011). However, there may have been better indicators of the issues associated with SES that impact on parenting in relation to housing, e.g. crowdedness (Evans et al., 2010), and neighbourhood poverty (Pinderhughes et al., 2001), that the measures used may not have captured.

Issues with self-report:

This study relied heavily on self-report measures, which constituted the measurement form of all of the variables aside from the mother-infant interaction observation. The limitations of using self-report have already been discussed in relation to key variables such as abuse and mental health problems, where trauma, stigma, distress and shame may limit the information women are willing to disclose to a researcher. In addition to this, self-report measures of alcohol and substance use have been found to be highly unreliable when compared to biological measures (de Beaurepaire et al., 2007), and unreliability is likely to be accentuated in pregnancy, as the stigma of alcohol and substance use at this time is more pronounced (Yonkers, Howell, Gotman, & Rounsaville, 2011). More generally,

research investigating clients' use of standardized self-report measures within mental health services highlights how concerns around confidentiality, as well as difficulties in summarizing experiences with the use of generic, non-personal questions were highlighted as barriers to service-users completion rates (Green, 2018). Although there are important differences between participants taking part in research, and service-users completing measures, there is likely overlap in the issues that deter people from completing these measures in the way intended.

4.3.6 Measurement: Unmeasured variables

As mentioned above, there were aspects of key constructs that may not have been captured in the measures used (e.g. emotional forms of abuse and features of socioeconomic disadvantage such as housing), however there were also key constructs that may have helped to elucidate the findings that were not included in the study and therefore not possible to analyse. Key variables that would have helped exploration of the potential mechanisms between abuse experiences and parenting would have been measures of parental stress, e.g. Parenting Stress Index (Abidin, 1990); maternal attachment representations, e.g. Adult Attachment Interview (George et al., 1996); maternal unresolved state of mind in relation to trauma/disorganization e.g. Atypical Maternal Behavior Instrument for Assessment and Classification, AMBIANCE (Goldberg, Benoit, Blokland, & Madigan, 2003); maternal reflective functioning e.g. The Parental Reflective Functioning Questionnaire (Luyten, Mayes, Nijssens, & Fonagy, 2017), and neurobiological measures, e.g. maternal and infant cortisol responsiveness through saliva or blood samples or amygdala responsiveness through functional magnetic resonance imaging. Some of these will be discussed further in the next section.

Additional measures of infant characteristics, such as temperament and any physical health or developmental conditions would similarly have been helpful to examine child influences on the dyadic construct of sensitivity used in the study, as infant characteristics are important in understanding the relationship (Austin, Hadzi-Pavlovic, Leader, Saint, & Parker, 2005; Meier, Wolke, Gutbrod, & Rust, 2003). The present study focused solely on mothers and their relationships with the infants, and although we examined the role of relationship status, it would have been helpful to measure the *quality* of the co-parenting relationship, as this has

been shown to predict child outcomes more than quality of couple relationship (McHale & Rasmussen, 1998; Schoppe-Sullivan et al., 2009). Additionally, if there was another parent involved, it would have been helpful to measure their sensitivity in the parent-infant relationship. Indeed, there is increasing evidence that the quality of the child's attachment relationship with the father parallels that with the mother (Kochanska & Kim, 2013), and that the majority of children will have established an attachment relationship with their father by 8 months old if he is living in the household (Lamb & Lewis, 2010). Indeed, by producing a piece of research focused only on mothers' relationships with their infants, I may be contributing to reinforcing a cultural norm around gender roles and childrearing, and this may be considered as an ethical limitation of the study as well.

Missing data:

Although there were generally very low levels of missing data, in the full model they accumulated due to the large numbers of variables, and so I conducted sensitivity analyses to examine any patterns in missingness in this model. Indeed, missingness was associated with many of the key variables: reduced sensitivity, minority ethnicity, migrant status, unemployment, no university degree, smoking and unplanned pregnancy. Therefore, the fully adjusted regression model included a more biased sample than the full sample. As reduced sensitivity was associated with these other variables in both univariate and multivariate analyses, it is unlikely that missing data introduced a large amount of *bias*, it is likely the effect of those with lower sensitivity and higher risk factors being excluded due to missing data is likely to have underestimated the observed associations.

4.4 Explanation of Findings and Comparison with Previous Literature

4.4.1 Comparison to Previous Studies

Most studies (10 out of 14) that examined the relationship between childhood abuse and observational assessment of mother-infant interaction found a direct or indirect relationship (Vaillancourt et al., 2017), whereas the present study found no association. One explanation for this discrepancy is that the present study found no association due to the limitations of the measurement of childhood abuse described previously. The majority of studies included in the systematic review used a standardized questionnaire measure of childhood maltreatment, such as the Childhood Trauma Questionnaire, CTQ (Bernstein & Fink, 1998). Those that did not use a standardized measure, still utilized interviews that asked specifically about childhood experiences, such as the Adult Attachment Interview (George et al., 1996), or questions adapted from the Conflict Tactics Scale, CTS (Straus, Hamby, Finkelhor, Moore, & Runyan, 1998). It is possible that experiences of childhood abuse were not captured sufficiently by our measurement to detect an association with mother-infant interaction quality.

Similarly, most studies that investigated the impact of domestic violence on parenting behaviour did find an association, often mediated by maternal mental health factors (Chiesa et al., 2018), whereas the present study found no evidence for an association between lifetime abuse experiences and sensitivity. Most studies have investigated *recent* exposure to violence, in particular exposure to violence in *pregnancy*, which was associated with parenting outcomes such as parental discipline, warmth and psychological aggression (Barrett, 2010), disengaged representations (Lannert et al., 2013) and neglectful parenting (Lannert et al., 2014). One study that examined past and current DV found that although they functioned similarly with respect to current mental health, only current DV was negatively related to parenting (Levendosky et al., 2006); decreasing sensitivity and warm responding, and increasing hostility and disengagement. Indeed one study found that it was recent IPV that mediated the relationship between childhood sexual abuse and parental warmth (Barrett, 2010). Similar to childhood abuse, the lack of association found between lifetime abuse experiences and sensitivity in this study may be due to the lack of specificity in the measurement of abuse experiences.

The lack of association between childhood and lifetime abuse and maternal sensitivity could also be explained by a floor-effect, due to the generally very low scores on maternal sensitivity in the sample. Less than 20% of the mothers in our study scored as being adequately sensitive, or 'good enough' (Crittenden, 2001), with 60% scoring in the 'high risk' category. Explanations for this will be discussed further in the next section, but as so few mothers scored in adequately or highly sensitive categories, it may be that lack of associations found is due to this floor effect of sensitivity.

4.4.2 Maternal Mental Health

In the study sample, nearly 70% of women had screened positive for depression at their booking appointment, and over 40% met criteria for a mental disorder at baseline. Local maternity population data from the study hospital suggests that around 12% of mothers screen positive for depression at their booking appointment, and the weighted population prevalence of mental disorder from the WENDY study was 27% (Howard et al., 2018). This study sample was a highly distressed population of women (see Section 4.3.2). In the univariate analyses, many of the mental health measures were associated with decreased sensitivity in mother-infant interactions, as has been demonstrated robustly for depression in previous research (Bernard et al., 2018). Therefore, one explanation for the very low proportion of adequately sensitive mothers is the generally poor mental health of this sample.

This may also be an explanation for the lack of association found between abuse experiences and mother-infant interaction quality. Several studies found that the relationship between childhood abuse and parenting behaviour was mediated by maternal mental health, particularly depression (Dixon et al., 2005; Madigan et al., 2015; Martinez-Torteya et al., 2014). Similarly, many of the studies examining the relationship between maternal intimate partner violence (IPV) experiences and parenting found that maternal mental health mediated the relationship (Chiesa et al., 2018). If we consider maternal mental health as a key mediator of associations between abuse experiences and parenting behaviour, then it is possible that

having a very distressed sample of mothers, who scored very low on sensitivity, may have obscured any associations.

4.4.3 Contextual factors

The models that explained the most variance in maternal sensitivity were those that included demographic and socioeconomic variables. This is an important finding, as often these variables are ignored, and at best adjusted for without further examination (Moullin et al., 2018), despite ecological models highlighting the importance of the context around the parent-infant relationship (Belsky, 1984; Bronfenbrenner, 1979).

Being White was the strongest predictor of increased maternal sensitivity in the fully adjusted model. One possibility, described in Section 4.2.3, is that inequalities in the threat posed by the observation situation, or inequalities in coding due to racial bias, may explain the association between ethnicity and maternal sensitivity score.

Previous studies have found that sensitivity was generally lower in BAME families, and that the main cause of this discrepancy was explained by family stress due to socioeconomic disadvantage (Mesman et al., 2012). There was little evidence for cultural explanations of this difference in the review, and they showed that parental sensitivity was related to positive child development in BAME families, suggesting the construct of sensitivity was not culturally bound in its utility (Mesman et al., 2012).

In univariate analyses indicators of socioeconomic advantage (being in the highest income bracket, employed and having a university degree) were associated with increased sensitivity. However, the association between ethnicity and sensitivity remained when socioeconomic factors were included, which would suggest that there is something about being BAME that impacted on maternal sensitivity, aside from socioeconomic disadvantage. Again, the limitations in the measurement of socioeconomic status must be held in mind, as it is possible that there are important aspects of socioeconomic disadvantage related to ethnicity (e.g. housing security, crowdedness or food security) that were not captured by the measures

used. In the Mesman review, the differences in sensitivity due to ethnicity were accounted for by *family stress* due to socioeconomic disadvantage (Mesman et al., 2012). We did not measure family stress or parenting stress, seen as key mediators between abuse and sensitivity in other studies (Barrett, 2010; Dixon et al., 2005), and so it was not possible to assess whether stress accounted for the association between ethnicity and sensitivity.

As we are considering mechanisms of intergenerational transmission of disadvantage (Moullin et al., 2018), it is important to consider socioeconomic inequalities in the generation above the mothers in our study. It is likely that BAME mothers grew up in more deprived households than their White counterparts, due to the enmeshment of race and socioeconomic inequality (Smedley & Smedley, 2005). It is therefore plausible that BAME mothers experienced less sensitive parenting when they were children, and this influenced their sensitivity in interactions with their infants. Therefore, the SES of the household parents grew up in may be as relevant to their parenting behaviour as their current SES. Indeed, Moullin suggests that parent-child attachment is a mechanism of intergenerational (dis)advantage, where a parent's socioeconomic position influences their ability to parent sensitively, as well as the direct impact socioeconomic factors have on child development (Moullin et al., 2018).

It is not only through greater exposure to socioeconomic disadvantage that BAME parents may experience increased stress, but the impact of discrimination and racism itself. There is a large body of evidence linking perceived and anticipated discrimination and stress (Sawyer, Major, Casad, Townsend, & Mendes, 2012; Williams, Yu, Jackson, & Anderson, 1997). More recently, studies in the US have started to look at these associations with parenting stress in particular (Nam, Wikoff, & Sherraden, 2015; Nomaguchi & House, 2013), finding that Black and Hispanic mothers experience more parenting stress in comparison to their White counterparts. There has been little research done in the UK, but it is plausible that increased stress due to discrimination and increased parenting stress experienced by BAME mothers may account for the association between ethnicity and maternal sensitivity.

Finally, there are likely cultural differences in parenting practice that were not the aim of investigation in this study, and which were difficult to explore in this type of study, using a measure developed and designed in the particular cultural context of the United States (Crittenden, 2001; Crittenden & Claussen, 2000a). Additionally, as there were such small numbers of women who identified as ethnicities other than 'White' or 'Black', it was not possible to examine the ethnic differences in more detail other than as a binary variable of White, and BAME. Indeed, as described in Appendix 1 and Section 1.1.4, there are critiques of whether the construct of sensitivity itself can be considered universal, and it is argued that the meaning of an interaction between parent and child can only be understood within an understanding of the cultural meanings and values (Otto & Keller, 2014; Quinn & Mageo, 2013). Indeed, most contemporary theories of attachment and of maternal sensitivity attempt in some way to address these issues, although they are seldom addressed in research samples of diverse populations. Crittenden, whose CARE-Index measure was used in this study describes sensitivity as an important component of the communicative process between parent and child (Claussen & Crittenden, 2000). She argues that to understand it, we have to pay particular attention to both the immediate and long-term contexts in which the interaction is taking place. As parental roles vary in terms of function between cultures and at different points in time, sensitivity must be defined explicitly within the social and cultural context. Crittenden states that '*if sensitivity is defined in culture-specific ways that are not stated explicitly, then we cannot compare studies across cultures. If it is not defined contextually, some cultures will look very insensitive, even when their children are well adapted and made safer (in that context) by the parents' "insensitive" behaviour*" (Claussen & Crittenden, 2000, p. 122). As the goal of the attachment relationship is to protect the child from danger, there is a universal and necessary aspect of sensitivity that is applicable to all humans. Importantly however, danger varies with the social and cultural context (Crittenden & Claussen, 2000a) as well as from one developmental period to another (Crittenden, 2000), and so appropriately protective behaviour may also vary. Indeed, in minority groups the cultural beliefs and value systems defining assumptions and rules about raising children may carry the influences of historical trauma (Ghosh Ippen, 2012; Ghosh Ippen et al., 2009).

Applied to our findings, it may be that there is cultural difference in parenting behaviour that drives the association between ethnicity and maternal sensitivity. Importantly, this difference in parental behaviour may be communicating something important to the child for their survival, and therefore 'adaptive'. Only through follow-up research, examining child outcomes later in life, would it be possible to elucidate whether the lack of sensitivity observed actually had a negative impact on the child.

Considering all of these explanations for an association between ethnicity and sensitivity, and the great diversity of our sample (in terms of ethnicity but also socioeconomic status), these explanations may also account for the seemingly very low number of mothers coded as adequately sensitive.

I have considered the findings in relation to two of the hypothesized mechanisms; maternal mental health and the contextual variables. I will now consider briefly the findings in relation to some of the unmeasured potential mechanisms.

4.4.4 Attachment Representations and 'Ghosts in the Nursery'

Mothers who are themselves securely attached, as measured by the AAI (George et al., 1996) are more likely to show sensitive parenting behaviour and to develop secure attachment relationships with their own children (De Wolff & Van Ijzendoorn, 1997; Isabella & Belsky, 1991). It is likely that mothers who experience childhood abuse are less likely to be securely attached, and that this is the mechanism through which sensitivity is affected (Figure 1). We did not measure maternal attachment representations in this study, and so it is not possible to examine this mechanism. However, it could account for the lack of association. If childhood abuse experiences impact parenting behaviour through maternal attachment representations, then it is plausible there would not be a clear association between childhood abuse experience and maternal sensitivity. Some mothers who experience childhood abuse may have had other, 'good enough' relationships aside from the abusive experiences, that would mean they were

secure in relation to attachment. Thus, our measure of childhood abuse, without a measure of adult attachment style, would not be sufficient to find an association.

Similarly, the lack of association may be explained by considering Fraiberg's hypothesis, that it is not childhood abuse in itself that predicts repetition of the past in the present, but that there is something specific about the memories for the events of childhood abuse that discriminates between those who go on to have difficulties in their relationship with their own child (Fraiberg et al., 1975). In this model it would not be the abuse experience itself that would predict parenting behaviour, but the parent's state of mind in relation to that experience, i.e. if the memory for the event is unresolved (there are unintegrated representations of meaning in relation to the event which create a fragmented representation). Indeed, disorganized attachment style is associated with unresolved loss or trauma in the caregiver and predicts social, cognitive and mental health difficulties in the child (Green & Goldwyn, 2002). This hypothesis is supported by neurobiological evidence that there is a blunting of amygdala response in relation to infant distress from traumatized mothers, indicating a disengagement from infant distress and disrupting maternal caregiving (Kim et al., 2014). We did not use any measure of unresolved trauma in the mothers, e.g. the AAI (George et al., 1996), and therefore would not have differentiated those with unresolved states of mind who experienced abuse.

In this study, when all of the mental health variables were included together in the model, it was symptoms of PTSD that significantly, independently predicted maternal sensitivity. This lends support to the above mechanisms, and again may help to explain the lack of association, as it may be the traumatization following abusive experiences, rather than the abusive experiences themselves, that impact on caregiving behaviours. This is supported by some of the evidence on maternal PTSD and mother-infant interactions and child development outcomes (Cook et al., 2017).

Mothers who have 'unresolved' states of mind regarding past trauma or loss have been observed to engage in frightening, frightened or atypical behaviours when interacting with their infants (Lyons-Ruth et al., 1999). It is these types of

behaviours that are associated with disorganised attachment, and with very poor outcomes in the child (Green & Goldwyn, 2002). These behaviours can be very subtle, and are not necessarily related to the sensitive, controlling or unresponsive behaviour. Specific measures have been adapted to capture these types of parenting behaviour, e.g. Atypical Maternal Behavior Instrument for Assessment and Classification; AMBIANCE (Goldberg et al., 2003). As this study did not measure the specific types of parenting behaviour associated with unresolved trauma, it is possible that this further accounts for the lack of association observed.

4.4.5 Reflective Functioning

Another hypothesized mechanism to explain the relationship between abuse experiences and parenting behaviour is that of parental reflective functioning, or mentalization (Fonagy, 2018). As mentalization is thought to develop within the context of early relationships (Jurist & Meehan, 2009), abusive experiences in childhood may impair a parent's ability as an adult to consider and respond to the emotional states of their child (Ensink et al., 2014). Again, this would mean that it is not the abuse experience in itself that impacts on parenting behaviour, but the impact that abuse experiences have on parental reflective functioning. Similarly, it was hypothesized that abusive experiences, and indeed other types of stressful experiences in adulthood may also impact on reflective functioning capacity, as it has been linked to psychopathology (Katznelson, 2014), and that this may explain associations between lifetime abuse experiences and sensitivity. As we did not measure parental reflective functioning, although measures are available e.g. The Parental Reflective Functioning Questionnaire (Luyten et al., 2017), this was not possible to assess, but again may explain the lack of association found, as those reporting abuse experiences would not clearly delineate the group who have impaired reflective functioning capacity.

4.5 Directions for Future Research

4.5.1 Abuse and Parental Sensitivity

Experiencing abuse in childhood is associated with experiencing abuse in adulthood (Beitchman et al., 1992; Coid et al., 2001), and abuse across the lifespan is associated with mental health difficulties (Lindert et al., 2014; Trevillion et al., 2012), as well as many other aspects of social disadvantage, such as isolation (Levendosky et al., 2004; Sperry & Widom, 2013) and lower socioeconomic status (Bohn, Tebben, & Campbell, 2004; Zielinski, 2009). Parental sensitivity is impaired by both mental health difficulties (Bernard et al., 2018), as well as social disadvantage (Crittenden & Bonvillian, 1984). This study demonstrated the importance of including measures of mental health, social support and social disadvantage when examining associations between abuse and sensitivity, and future research must include these variables to avoid issues of confounding.

It could be argued that further research is needed to elucidate the mechanisms for any associations between abuse experiences and parenting sensitivity, as mechanisms have important implications for intervention strategies. For example, if maternal mental health accounts for associations between abuse and parenting quality, a focus on alleviating mental health symptoms may be appropriate, whereas if reflective functioning accounts for the difference, intervention strategies should focus on this. However, there has been substantial research supporting all of the different mechanisms discussed in this thesis. Additionally, the models including the varied influences on parenting behaviour are highly complex (Belsky, 1984), and so research at a population level will not produce a key mechanism and key point of intervention. Therefore, I would argue that future epidemiological research can only take us so far in helping to support parent-infant relationships. What is needed is a consideration of all of these factors at the family level, e.g. through the use of psychological formulation, to determine which influences on parenting behaviour (e.g. trauma, stress, reflective functioning, attachment difficulties) are important for that family, and tailoring intervention to meet those needs. Future research at the population level could investigate the effectiveness

of using psychological formulation to support parent-infant relationships. Indeed, there has been little research to date evaluating the use of formulation on outcomes for patients in mental health settings, despite its promotion as a psychological alternative to psychiatric diagnosis (Johnstone, 2018).

4.5.2 Ethnicity and Parental Sensitivity

The finding of such a strong association between ethnicity and maternal sensitivity in this study warrants further investigation. As I have discussed, there are many potential explanations for this association.

Research should be conducted into the role of racial bias in the coding of quality of parent-infant interactions. Some research in the US has looked at racial bias in assessments of suspected childhood maltreatment and parenting behaviour (Berger, McDaniel, & Paxson, 2006). Berger and colleagues examined whether the ethnicity of interviewers, relative to the ethnicity of families they interview, influences parenting assessments (Berger, McDaniel, & Paxson, 2005). They found evidence of racial bias in some measures of interviewer-assessed parenting behaviours, which was more pronounced for measures that required some subjective assessment by the interviewer. Similar research has not been conducted into observational measures of sensitivity in parent-infant interactions but is needed to assess the extent to which racial bias may bias outcomes and undermine the validity of using these measures in diverse populations.

Further research needs to include the role of parental stress when considering associations between ethnicity and parenting behaviour. Indeed parental and family stress were key factors in changing parental sensitivity and therefore predicting child outcomes in analysis of the NICHD study of Early Child Care (Belsky & Fearon, 2002). Evidence for associations between minority ethnicity and increased parental stress (Nam et al., 2015; Nomaguchi & House, 2013), as well as increased stress from perceived and anticipated discrimination (Sawyer et al., 2012; Williams et al., 1997), and increased socioeconomic stress (Smedley & Smedley, 2005; Williams et al., 1997), suggest this may be an important mechanism. It is important that intersecting (Crenshaw, 1989) aspects of social

disadvantage are considered in a meaningful way in epidemiological research, through analysis methods that address this intersectionality (Gazard, Frissa, Nellums, Hotopf, & Hatch, 2014; Goodwin et al., 2017; Hatch et al., 2016). Future research should then move to evaluate interventions that target parental stress, particularly at the universal level. In this study, levels of sensitivity were generally very low, a concerning finding, and perhaps a call to think about a more public health approach to supporting parent infant relationships in highly stressed and distressed populations.

Finally, the dominance of one particular cultural conception of high-quality parenting is clearly a barrier to developing interventions that serve diverse populations. Some cross-cultural research has highlighted the issues with applying western typologies in research with families from other cultures, perhaps a similar 'category fallacy' to applying western typologies of mental health (Kleinman, 1977). Indeed, the studies reviewed in Appendix 1 and Section 1.1.4 assessing the cross-cultural validity of the constructs of attachment and sensitivity, demonstrate that at best the constructs vary so much depending on culture that it would be very difficult to conceptualise of universal tools of measurement (Mesman et al., 2008), and at worst that the constructs themselves are fundamentally ethnocentric. The latter position calls for a challenging of the very basic assumptions of the theoretical models of attachment and sensitivity as defined by European and North American theorists and researchers (Quinn & Mageo, 2013). An example of cross-cultural research specific to sensitivity is a Chinese-American review of studies that have examined parental warmth and control in Chinese and Chinese immigrant families (Lim & Lim, 2004). They found less conclusive associations between control and child psychosocial outcomes than within White families (Lim & Lim, 2004). The authors argue that the qualitative differences in Chinese parenting call for more research that operationalises culturally specific and culturally sensitive dimensions of parenting. Indeed, the anthropological research highlights fundamental differences in the cultural values, norms and beliefs surrounding parenting, that clearly influence parenting behaviour. This suggests that although it is often *possible* to apply the same measures developed in Western cultural contexts all over the world, they may hold little meaning or utility (Quinn & Mageo, 2013).

Therefore, future research from within other cultures, developing culturally specific constructs and measures of parenting quality is needed. This would help elucidate the universal and specific dimensions of parenting that are important for child outcomes.

4.5.3 Parental Sensitivity and Child Outcomes: Including the Context

Parental sensitivity is only of interest in as far as it predicts positive biopsychosocial outcomes for children (Ranson & Urichuk, 2008). However, the findings from this study highlight the importance socio-demographic variables in predicting sensitivity, and there is a clear evidence-base that these factors are of critical importance for child outcomes (Bornstein, Hahn, Suwalsky, & Haynes, 2003; Bradley & Corwyn, 2002). Therefore, it is plausible that associations between parenting behaviour and child outcomes are overestimated, as there is substantial contextual confounding. Future research using longitudinal birth cohorts needs to include extensive adjustment of socio-demographic variables to establish the extent of confounding in associations between parenting behaviour and child outcomes.

4.6 Implications for Clinical Practice

4.6.1 Ethnicity, Culture and Parenting

The issues raised in the measurement of parent-infant relationships in relation to ethnicity have serious implications for clinical practice as well as research. Observational measures such as the CARE-Index are used as part of assessments to identify parents in need of support, and parents in need of further investigation from child protection services. If there is racial bias in these measures, whereby BAME parents appear less sensitive, then this will lead to discrimination in social service involvement. Clinicians need to use culturally specific and sensitive measures of parenting quality to ensure that the right parents access the right support.

For example, Lieberman's Child-Parent Psychotherapy (CPP) model of intervention has thought extensively about tailoring engagement, intervention and training to be culturally sensitive (Ghosh Ippen, 2012; Lieberman, 1990). Lieberman and Ghosh Ippen argue that cultural sensitivity is a special form of interpersonal sensitivity, and therefore a critical ingredient in successful interventions. They argue that babies can only be understood through the particular cultural outlook of the adults who are interpreting them. Ghosh Ippen argues that cultural competence is not enough, but that we need our interventions to be contextually congruent; focusing not only on a family's culture but on their history, their current situation, and future goals. The emphasis on context over culture is due to the fact that culture is always changing, is context dependent, and that cultural values and situational demands often conflict (Ghosh Ippen et al., 2009). Ghosh Ippen proposes an attachment, culture and trauma (ACT) model that integrates these three domains as key contextual forces that shape development.

> *"The ghosts are not only in the nursery (Fraiberg et al., 1975) but in our society. The legacy of historical trauma persists in sociocultural contexts fraught with poverty, racism, discrimination and oppression because these processes serve as reminders that the horrors, which often remain unspoken, are not yet fully banished from reality. Thus before we attempt to change parental behaviors that are not consistent with the way we want things to be – behaviors we might label as "controlling", "intrusive", "withdrawn", or "resistant" – we must understand that they likely evolved as part of, and may continue to serve, a protective function"* (Ghosh Ippen et al., 2009, p. 111).

In parent-child work with families, she argues for assessment of the historical and present-day realities linked to threat, fear, sadness and anger, and the facilitation of dialogue about those realities. Reflecting on the context through dialogue with families is the key to a contextually congruent approach. She argues for a move away from a belief in a single truth towards a dialectical approach, that can allow for multiple truths to be equally valid (Nisbett, Peng, Choi, & Norenzayan, 2001). Additionally, Ghosh Ippen argues that interventions that incorporate and embrace the strengths of a cultural group may be especially meaningful and effective.

Clinicians working in assessing and supporting parent-infant relationships should attempt to incorporate this understanding around contextual congruence. Indeed, Crittenden's Dynamic Maturational Model (Crittenden, 2006) similarly addresses culture and context, and Crittenden argues that assessment tools must be sensitive to these constructs (Crittenden & Claussen, 2000b).

4.6.2 Trauma Focused Interventions

The findings from this study support evidence that trauma impacts on parenting (Cook et al., 2017; Kim et al., 2014). One clinical implication of this is that parent-infant interventions should be trauma-focused. Lieberman's CPP model, and indeed other forms of psychoanalytic Parent-Infant Psychotherapy (PIP) (Baradon, Biseo, Broughton, James, & Joyce, 2016) are primarily based on the 'transmission model' of Fraiberg, that parents' interactions with their children are influenced by their 'ghosts in the nursery' (Fraiberg et al., 1975). The primary aim of these approaches is to support parents to recognise how these ghosts may negatively inform their representations of their children's behaviour and place the attachment relationship at risk (Baradon et al., 2016; Lieberman, Ippen, & Dimmler, 2018). PIP and CPP therapists work closely and often for a relatively long time (around 18 months) with parents to support them in interpreting their child's behaviour and responding sensitively to their needs (Baradon et al., 2016; Lieberman et al., 2018). Thus, PIP and CPP are inherently trauma-focused approaches.

A report from the Early Intervention Foundation reviewed the evidence for different interventions being used to support parent child interaction in the early years (0-5 years old) and found several effective intervention programmes that support attachment relationships (Asmussen, Feinstein, Martin, & Chowdry, 2016). Lieberman's CPP model described above, both for infants and children, was found to have good evidence as a targeted-indicated intervention in improving children's attachment security amongst families where there was identified risk of an insecure attachment. The Family Nurse Partnership programme (Olds et al., 2002), an intensive home visiting programme for first-time teenage mothers and babies, has good evidence as a targeted-selective intervention, improving children's behaviour

and intellectual development (Olds, 2016). However, trial results from implementation in the UK are less promising than those conducted in the USA and the Netherlands (Robling et al., 2016). There is also debate around who FNP should be targeted at (Browne & Jackson, 2013). Finally, they found good evidence for a universal intervention for couples expecting their first child; the Family Foundations programme (Feinberg, Kan, & Goslin, 2009). This programme improved co-parenting skills, reduced family conflict, improved children's attachment related behaviours and showed long-term improvements in their behaviour at school (Feinberg, Jones, Roettger, Solmeyer, & Hostetler, 2014).

Although CPP and PIP are trauma-focused interventions delivered by psychotherapists, most parent-infant interventions, for families at the universal to targeted levels of need, are more brief interventions delivered by specialist nurses, or early help workers in community settings such as Children's Centres. Training on the Attachment, Culture, Trauma model of parent-child work (Ghosh Ippen et al., 2009) could support these workers in having a contextually congruent approach to assessment and intervention. It is also important that these workers are trained in recognising symptoms of trauma, and that there is multi-agency working to ensure that parents who are experiencing trauma are able to be identified and supported by more specialist services where needed.

4.6.3 Tackling Health Inequalities

The research demonstrating the power of parenting quality and attachment relationships on child outcomes, as well as the research demonstrating the importance of socioeconomic factors must be considered together in order to tackle health inequalities. The intergenerational transmission of mental ill health and abuse through parenting have always been key in the development of our understanding of attachment (Belsky, 1984). However, focusing on the bond between parent and child risks obscuring the socioeconomic context in which it develops. Moullin argues that attachment theory can engage with the micro-level mechanisms that connect parenting processes and socio-emotional factors to the intergenerational transmission of socioeconomic inequality (Moullin et al., 2018).

Socioeconomic disadvantage predicts lower quality parenting and less secure attachment, and this predicts poorer outcomes in children which in turn can add to their socioeconomic disadvantage (See Figure 7).

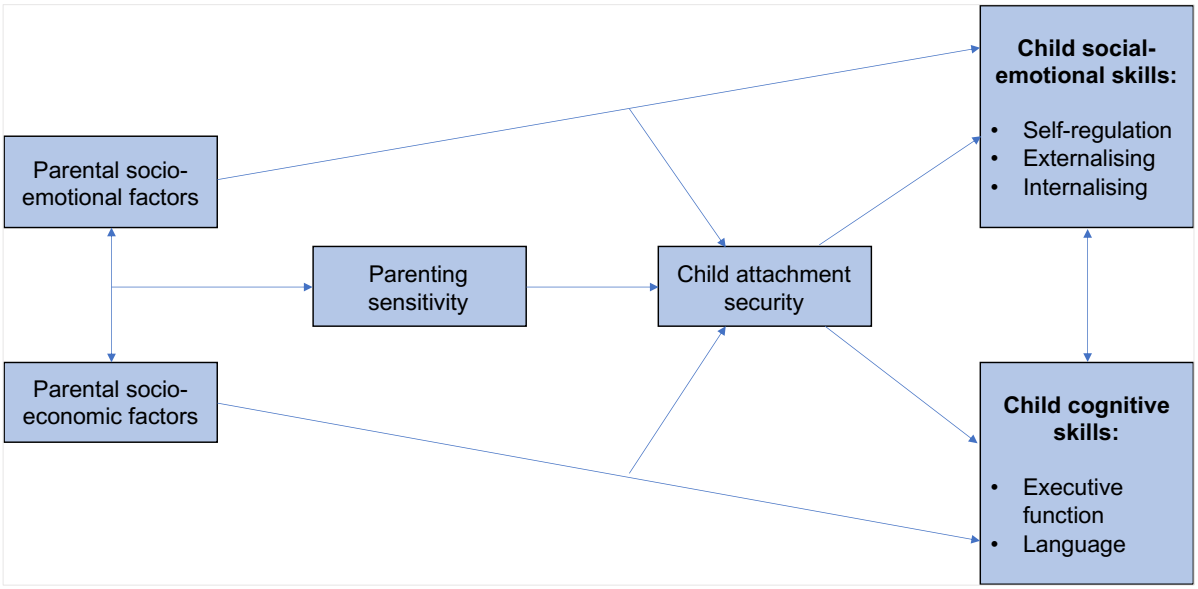


Figure 7: Graphic summary of the theorised role of parent-child attachment in intergenerational (dis)advantage (Moullin et al., 2018)

As the evidence suggests that transmission of socioeconomic inequality is both material (socio-economic) and relational (socio-emotional), we must utilize complementary explanations *and* interventions.

There is a call to reduce socioeconomic inequalities as a public health intervention to prevent mental health problems (Harper, 2016). In the present study, it was clear that socioeconomic disadvantage was a key predictor of parenting quality. Therefore, instead of solely attempting to diminish the impact of social inequalities on mental health, parenting and child development, psychologists could also contribute to political discourses, policies and interventions that aim to decrease those socioeconomic inequalities in the first place. Campaigning groups such as Psychologists for Social Change offer possibilities for psychologists and other

mental health professionals to become active in these more political arenas (McGrath, Griffin, & Mundy, 2015).

At the same time, it is important to acknowledge the socioemotional processes; the psychological mechanisms through which advantages and disadvantages persist across generations. Gilbert's suggestion 'to have a "Defeat Abuse", rather than "Defeat Depression" campaign' (Gilbert, 2002) is particularly relevant to the research in this thesis. Early childhood interventions may be seen as the key interventions concerned with the primary prevention of childhood abuse through tackling intergenerational transmission; stopping the repetition of the past in the present (Reynolds, Mathieson, & Topitzes, 2009).

In general, interventions to support parent-child relationships in the early years should be viewed as interventions to reduce health inequalities. Indeed, the evidence linking experiences in the early years to later health outcomes is so strong that it was the priority area for the 2010 Marmot Review into reducing health inequalities (Marmot et al., 2010). Inequalities in the early years have lifelong impacts, and interventions to disrupt inequalities are most effective and cost-effective in this early period of life (Marmot et al., 2010). Sure Start (Glass, 1999) was lauded in the original Marmot report as exemplifying a 'universally proportionate' approach; improving outcomes for young children and their families, with a particular focus on the most disadvantaged, so children are equipped for life and ready for school, no matter their background. In the 10-year update on the Marmot Review, the authors comment on the increase in child poverty rates, at the same time as significant funding cuts to Sure Start and Children's Centres over the intervening 10 years (Marmot, 2020). They also comment on the continuation of low rates of pay and low levels of qualification required in the childcare workforce, despite recommendations that this would be a key area for increased spending and training. Therefore, the updated report's recommendations are not dissimilar from the report 10 years prior (Marmot, 2020):

- Increasing levels of spending on early years, and ensure allocation of funding is proportionately higher for more deprived areas
- Reduce levels of child poverty

- Improve availability and quality of early years services, including Children's Centres, in all regions of England
- Increase pay and qualification requirements for the childcare workforce

These recommendations highlight the need to address both material and relational disadvantage and fit with the other recommendations for clinical practice from this thesis, e.g. training early years workers in the Attachment, Culture, Trauma (ACT) (Ghosh Ippen et al., 2009) model.

On my current placement at a national charity for child and family mental health we are delivering work that fits with some of these suggestions and offers an example of how psychologists and psychotherapists could support universal interventions. The charity won a grant from a government fund, in collaboration with two local authorities in London, to pilot and evaluate an integrated early-years pathway. The universal part of this work involves psychologists and psychotherapists (including myself) from the charity training the early years workforce in theory and interventions to support positive parent-infant relationships through their work in the Children's Centres and facilitating reflective practice to support this work. Being part of this project has highlighted to me the need for greatly increased resources in terms of funding and staff in the early years, but has also shown the valuable role that psychologists, and our complex models of parenting, attachment and development, can have in supporting community-based universal interventions.

4.7 Reflexivity

Quantitative research studies mostly do not include a section on reflexivity (Finlay & Gough, 2003). The positivist philosophical position that premises quantitative measurement, data collection and analysis holds that the researcher's identity and experiences should as far as possible be removed from the research process to maintain objectivity. I hold this position in as far as I hope that another researcher, different to me in any number of ways, could replicate my study and would produce the same findings. However, I have adopted a critical realist position and acknowledge that the questions asked by a researcher, how they choose to analyse them (e.g. which variables are considered relevant), and the interpretation of findings in the data, all involve decisions that may be influenced by the identity, experiences and position of the researcher, and so I shall include some personal reflections. I am a 30-year-old, White, female Trainee Clinical Psychologist with no children. As this was a secondary data analysis, and I did not conduct the mother-infant observations myself, it is unlikely that these aspects of my identity influenced the research participants or the data collection, but I will consider the influence of my identity and experiences on my research journey.

My research interest has always been in examining health inequalities. This has stemmed from my political beliefs and my involvement in campaigns around economic, gender and racial inequalities – indeed I worked full time as a campaigner before pursuing a career in psychology. Before clinical training I completed a PhD attached to the WENDY study within a Women's Mental Health research team. I was involved in the planning and data collection of the WENDY study, conducting some of the baseline interviews alongside the research midwives and team. As a woman, and a feminist, I was particularly interested in women's mental health, and my PhD project examined the perinatal mental health of migrant women. It is perhaps interesting that I made this my focus as a White woman, born in London to Scottish parents. Having grown up in a diverse city, rife with visible inequalities, issues of racism have always seemed close, and my parents encouraged me to see racism as a White people's problem. I examined the WENDY data to look at inequalities in mental health on the basis of immigration

status and ethnicity, and conducted a qualitative study examining migrant women's experiences of discrimination and the impact of this on their wellbeing in the perinatal period.

Over the course of clinical training I became increasingly interested in infant and child mental health. I thought more about what preventative approaches to mental health care might look like, and about the intergenerational transmission of trauma. I started to think more about how inequalities may be passed on from one generation to the next, not just through economic and structural deprivation, but relational deprivation too. I was keen to examine the mother-infant interaction data from the WENDY study with a trauma-focused perspective. My previous research into health inequalities influenced how I chose to investigate this question – that I was interested in including as many contextual socioeconomic and demographic variables in the models. Furthermore, it is likely that my focus on women's experiences of racism in my interpretation of the findings of the present study is influenced by my previous experiences and research.

Through the course of conducting this research I have come to question how we (and even whether we can!) measure and quantify parent-child relationship quality. In my clinical work over the past year, which has been focused on these relationships, I have gained an insight into the complex interplay between culture, context and changes over time in parent-child relationships – difficult to capture at the level of the individual family in clinical work – likely impossible to capture in population-level analyses, particularly in diverse populations. At the same time, in my learning about commissioning and planning of health services, I understand that we need ways to examine population level health to inform interventions, and we need to evaluate interventions at this level too. For me this has emphasised the importance of encouraging a plurality of approaches. I hope to be able to expand on this thesis research in the future; findings ways through more qualitative methods to include a parent's understanding of the meanings of their interactions alongside observations. I also think we need a plurality of approaches in addressing health inequalities. I am going on to work in an early years service – supporting parents with young children at the family level as a psychologist – and

at the same time I see the importance of maintaining involvement in campaigns that seek to redress the structural inequalities that make life difficult for families.

4.8 Conclusion

This study examined the impact of maternal experiences of abuse on maternal sensitivity in mother-infant interactions at 3-months postpartum. Although there was insufficient evidence to support the hypotheses, important findings emerged. Sociodemographic factors, often ignored in the attachment literature, were key predictors of sensitivity; particularly ethnicity and indicators of socioeconomic disadvantage. Additionally, trauma symptoms were seen to negatively impact on maternal sensitivity. With the strengths and limitations of the study design taken into account, these findings highlight the importance of including sociodemographic variables in epidemiological analyses of parental sensitivity.

Parental experiences of abuse are unlikely to independently predict sensitivity in interaction with their infant. Experiences of abuse are associated with socioeconomic disadvantage, poor social support, trauma and mental health problems, all of which can get in the way of ‘good enough’ parenting. Further research is needed to develop culturally sensitive and contextually congruent ways of assessing and supporting parent-infant relationships. Universal interventions focused on supporting parent-infant relationships should be viewed as one of the strongest tools that a public health approach to tackling health inequalities has. These community-based approaches need sufficient funding, and staff need sufficient training, if they are to address both material and relational inequalities.

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6 APPENDICES

Appendix 1: Brief review of the Strange Situation Test, attachment classifications and cross-cultural validity

Ainsworth developed the Strange Situation Test to assess the quality of attachment relationships in a controlled, experimental setting (Ainsworth & Wittig, 1969). The experiment is set up in a small room with one-way glass for observation of the behaviour of the infant in a series of episodes primarily focused on when the mother leaves and returns. Ainsworth identified three main attachment styles; secure (type B), insecure avoidant (type A) and insecure ambivalent/resistant (type C) which she concluded to be the result of early interactions with the mother (Ainsworth & Bell, 1970). Since these classifications, a fourth attachment style known as disorganised was identified (type D) (Main & Solomon, 1986).

Securely attached children comprised the majority in Ainsworth's studies (Ainsworth & Bell, 1970; Ainsworth et al., 1978). Securely attached children feel confident that the attachment figure will be available to meet their needs. They use the attachment figure as a safe base to explore the environment and seek the attachment figure in times of distress (Main & Cassidy, 1988). In contrast, independence from the attachment figure, both physically and emotionally characterises the insecure avoidant classification (Behrens, Hesse, & Main, 2007). A combination of clingy and dependent behaviour, while rejecting the attachment figure when they engage in interaction is characteristic of the insecure ambivalent child. These three attachment behaviours can be seen as goal-directed strategies for reducing distress. The group of infants who show a variety of contradictory or bizarre responses, unclassifiable in terms of a goal-directed organisation within attachment theory, form the group with the 'disordered' attachment style (Main, 1999).

The Strange Situation has been used to classify child attachment in research conducted across the world. A famous meta-analysis aggregated samples by country and continent to analyse differences and similarities across cultures (Van IJzendoorn & Kroonenberg, 1988). Although they did find differences in the proportion of different attachment classifications in different cultures, in all countries the majority of infants were securely attached, and intracultural variation was nearly 15 times the cross-cultural variation. Thus, attachment theory has been posited as a universal theory of human development, and the Strange Situation test remains the gold standard measurement for assessing attachment security.

However, the field of attachment research has been critiqued as suffering from a profound ethnocentrism. Quinn and Mageo argue that the development of the 'gold

standard' Strange Situation test led research into attachment to become inflexible (Quinn & Mageo, 2013). They argue that "an American cultural ideal of this period – the attentive, supportive stay-at-home middle-class mom – became a standard for promoting the psychological health of American children of all classes and subcultures, and indeed a standard for all the world against which the practices and norms of a vast variety of people were, we argue inappropriately, judged" (Quinn & Mageo, 2013, p. 4). They describe attachment theory as a folk theory, in which elements of experience in a particular culture are abstracted and held as a universal formulation of the human condition. For attachment theory this is the culture of middle-class Americans. This results in a failure to assess infant-caregiver relationships across cultures in a meaningful way, as both the constructs, and the tools to measure them are embedded in a specific set of cultural values that may not be applicable elsewhere (Quinn & Mageo, 2013).

In more recent years, attachment research has attempted to incorporate ethnographic research to examine the complex interplay between universal aspects of childrearing, and the specificities of the cultural contexts in which it occurs. In a review of the cross-cultural research into patterns of attachment, Mesman and colleagues examine both ethnographic and standardized observational studies into attachment patterns in communities in Africa, East Asia, Latin America, and Israel (Mesman et al., 2008). Mesman and colleagues argue that the research demonstrates support for universal and normative hypotheses of attachment theory, but that the form this takes, for instance the type and number of caregivers and caregiving arrangements, as well as the infants' ways of expressing attachment behaviours, vary depending on cultural norms and customs (Mesman et al., 2008). For example, in a study of the Hausa in Nigeria, infants were always held in close proximity to their caregivers and were less free to explore the environment by themselves due to the lack of safety in the environment (Marvin, VanDevender, Iwanga, LeVine, & LeVine, 1977). The Hausa were described as being indulgent and sensitive, and at the same time restrictive (Marvin et al., 1977). However the reviewers argue that the infants nonetheless used their caregivers (usually around three to four different figures) as a secure base, but that their exploration took a more visual form (Mesman et al., 2008). Another example

In this way, they argue that with sensitive research incorporating ethnographic methods alongside observational tools, attachment relationships can be meaningfully assessed in local cultural contexts. This position reflects Keller and Otto's assertion that attachment is biologically based and culturally influenced (Keller & Otto, 2009). Indeed, the argument that most research has been based within a particular cultural context, and needs to be reconceptualised to include contextual adaptations, cultural variations and that even basic assumptions must be considered in light of varying cultural premises around caregiving distribution, stranger anxiety and conceptions of intimacy and agency (Otto & Keller, 2014) is

becoming more widely accepted. For example, Patricia Crittenden's Dynamic Maturational Model (DMM) of attachment relationships pays particular attention to the different adaptive needs of the attachment relationship both within different contexts and cultures, as well as at different stages of development (Crittenden & Claussen, 2000b).

Appendix 2: Ainsworth's original descriptions of highly sensitive and highly insensitive mother (M) - baby (B) interactions (Ainsworth, Bell, & Stayton, 1974)

9. Highly sensitive. *This mother is exquisitely attuned to B's signals; and responds to them promptly and appropriately. She is able to see things from B's point of view; her perceptions of his signals and communications are not distorted by her own needs and defenses. She "reads" B's signals and communications skilfully, and knows what the meaning is of even his subtle, minimal, and understated cues. She nearly always gives B what he indicates that he wants, although perhaps not invariably so. When she feels that it is best not to comply with his demands – for example, when he is too excited, over-imperious, or wants something he should not have – she is tactful in acknowledging his communication and in offering an acceptable alternative. She has "well-rounded" interactions with B, so that the transaction is smoothly completed and both she and B feel satisfied. Finally, she makes her responses temporally contingent upon B's signals and communications.*

1. Highly insensitive. *The extremely insensitive mother seems geared almost exclusively to her own wishes, moods, and activity. That is M's interventions and initiations of interaction are prompted or shaped largely by signals within herself; if they mesh with B's signals, this is often no more than coincidence. This is not to say that M never responds to B's signals; for sometimes she does if the signals are intense enough, prolonged enough, or often enough repeated. The delay in response is in itself insensitive. Furthermore, since there is usually a disparity between one's own wishes and activity and B's signals, M who is geared largely to her own signals routinely ignores or distorts the meaning of behavior. Thus, when M responds to B's signals, her response is inappropriate in kind or fragmented and incomplete.*

(Ainsworth, Bell, & Stayton, 1974, pp. 131-133)

Appendix 3: Brief review of the literature on attachment security and child outcomes

Social-emotional competence

In early childhood (up to 4 years old), secure attachment in infancy is associated with affective sharing (Waters, Wippman, & Sroufe, 1979) and more peer competence (Pastor, 1981). Also in early childhood, insecure and disorganised attachment styles have been linked to the use of aggression (Booth, Rose-Krasnor, & Rubin, 1991; Lyons-Ruth, 1996). By the age of 8 or 9 years old, secure attachment in infancy is associated with being more socially active, popular, having a more positive outlook and lower social anxiety (Bohlin, Hagekull, & Rydell, 2000), as well as higher self-esteem (Cassidy, 1988). Attachment insecurity in infancy is associated with social withdrawal (Gerhold, Laucht, Texdorf, Schmidt, & Esser, 2002), peer difficulties and aggression (Cohn, 1990) in middle childhood. Despite this evidence, meta-analytic data has found only a small effect size for the ability of attachment classification to predict interpersonal relations (Schneider, Atkinson, & Tardif, 2001), suggesting a strong influence of other factors (e.g. environmental).

Cognition

Attachment security in infants is associated with more advanced object permanence (Bell, 1970), which has been shown to predict overall intelligence and cognitive abilities including language and reading by the age of 6 years old (Rose, Feldman, & Wallace, 1992). Longitudinal studies have found that children who were securely attached at the age of 7 were more advanced on a variety of measures of cognitive functioning at the age of 15 when compared to insecurely attached peers (Jacobsen, Edelstein, & Hofmann, 1994). A meta-analysis of 25 studies showed a positive relationship between secure attachment, higher language ability and increased cognitive abilities (van IJzendoorn, Dijkstra, & Bus, 1995).

Physical health

There is less research linking early relationships to physical health outcomes, although it has been suggested that attachment security has an important buffering effect against elevations of the stress hormone, cortisol (Dozier, Peloso, Lewis, Laurenceau, & Levine, 2008; Gunnar, 1998). Some specific physical health problems have been investigated, for example, children with failure to thrive syndrome (inability to gain weight and lack of adequate physical growth) were

twice as likely to exhibit anxious or disorganised attachment patterns as normal controls (Ward, Lee, & Lipper, 2000).

Mental health

Insecure attachment has been consistently associated with higher levels of depression, and a meta-analysis has linked it to various anxiety disorders (De Ruiter & Van Ijzendoorn, 1992). Insecurely attached individuals are more likely to experience a mental health disorder than their secure counterparts (Ranson & Urichuk, 2008). Lots of this evidence suggests the association is between the maternal caregiving behaviours (e.g. sensitivity) and psychological wellbeing, rather than specifically attachment classification (Ranson & Urichuk, 2008).

Appendix 4: Brief overview of attachment and neurobiology

The human brain growth spurt begins in the third trimester of pregnancy and continues to about 18 to 24 months of age, with over 80% of development occurring postnatally (Dobbing & Sands, 1973). It is widely agreed in developmental neuroscience that the infant brain is designed to be moulded by the environment it encounters (Schore, 2001). The key element of the environment viewed as critical for this development is the attachment relationship to the primary caregiver. Schore has proposed that attachment theory is a regulatory theory; that in secure attachment relationships the mother is unconsciously regulating the baby's shifting arousal levels and therefore emotional states. In this way, attachment can be conceptualised as the dyadic regulation of emotion (Sroufe, 1997). Damasio argues that emotions are the highest order direct expression of bioregulation in complex organisms, which makes them essential to the adaptive function of the brain (Damasio, 1998).

The right brain is involved in processing social-emotional information, facilitating attachment functions, and regulating bodily and affective states (Schore, 2015). It is also implicated in the control of vital functions supporting survival and enabling the organism to cope with stress (Wittling & Schweiger, 1993). Schore proposes that the maturation of the right brain regulatory capacities is dependent on the experience embedded in the attachment relationship between the infant and primary caregiver. Through experiencing the caregiver's regulatory capacities, the infant develops their ability to evaluate stressful changes in the external environment. This allows them to form coherent responses to cope with stressors. Stressors are not just painful events, but novel events are stressors too. Thus, the capacity to cope with stressors is fundamental to the development of the capacity to learn new information (Schore, 2015). This helps us to understand how a social-emotional construct such as attachment relationships, can influence cognitive ability and language development. With the neurobiological account, care during infancy can be seen as 'programming' behavioural responses to stress in the offspring (Caldji et al., 1998).

Appendix 5: Crime Survey for England and Wales definition of domestic abuse

Definition of domestic abuse:

- non-sexual abuse by a partner: physical force, emotional or financial abuse, or threats to hurt the respondent or someone close to them, carried out by a current or former partner
- non-sexual abuse by a family member: physical force, emotional or financial abuse, or threats to hurt the respondent or someone close to them, carried out by a family member other than a partner (father or mother, step-father or mother or other relative)
- sexual assault carried out by a partner or other family member: rape or assault by penetration (including attempts), or indecent exposure or unwanted touching carried out by a current or former partner or other family member
- stalking carried out by a partner or other family member: two or more incidents (causing distress, fear or alarm) of receiving obscene or threatening unwanted letters, emails, text messages or phone calls, having had obscene or threatening information about them placed on the internet, waiting or loitering around home or workplace, or following or watching by a current or former partner or family member

Does not include “coercive and controlling behaviour” introduced in December 2015.

Appendix 6: Table of studies examining the relationship between intimate partner violence (IPV) and parenting in infancy (adapted from Chiesa et al., 2008)

Author Year Country	Study Design Quality	Sample recruitment	Numbers, age of children	Measure of parenting	Outcome
Barrett (2010) USA	Cross-sectional 2A	Randomly selected from Temporary Assistance for Needy Families roles in large urban areas	483 families; age of children – birth to 3 years old	Parenting: parental warmth, discipline (from the parent-child conflict tactics scale revised; CTSPC (Straus et al., 1998)), psychological aggression, nonviolent discipline and harsh physical discipline (from IFS-CWB scales (Lewis et al., 2000)).	Recent IPV was independently associated with four of the five parenting variables in the hierarchical regression equations (parental stress, nonviolent discipline, psychological aggression, and corporal punishment), but not with parental warmth. Lifetime history of IPV was not significantly related to any parenting variable when other childhood and adulthood factors were considered. A recent history of IPV mediated the relationship between childhood sexual abuse and psychological aggression. The relationship between childhood sexual abuse and parental warmth was mediated by depression symptoms.

Cassanueva and Martin (2007) USA	Case-control 3A	Recruited from 2 low income prenatal clinics	88 mothers; age of children – 1 month old	Potential for child abuse assessed using the Child Abuse Potential Inventory; CAPI (Milner, 1986)	Compared to non-abused women, women abused during pregnancy had more than 3 times the odds of having a very high level of child abuse potential, elevated to the point where they were of clinical concern. The increased child abuse potential among victimized pregnant women was in part due to the abused women's higher levels of distress and problems with others.
Dayton et al. (2010) USA	Prospective cohort/longitudinal 2A	Pregnant women recruited from the community sample in a medium sized city and surrounding counties	164 mothers; age of children – approximately 1 year old	Maternal representations of the infant; Working model of the child interview (Zeanah et al., 1996) Observed maternal parenting behaviour (recorded on videotapes) were coded in regard to four behavioural and two affective domains (sensitivity, disengagement, controlling manipulation, covert hostility, warmth, and joy)	There was no main effect for postnatal IPV (although only analysed controlling for prenatal IPV) on observed parenting, and postnatal IPV did not moderate the relationship between prenatal representations (of the infant) and parenting behaviours. Mothers whose representations were disengaged were more behaviourally controlling with their children. Mothers with distorted representations were more hostile, and those with more balanced representations showed more positive parenting.

Lannert et al. (2013) USA	Prospective cohort/longitudinal 2A	Pregnant women recruited at health clinics and other women's agencies in an urban community	180 mothers; age of children – prenatal to 3 years old	Maternal representations of the infant; Working model of the child interview (Zeanah et al., 1996)	Prenatal IPV was significantly negatively correlated with balanced representations, and significantly positively correlated with disengaged representations. There was no correlation with distorted representations. Some personality traits served to buffer the effects of IPV on maternal representations, whereas others magnified negative effects on maternal representations and increased the odds of non-balanced representations.
Lannert et al. (2014) USA	Cross-sectional 2A	Mothers recruited from local businesses, electronic social media, organizations that serve families with young children, and organisation that serve women experiencing IPV in rural, urban and suburban communities	182 mother-infant dyads; age of children – 11 to 15 months old	Neglectful parenting (MNBS-PR; (Kantor et al., 2004)) and harsh parenting behaviours (CTSPC; (Straus et al., 1998))	Maternal prenatal IPV had a direct effect on maternal trauma symptoms, whereas IPV occurring in first year of infant's life did not. Maternal trauma symptoms predicted neglectful parenting, whereas general risk factors predicted harsh parenting. Infant trauma symptoms were directly predicted by prenatal IPV and maternal trauma symptoms and neglectful parenting mediated this relationship. Postnatal IPV was not associated with maternal nor infant trauma symptoms when prenatal IPV was taken into account.

Levendosky et al. (2006) USA	Prospective cohort/longitudinal 3A	Mothers recruited from over 50 agencies with 2 different flyers – one asking for pregnant women and the other for pregnant women who had experienced IPV during pregnancy	203 mother-child dyads; age of children – prenatal to 1 years old	Maternal behaviours in the final 10mins of a 12-min, laboratory, free-play session were coded by trained coders. A coding system was adapted from (Ainsworth et al., 1978; Crittenden, 1981; Lyons-Ruth & Zoll, 1983) including six scales of maternal parenting: sensitivity; warmth; joy; disengagement, connection, involvement; hostility; intrusive, controlling behaviour.	Past and current IPV functioned similarly with respect to current mental health – more DV was related to worse mental health. Past IPV was not related to parenting, whereas current IPV was negatively related to parenting, although only a small amount of variance was accounted for by IPV. Current IPV was associated with mother's inability to respond warmly and sensitively to her infant, and there was increased hostility and disengagement.

Appendix 7: Brief review of theorized mechanisms for why adults with abuse histories are expected to have difficulties in mentalizing regarding trauma

1. The complex and confusing psychological experiences and reactions in the context of abuse are likely to be particularly challenging to mentalize (Cloitre, Cohen, & Koenen, 2011). On their own, children are unlikely to succeed in elaborating a verbal and mentalized account of traumatic experience without recourse to a trusted adult who can help them elaborate a narrative. This means that memories are more likely to be traumatic (Brewin, 2011).
2. Children may be too scared to think about the abuse and the minds of caregivers, in order to preserve their attachment relationships (Allen, 2013).
3. Children in abusive attachment relationships frequently resort to dissociation (Brewin, 2011; Briere, 2002). This compartmentalization of trauma related memories may help regulation but at the cost of inhibiting mentalization.
4. Children who grow up with abusive attachment relationships become used to predominantly use an automatic reflexive mode adapted to detect threat, rather than a slower reflective mode involving the prefrontal cortex. Maintaining the capacity to be reflective when under stress is likely more difficult for individuals who grew up in contexts of potential threat.

Appendix 8: WENDY study information sheet and consent form

[redacted] [redacted]

Participant Information Sheet

Title of Project: Well-being in pregnancy in an inner city maternity service

We would like to invite you to take part in a study about well-being during pregnancy and how health services can improve well-being in pregnant women. We will provide an interpreter if you need help speaking English. Please take time to consider the following information and discuss it with other people if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether or not you would like to take part.

What is the purpose of the study? It is not currently clear how midwives can best assess emotional well-being in pregnancy. This study is part of a larger research programme looking at well-being of women during and after pregnancy.

Do I have to take part? No. It is up to you to decide whether or not to take part. We will describe the study and go through this information sheet. If you agree to take part, we will then ask you to sign a consent form. You are free to leave the study at any time and without giving a reason. This will not affect the care you receive either now or at any time in the future.

What will happen to me if I take part? When you come in for your antenatal booking we will ask you to take part in an interview about your emotional well-being. The interview will take about 40-55 minutes. There are no right or wrong answers to any of the questions. If you are not able to complete the interview at your antenatal booking, we will aim to complete the interview within the next two weeks, at a convenient time and location for you. When you are around 28 weeks pregnant and at three months post-delivery, we will carry out an interview and/or post you a questionnaire. Alongside the three month post-delivery research interview, we would like to make a short video with you and your baby playing as you normally would. This video would last for no longer than 5-10 minutes and is used to observe mother-infant interactions. You can choose not to agree to this specific aspect of the study while still participating in the interview.

Expenses and payments You will receive a £15 Love2Shop voucher, to thank you for taking part in the research. We will also reimburse any travel expenses.

Will my information be confidential? The information you provide will be confidential, in accordance with the Data Protection Act 1998, and any identifiable details will be stored separately from the answers you give during the interview. Only members of the research team will have access to your confidential information, which will only be used for the

purposes of this study. The only exception to this is if you tell us information which suggests a risk of serious danger to yourself or others. If this happens, we will inform the staff involved in your care. Video-tapes will be securely stored after the interview and will remain confidential.

What are the possible advantages of taking part? We cannot promise that the study will help you but your information will help to increase the understanding of how health services can improve well-being in pregnant women. We will offer everybody information about sources of help and support.

What are the possible disadvantages of taking part? We will ask you questions about your well-being which you may find personal. You can take time in answering and do not have to answer questions that you do not want to. You can discuss any concerns at the end of the interview and we will ask if you would like your midwife to be told, so that they can provide further support.

What if there is a problem? If you have any concerns about the study, you should ask to speak to the researchers, who will do their best to answer your questions (Telephone: [redacted]. If you are unhappy about the research and would like to make a formal complaint, you can do this through the NHS Complaint Procedure. Details are available from the [redacted] Trust.

What will happen to the results of the study? The results of this study are likely to be published as a report and as an academic publication. We will not use your name or details that could identify you in any publication. Copies of all publications will be available from the researchers.

Who is funding and organising the study? The study is funded and commissioned by the National Institute for Health Research. [redacted] is organising the study.

Who has reviewed the study? All research in the NHS is looked at by an independent group of people called a Research Ethics Committee, to protect your safety, rights, well-being and dignity. This study has received favourable opinion by London Camberwell St. Giles NHS Research Ethics Committee (reference number: 14/LO/0075).

Contact for further information: [redacted]

Thank you very much for reading this information sheet.

[redacted] [redacted]

Study number:
Participant identification number:

CONSENT FORM
Title of Project: Well-being in pregnancy in an inner city maternity service
Chief Investigator: [redacted]

	Please initial box
1. I confirm that I have read and understood the Participant Information Sheet v4 17 07 15 for the above study. I have had the opportunity to think about the information, ask questions about the study, and have had my questions answered.	☐
2. I understand that taking part in the study is voluntary and that I can leave at any time, without giving any reason, without my medical care or legal rights being affected.	☐
3. I agree to take part in this study.	☐
4. I give permission for researchers to have access to my medical records.	☐
5. I agree to be contacted by the researchers about ethically approved related studies.	☐
6. I agree to parts of the interview being recorded for quality control and for analysis of discussions about experiences at antenatal booking. Recordings will be anonymised and stored securely. Original copies of the recordings will be destroyed securely at the end of the study	☐
7. I agree to my midwife being informed of my participation in this study.	☐
8. I would like to be sent a summary of the research findings upon completion of the study.	☐
9. I agree to the video-taped play interactions with me and my infant	☐

Name of Participant	Date	Signature
Name of Person taking consent	Date	Signature

When completed: one copy for participants, one copy for researcher site file.

Appendix 9: Table describing variables, data levels and groupings for analysis

Table continued over several pages

Variable	Measure and study time-point	Data levels	Grouping for analysis
Mother-infant interaction			
Maternal sensitivity	*3-month follow up:* CARE-Index coded interaction	0-14	*For additional descriptive analyses:* 1 – Highly sensitive (11-14) 2 – Adequately sensitive (7-10) 3 – Ineptly sensitive (5-6) 4 – High risk (0-4) *For all other analyses:* Continuous
Maternal control		0-14	Continuous
Maternal unresponsiveness		0-14	Continuous
Infant cooperation		0-14	Continuous
Infant compulsivity		0-14	Continuous
Infant difficultness		0-14	Continuous
Infant passivity		0-14	Continuous

Variable	Measure and study time-point	Data levels	Grouping for analysis
Maternal experiences of trauma and abuse			
Maternal experience of trauma	*Baseline:* SCID events and age PDS *All time points:* Composite Abuse Scale	Number of traumatic events reported on the SCID and the PDS	0 – 0 events listed on PDS or SCID 1 – up to 1 event listed on PDS or SCID 2 – more than 1 event listed on PDS or SCID
Maternal experience of abuse	*Baseline* Composite variable from SCID trauma, PDS and CAS(S)	Experience of abuse: Sexual abuse at any age by any person, child abuse (sexual, physical, non-physical), partner abuse (sexual, physical, non-physical), physical abuse by stranger, if defined as a trauma (by SCID)	0 – no experience of abuse 1 – experienced abuse
Maternal experience of childhood abuse		Any childhood abuse: Sexual, physical and non-physical abuse by any person when under the age of 16 (including kidnapping, being held hostage, being locked in a room, emotional abuse)	0 – no experience of childhood abuse 1 – experienced childhood abuse
Maternal experience of intimate partner violence	CAS(S), *all time points*	Score ranging from 0-55. Score of 3 or more is indicative of abuse. Single item scores were used for composite abuse variable.	0 – no experience of intimate partner violence 1 – experience of intimate partner violence
Demographics			
Age at baseline	Date of birth, *baseline*	Continuous age variable created from difference in years between date of baseline interview and date of birth	Continuous

Variable	Measure and study time-point	Data levels	Grouping for analysis
Any other children	*Baseline*	0. No 1. Yes	0. No 1. Yes
Ethnicity	*Baseline*	1. White English / Welsh / Scottish / Northern Irish / British 2. White Irish 3. Gypsy or Traveller 4. Other White 5. Black British 6. Black Caribbean 7. Black African 8. Other Black 9. Asian/Asian British Indian 10. Asian/Asian British Pakistani 11. Asian/Asian British Bangladeshi 12. Asian/Asian British Chinese 13. Other Asian 14. White and Black Caribbean 15. White and Black African 16. White and Asian 17. Other Mixed /Multiple Ethnic 18. Arab 19. Any Other Ethnic Group	*For descriptive analyses:* 1 – White (1-4) 2 – Black (4-8) 3 – Asian (9-13,18) 4 – Mixed (14-17) 5 – Other (19) *For use in models as a binary variable:* 1 – White (1-4) 2 – Non-White (5-19)

Variable	Measure and study time-point	Data levels	Grouping for analysis
Immigration status	*Baseline*	1. UK National 2. EEA citizen 3. Indefinite leave to remain 4. Exceptional leave to remain 5. Temporary admission 6. Awaiting initial decision 7. Appealing initial refusal 8. Refused asylum 9. Other Where possible I re-coded the 'other' category, and this created a new category of 'spousal/family/ancestral visa'.	*For descriptive analyses:* 1 – UK National (1) 1 – EEA citizen (2) 3 – Indefinite leave to remain (3) 4 – Exceptional leave to remain or temporary admission (3-4) 5 – Awaiting initial decision or appealing initial refusal (6-7) 6 – Spousal/family/ancestral visa (from 9) 7 – Other *Binary variable of security of status:* 1 – Secure immigration status (1-3) 2 – Insecure immigration status (4-7)

Variable	Measure and study time-point	Data levels	Grouping for analysis
Region of birth	*Baseline*	1. UK 2. Northern Europe 3. Eastern Europe 4. Southern Europe 5. Western Europe 6. Eastern Africa 7. Middle Africa 8. Northern Africa 9. Southern Africa 10. Western Africa 11. Central Asia 12. Eastern Asia 13. Southern Asia 14. South-Eastern Asia 15. Western Asia 16. Northern America 17. Central America 18. South America 19. The Caribbean 20. Australasia/Oceania	*For descriptive analyses* 0 – UK (1) 1 – Europe (2-5) 2 – Africa (6-10) 3 – Asia (11-15) 4 - Americas & Australasia (16-20) *For binary analysis of migrant status:* 0 – UK-born (0) 1 – Migrant (1-4)

Variable	Measure and study time-point	Data levels	Grouping for analysis
Socioeconomic			
Employment	*Baseline*	1. Full-time paid work, working 2. Full-time paid work, on leave 3. Part-time paid work, working 4. Part-time paid work, on leave 5. Voluntary job 6. Student (not also employed) 7. Student (also in employment) 8. Unemployed 9. Not working due to looking after the home 10. Not working due to long-term illness or disability 11. Other	*For descriptive analyses:* 1 – Paid employment (1-4 2 – Voluntary job/student (5-7) 3 – Not working (8-10) 4 – Other (11) *For use in models as a binary variable:* 1 – Working/studying (1-7) 2 – Not (8-11)
Income	*Baseline*	1. £0-£5475 2. £5476-£14,999 3. £15,000-£30,999 4. £31,000-£45,999 5. £46,000-£60,999 6. £61,000 or more 7. Would rather not say	1 – 0-15k (1-2) 2 – 15-45 (3-4) 3 – 46+ (5-6) 4 – rather not say (7)

Variable	Measure and study time-point	Data levels	Grouping for analysis
Education	*Baseline*	1. No formal qualifications 2. GCSE or equivalent 3. A-level or equivalent 4. NVQ level 5. BTEC level 6. Higher national certificate/Diploma 7. Bachelors degree 8. Masters degree 9. Doctoral degree 10. Relevant professional training	*For descriptive analyses:* 1 – GCSE/equivalent or less (1-2) 2 – A-level or equivalent (3-6) 3 – University degree or higher (7-10) *For use in models as a binary variable:* 1 – No university degree (1-6) 2 – University degree (7-10)
Mental health			
Common mental disorders	SCID, *Baseline*	For this variable I grouped together the following disorders assessed: - Major depressive disorder - Major depressive disorder - Mixed anxiety and depressive disorder - Panic disorder - Agoraphobia - Social phobia - Obsessive compulsive disorder - Posttraumatic stress disorder - Generalized anxiety disorder - Bipolar disorder - Borderline personality disorder - Eating disorders (INCLUDE ALL) If a woman was diagnosed as having any one or more of these disorders from the SCID she was scored as positive for presence of a mental disorder.	0 – No CMD 1 – CMD

Variable	Measure and study time-point	Data levels	Grouping for analysis
Depressive symptoms	EPDS, *all time points*	0-28 (cut-off >=13 indicates clinical threshold for depression)	Continuous
Anxiety symptoms	GAD-2, *all time points*	0-6 (cut-off >=3 indicates clinical threshold for anxiety)	Continuous
Personality disorder symptoms	SAPAS, *baseline*	0-8 (cut-off>=3 probable PD)	0 – No PD 1 – Probable PD
Posttraumatic stress disorder symptoms	PDS, *baseline*	Symptom severity score (0-51)	Continuous
Hazardous drinking	AUDIT, *baseline*		0 – No hazardous drinking 1 – Hazardous drinking
Hazardous substance use	DUDIT, *baseline*		0 – No hazardous substance use 1 – Hazardous substance use
Obstestric/medical			
Current smoking	*Baseline*	0. No 1. Yes	0. No 1. Yes
Planned pregnancy	*Baseline*	1. Planned 2. Unplanned	1. Planned 2. Unplanned
Previous miscarriages/terminations	*Baseline*	0. No 1. Yes	0. No 1. Yes
Baby outcomes			
Pregnancy	*Patient notes or 3-month*	1. Singleton 2. Twins 3. Triplets	1. Singleton 2. Twins 3. Triplets
Gestational age at delivery	*Patient notes or 3-month*	Number of weeks	*For analyses:* 0 - At-term (>=37 weeks) 1 – Premature (<37 weeks)

Variable	Measure and study time-point	Data levels	Grouping for analysis
Social support			
Social support	Social Provisions Scale *All time points*	Total score on the scale (24-96)	Continuous
Relationship status	*Baseline*	0. Single 1. Partner but not cohabiting 2. Married/Cohabiting 3. Separated/Divorced/widowed	For all analyses: 0 – Single (0 & 3) 1 – In a relationship (2-3)

Appendix 10: SCID traumatic events question with DSM-IV Criterion A

Below is an extract from the SCID module with the question to ask about traumatic events verbatim, and the note to consider about the types of traumatic event that are included:

> "Sometimes things happen to people that are extremely upsetting -- things like being in a life threatening situation like a major disaster, very serious accident or fire; being physically assaulted or raped; seeing another person killed or dead, or badly hurt, or hearing about something horrible that has happened to someone you are close to. At any time during your life, have any of these kinds of things happened to you?"
>
> *NOTE: List only events that correspond in severity to criteria A(1) i.e. the person experienced, witnessed or was confronted with events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others*
>
> *Criterion A of DSM-IV:*
>
> *The person has been exposed to a traumatic event in which BOTH of the following were present:*
>
> *(1) the person experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others*
>
> *(2) the person's response involved intense fear, helplessness or horror.*
>
> (First et al., 2012)

Appendix 11: Traumatic events question from the PDS

Below is the question to identify traumatic events in the PDS (Foa, 1996). I have highlighted in bold the items that were included in the study measure of abuse.

> *Many people have lived through or witness a very stressful and traumatic event at some point in their lives. Indicate whether or not you have experienced or witnessed each traumatic event listed below by marking "yes" or "no".*
>
> 1. *Serious accident, fire, or explosion (for example, an industrial, farm, car, plane, or boating accident)*
> 2. *Natural disaster (for example, tornado, hurricane, flood or major earthquake)*
> 3. ***Non-sexual assault by a family member or someone you know (for example, being mugged, physically attacked, shot, stabbed, or held at gunpoint)***
> 4. ***Non-sexual assault by a stranger (for example, being mugged, physically attacked, shot, stabbed, or held at gunpoint)***
> 5. ***Sexual assault by a family member or someone you know (for example, rape or attempted rape)***
> 6. ***Sexual assault by a stranger (for example, rape or attempted rape)***
> 7. *Military combat or war zone*
> 8. ***Sexual contact when you were younger than 18 with someone who was five or more years older than you (for example, contact with genitals, breasts)***
> 9. *Imprisonment (for example, prison inmate, prisoner of war, hostage)*
> 10. *Torture*
> 11. *Life-threatening illness*
> 12. *Other traumatic event*
> 13. *If answered "yes" to question 12, please specify the traumatic event*
>
> (Foa, 1996)

Appendix 12: Further details of the AUDIT and DUDIT measures

The Alcohol Use Disorder Identification Test (AUDIT)is a ten-item self-administered questionnaire of alcohol use in the previous year (Babor et al., 2008). The 10 items include two questions on quantity and frequency of alcohol use, a question on binge drinking, two CAGE questions (Ewing, 1984), and five DSM-III criterion questions. Each item is rated on a five-point scale from 0 to 4. The maximum score is 40, with a score of 6 or more for women, and 8 or more for men, indicating harmful or hazardous drinking. A score of 13 or more in women, and 15 or more in men, is likely to indicate alcohol dependence (Babor et al., 2008). Using a cut-off score of 8, the measure demonstrated good sensitivity and specificity (0.85 and 0.88, respectively) with ICD-10 diagnostic criteria for harmful drinking (Cherpitel, 1995). The AUDIT has not been validated in pregnant populations, despite the hazards associated with alcohol use being greater during pregnancy. As a lower cut-off score for pregnant women has not been validated, the standard cut-off for women was used in this study. This may serve to underestimate the prevalence of hazardous alcohol use during pregnancy in this study, as a lower level of alcohol use than in general population samples may be hazardous for pregnant women. However, in the study there were very few women scoring above 4 on the AUDIT, suggesting that it wouldn't have made a large difference to the estimate to use a lower threshold.

The Drug Use Disorders Identification Test (DUDIT) is an 11-item self-administered questionnaire of drug use and drug-related problems in the previous year (Berman et al., 2003). The maximum score for the DUDIT is 44, with a score of 2 or more for women, and 6 or more for men, indicating drug related problems. A score of 25 or more in women and men is likely to indicate drug dependence (Berman et al., 2003). Using a cut-off score of 25, the measure demonstrated good sensitivity and specificity (0.90 and 0.78, respectively) with ICD-10 diagnostic criteria for drug dependence (Berman et al., 2003). As with the AUDIT, the DUDIT has not been validated in pregnant populations, although the hazards associated with drug use are greater during pregnancy. Again, the standard cut-off score for women indicating drug-related problems was used, which may serve to underestimate the prevalence of drug-related problems in pregnancy, which may be indicated by a lower threshold. Again, there were so few women scoring above 0 on the DUDIT, it is unlikely that there was gross underestimation of drug-related problems.

Appendix 13: Comparison between the WENDY sample and the study hospital maternity population

We were able to obtain basic data on ethnicity, age and number of other children of the women who had their antenatal booking appointment at the hospital during the study period, to compare to the women who took part in the WENDY study (see Table below). The women in the WENDY sample appear to be representative of the local maternity population in terms of ethnicity, age and the number of children they have.

Table with comparison of the WENDY study sample to the local maternity population

	WENDY data	**Maternity data**
Ethnicity	White: 284 (52%) Black: 177 (32%) Asian: 25 (5%) Mixed: 23 (4%) Other: 36 (7%)	White: 4914 (51%) Black: 3162 (33%) Asian: 594 (6%) Mixed: 308 (3%) Other: 646 (7%) Unknown/missing: 601 9624 complete
Age	Mean: 32.85, range: 16-47.5 <20: 8(1%) 20-29: 150(28%) 30-39:341(63%) 40+: 46 (8%)	Mean: 31.67, Range: 14-52 <20: 232 (2%) 20-29: 3048 (30%) 30-39: 6240 (61%) 40+: 705 (7%) 10225 complete
Other children	1: 175 (32%) >=2: 99 (18%) None: 271 (50%)	1: 3209 (31%) >=2: 1939 (19%) None: 5077 (50%) 10225 complete

Appendix 14: UEL ethics application and review decision letter

UNIVERSITY OF EAST LONDON

School of Psychology

ETHICS APPLICATION FOR RESEARCH INVOLVING SECONDARY ANALYSIS OF EXISTING DATA

1. If your research solely involves access to and analysis of existing data please complete this application form electronically, fully and accurately.
2. Include electronic copies of document/s pertaining to the original ethics clearance of the initial dataset and other permissions as part of this **ONE DOCUMENT** SAVED AS **.doc**
3. Email your supervisor the completed application and all attachments as **ONE DOCUMENT**. INDICATE 'ETHICS SUBMISSION' IN THE SUBJECT FIELD OF THIS EMAIL.
4. If ethical and legal protocol is demonstrated your supervisor will type in his/her name in the 'supervisor's signature' section (5.2) and email your application to psychology.ethics@uel.ac.uk for processing. You should be copied into this email so that you know your application has been submitted. It is the responsibility of students to check this. Your supervisor will let you know the outcome of your application. Do NOT access and use the intended dataset until this ethics application has been approved.
5. Attach a copy of this application with completed approval section (below) to your thesis/dissertation/project.

PLEASE ANSWER THE FOLLOWING

1. Briefly outline the aims/objectives of the research and what it involves

This study aims to use rich quantitative data from a representative sample of women from a diverse London maternity service to investigate the impact of maternal trauma on the mother-infant dyad within the wider ecological context.

Research Questions

1. Is there an association between maternal experiences of trauma and maternal sensitivity in early mother-infant interactions?

2. What happens to the relationship between maternal trauma and maternal sensitivity when contextual factors (social support, maternal mental health, socio-demographic factors) are included in the regression analysis?
3. Is there an association between maternal experiences of trauma and other aspects of early mother-infant interaction (maternal control and unresponsiveness; infant cooperativeness, compulsiveness, difficultness and passivity)?

2. Give details about the data you will be accessing
(e.g. what are the participant demographics of the original data you want to use? Is the original data anonymised? Is visual data involved and, if so, what is it?)

The data was collected as part of a National Institute for Health Research (NIHR) programme grant investigating perinatal mental health. The *Wellbeing in an inner-city maternity service (WENDY)* study was a cohort study, based on a random sample of women attending their first antenatal booking appointment at a London hospital (around 10 weeks gestation), stratified by their response to their midwife on the Whooley depression screening questions (Whooley et al., 1997).The primary purpose of the baseline study was to estimate the prevalence of common mental disorders in early pregnancy, and to evaluate the effectiveness of the Whooley screening questions at identifying women with depression. The results of this study have been published (Howard et al., 2018), and this paper contains further methodological details of the study, and details of participant characteristics which are briefly summarised here.

545 women were included at baseline, and women were followed up at 28 weeks gestation and at 3 months following birth. A sub-sample of women (n=206) had a video recording of their interaction with their infant at the 3-month postpartum follow-up. This sub-sample will form the sample for this study. The video data has already been coded using the CARE-Index measure (Crittenden, 2006), and so there will be no access to or use of the video data for the purposes of this study. The dataset that will be accessed for this study contains no personally identifiable data. However, as the data set is detailed, and it is feasible that a participant could be identified on the basis of this detail, the data will only be accessed at [redacted], where it is stored on a secure drive. This is in line with policy outlined in the study's data protection registration (form attached).

3. Who is the owner of the original data? (i.e. the copyright holder/s/initial researcher and their affiliation)

[redacted]

4. Who is the guardian of the original data, if different from the above?

(i.e. name of the archive through which you will access the data)

Same as above

6. If you are not accessing data through a data archive have you obtained permission from the owner of the data? If not, why not? (Attach evidence of permission or specify details)

A letter of permission from the owner of the data is attached.

RESEARCHER OBLIGATIONS

1. It is your responsibility to ensure that in gaining access to and using existing data from another source that you have full and appropriate permission from the guardian of the data you intend to use and/or the owner of the data (copyright holder).

2. You must comply with any regulations of use that the guardian and owner of the data stipulate.

3. So as not to infringe copyright, the data source and the guardian and owner (copyright holder) of the data must be acknowledged in your research.

4. You must not pass on the data to other people or groups.

5. You will not need consent from research participants of exiting data where consent was gained as part of the initial data collection and where participants have agreed that their data can be used for further research. The guardian or owner of existing datasets should confirm this, and also that the data you intend to use has been properly anonymised.

I CONFIRM THAT	YES	NO
My proposed research involves no new participant recruitment and no new collection of data	x	

I have permission from the guardian or owner of the data set I intend to use and confirm that participants' consent to use their data is ongoing	x	
Relevant documentation such as permissions is attached If not, why not?	x	
I understand the nature of my ethical and legal obligations in this research (as above) and agree to comply	x	

SIGNATURES

THE TYPING OF FULL NAMES BELOW WILL ACTS AS SIGNATURES

Student's name/signature: Fraser Anderson

Student Number: U1725745

Course: Professional Doctorate in Clinical Psychology

Title of research: The relationship between maternal experiences of trauma and maternal sensitivity in early mother-infant interactions.

Date:26-2-19

I HAVE READ THE APPLICATION AND CONFIRM THAT THE PROPOSED RESEARCH INVOLVES NO NEW PARTICIPANT RECRUITMENT OR DATA COLLECTION

Supervisor's name/signature: Dr Caroline Edmonds

Date:26-2-19

ATTACH ELECTRONIC COPIES OF SUPPORTING DOCUMENTS HERE

[redacted]

[redacted]

30th October 2018

To whom it may concern

Re: WENDY study (well-being in pregnancy in an inner city maternity service) data usage

As owner and guardian of the data, I write to confirm that Fraser Anderson has permission to access and analyse the WENDY study data for her DClinPsy thesis at the University of East London.

Please do contact me if you need any further information.

Yours sincerely,

[redacted]

[redacted]

IF SCANNING NECESSARY DOCUMENTS IS NOT *AT ALL* POSSIBLE, SUBMIT TWO HARDCOPIES OF YOUR APPLICATION (INCLUDING ALL ATTACHMENTS) DIRECTLY TO THE HELPDESK. HARDCOPY APPLICATIONS ARE TO BE SIGNED BY YOU AND YOUR SUPERVISOR AND DELIVERED TO THE HELPDESK BY YOU.

For School use only

APPROVED Chair of School REC	YES	NO
Recommendations (if any): Date:		

School of Psychology Research Ethics Committee

NOTICE OF ETHICS REVIEW DECISION

For research involving human participants
BSc/MSc/MA/Professional Doctorates in Clinical, Counselling and Educational Psychology

REVIEWER: Melanie Spragg

SUPERVISOR: **Caroline Edmonds**

STUDENT: Fraser Anderson

Course: Professional Doctorate in Clinical Psychology

Title of proposed study: The relationship between maternal experiences of trauma and maternal sensitivity in early mother-infant interactions.

DECISION OPTIONS:

1. **APPROVED:** Ethics approval for the above named research study has been granted from the date of approval (see end of this notice) to the date it is submitted for assessment/examination.

2. **APPROVED, BUT MINOR AMENDMENTS ARE REQUIRED BEFORE THE RESEARCH COMMENCES** (see Minor Amendments box below)**:** In this circumstance, re-submission of an ethics application is not required but the student must confirm with their supervisor that all minor amendments have been made before the research commences. Students are to do this by filling in the confirmation box below when all amendments have been attended to and emailing a copy of this decision notice to her/his supervisor for their records. The supervisor will then forward the student's confirmation to the School for its records.

3. **NOT APPROVED, MAJOR AMENDMENTS AND RE-SUBMISSION REQUIRED** (see Major Amendments box below)**:** In this circumstance, a revised ethics application must be submitted and approved before any research takes place. The revised application will be reviewed by the same reviewer. If in doubt, students should ask their supervisor for support in revising their ethics application.

DECISION ON THE ABOVE-NAMED PROPOSED RESEARCH STUDY
(Please indicate the decision according to one of the 3 options above)

Approved

Minor amendments required *(for reviewer)*:

Major amendments required *(for reviewer):*

Confirmation of making the above minor amendments *(for students)*:

I have noted and made all the required minor amendments, as stated above, before starting my research and collecting data.

Student's name *(Typed name to act as signature):*
Student number:

Date:

(Please submit a copy of this decision letter to your supervisor with this box completed, if minor amendments to your ethics application are required)

ASSESSMENT OF RISK TO RESEACHER *(for reviewer)*

Has an adequate risk assessment been offered in the application form?

YES

Please request resubmission with an adequate risk assessment

If the proposed research could expose the researcher to any of kind of emotional, physical or health and safety hazard? Please rate the degree of risk:

☐ HIGH

Please do not approve a high risk application and refer to the Chair of Ethics. Travel to countries/provinces/areas deemed to be high risk should not be permitted and an application not approved on this basis. If unsure please refer to the Chair of Ethics.

☐ MEDIUM (Please approve but with appropriate recommendations)

☐ **LOW**

Reviewer comments in relation to researcher risk (if any).

Reviewer *(Dr Melanie Spragg)*:

Date: 07/03/2019

This reviewer has assessed the ethics application for the named research study on behalf of the School of Psychology Research Ethics Committee

RESEARCHER PLEASE NOTE:

For the researcher and participants involved in the above named study to be covered by UEL's Insurance, prior ethics approval from the School of Psychology (acting on behalf of the UEL Research Ethics Committee), and confirmation from students where minor amendments were required, must be obtained before any research takes place.

For a copy of UELs Personal Accident & Travel Insurance Policy, please see the Ethics Folder in the Psychology Noticeboard

UNIVERSITY OF EAST LONDON

School of Psychology

REQUEST FOR AMENDMENT TO AN ETHICS APPLICATION

FOR BSc, MSc/MA & TAUGHT PROFESSIONAL DOCTORATE STUDENTS

Please complete this form if you are requesting approval for proposed amendment(s) to an ethics application that has been approved by the School of Psychology.

Note that approval must be given for significant change to research procedure that impacts on ethical protocol. If you are not sure about whether your proposed amendment warrants approval consult your supervisor or contact Dr Tim Lomas (Chair of the School Research Ethics Committee. t.lomas@uel.ac.uk).

HOW TO COMPLETE & SUBMIT THE REQUEST

7. Complete the request form electronically and accurately.
8. Type your name in the 'student's signature' section (page 2).
9. When submitting this request form, ensure that all necessary documents are attached (see below).
10. Using your UEL email address, email the completed request form along with associated documents to: Dr Tim Lomas at t.lomas@uel.ac.uk
11. Your request form will be returned to you via your UEL email address with reviewer's response box completed. This will normally be within five days. Keep a copy of the approval to submit with your project/dissertation/thesis.
12. Recruitment and data collection are **not** to commence until your proposed amendment has been approved.

REQUIRED DOCUMENTS

1. A copy of your previously approved ethics application with proposed amendments(s) added as tracked changes.
2. Copies of updated documents that may relate to your proposed amendment(s). For example an updated recruitment notice, updated participant information letter, updated consent form etc.
3. A copy of the approval of your initial ethics application.

Name of applicant:	Fraser Anderson
Programme of study:	Doctorate in Clinical Psychology
Title of research:	The relationship between maternal experiences of trauma and maternal sensitivity in early mother-infant interactions
Name of supervisor:	Prof Caroline Edmonds

Briefly outline the nature of your proposed amendment(s) and associated rationale(s) in

the boxes below

Proposed amendment	Rationale
Title of the study to be changed. The proposed amendment is to change the word 'trauma' to the word 'abuse', making the title: **The relationship between maternal experiences of abuse and maternal sensitivity in early mother-infant interactions**	The research question has been refined and is specific to abusive experiences rather than more general traumatic experiences, and so the title should reflect this specificity.

Please tick	YES	NO
Is your supervisor aware of your proposed amendment(s) and agree to them?	x	

Student's signature (please type your name): Fraser Anderson

Date: 26th March 2020

TO BE COMPLETED BY REVIEWER		
Amendment(s) approved	Yes	
Comments		

Reviewer: Tim Lomas
Date: 26.3.20

Appendix 15: UEL data management plan

UEL Data Management Plan: Full

For review and feedback please send to: researchdata@uel.ac.uk

If you are bidding for funding from an external body, complete the Data Management Plan required by the funder (if specified).

Research data is defined as information or material captured or created during the course of research, and which underpins, tests, or validates the content of the final research output. The nature of it can vary greatly according to discipline. It is often empirical or statistical, but also includes material such as drafts, prototypes, and multimedia objects that underpin creative or 'non-traditional' outputs. Research data is often digital, but includes a wide range of paper-based and other physical objects.

Administrative Data	
PI/Researcher	Fraser Anderson
PI/Researcher ID	u1725745
PI/Researcher email	u1725745@uel.ac.uk
Research Title	The relationship between maternal experiences of abuse and maternal sensitivity in early mother-infant interactions
Project ID	N/A
Research Duration	October 2019 – September 2020
Research Description	The study is secondary data analysis of data collected for the purposes of research. The data was collected as part of a National Institute for Health Research (NIHR) programme grant investigating perinatal mental health. The Wellbeing in an inner-city maternity service (WENDY) study was a cohort study, based on a random sample of women attending their first antenatal booking appointment at an [redacted] hospital. This study aims to use rich quantitative data from a representative sample of women from a diverse London maternity service to investigate the impact of maternal abuse experiences on the mother-infant dyad within the wider ecological context. Research Questions

	1. Is there an association between maternal experiences of abuse and maternal sensitivity in early mother-infant interactions? 2. What happens to the relationship between maternal abuse and maternal sensitivity when contextual factors (social support, maternal mental health, socio-demographic factors) are included in the regression analysis? 3. Is there an association between maternal experiences of abuse and other aspects of early mother-infant interaction (maternal control and unresponsiveness; infant cooperativeness, compulsiveness, difficultness and passivity)?
Funder	Not applicable – part of a professional doctorate
Grant Reference Number	Not applicable – part of a professional doctorate
Date of first DMP version	26/03/2020
Date of last DMP update	31/03/2020
Related Policies	e.g UEL's Research Data Management Policy
Does this research follow on from previous research? If so, provide details	Not applicable
Data Collection	
What data will you collect or create?	None - Secondary analysis of pre-existing data. Will you be exporting any of the data? If so to where and how? Will you use any software to analyse the data e.g. SPSS or NVivo or similar The data was already exported into a STATA data file by the research team. It is available on the secure shared drive at [redacted]. Due to COVID-19 closing access to the university computers, and the need to access data remotely, an anonymised data export with variables for my study is now also available to me in my secure [redacted] OneDrive file. I am analysing the data using STATA.
How will the data be collected or created?	Secondary analysis of pre-existing data.

Documentation and Metadata	
What documentation and metadata will accompany the data?	There is an Excel codebook that accompanies the STATA data file. This is stored on the [redacted] secure shared drive, and a copy is now in my secure [redacted] OneDrive file. There are STATA .do files that contain the analysis code for the study. These are stored in the [redacted] secure shared drive.
Ethics and Intellectual Property	
How will you manage any ethical issues?	A UEL ethics application for research involving secondary analysis of existing data was submitted and approved on 07-03-2019. Ethical approval for the original study was obtained from London Camberwell St. Giles NHS Research Ethics Committee. The primary ethical issue specific to this data is maintaining confidentiality of the women who took part. Although the dataset being used contains no personally identifiable data, and has been anonymised, it will still only be stored and accessed via the secure drive at [redacted] or the secure OneDrive. All results reported will be at a sample level, and so will not make any participant identifiable by unique characteristics.
How will you manage copyright and Intellectual Property Rights issues?	Not applicable
Storage and Backup	
How will the data be stored and backed up during the research?	The dataset being used for this study contains no personally identifiable data, as it has been anonymised. Nevertheless, the data is stored at [redacted] on a secure drive, and will only be accessed from that site. This is in line with policy outlined in the original study's data protection registration.

How will you manage access and security?	As above
Data Sharing	
How will you share the data?	Not applicable
Are any restrictions on data sharing required?	Not applicable
Selection and Preservation	
Which data are of long-term value and should be retained, shared, and/or preserved?	Not applicable
What is the long-term preservation plan for the data?	Not applicable
Responsibilities and Resources	
Who will be responsible for data management?	Fraser Anderson [redacted] (external supervisor) is the owner and guardian of the original data. Fraser Anderson has permission to use it for the purposes of the thesis.
What resources will you require to deliver your plan?	Not applicable

Review	
Reviewer name: Date: 31/03/2020	Penny Jackson Research Data Management Officer

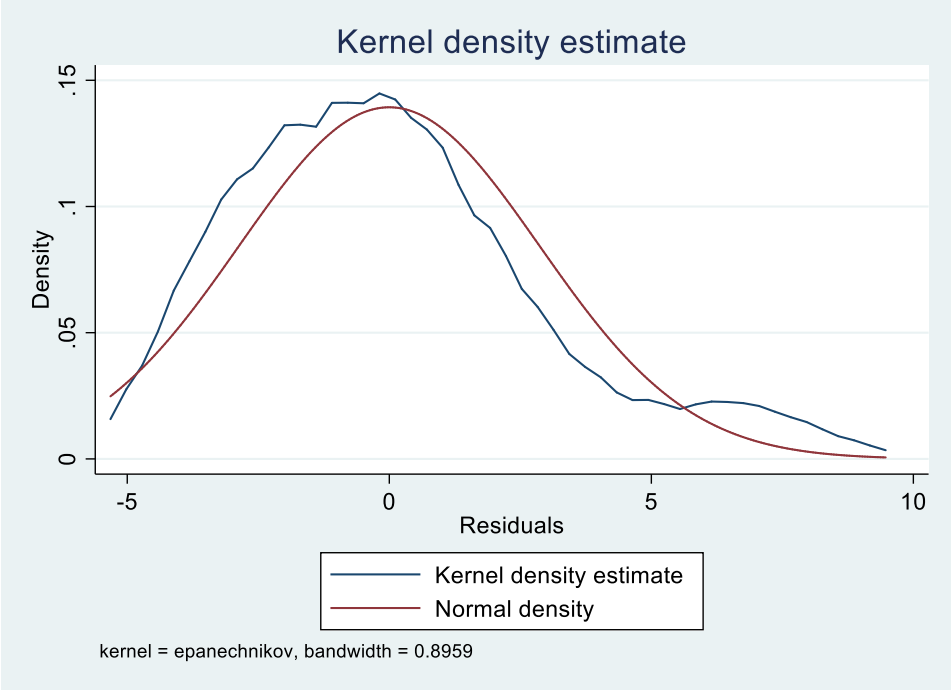
Appendix 16: Testing for the assumptions required for a linear regression analysis

Linearity of relationship between predictor and outcome variables

It is not possible to visually inspect a scatter plot of the relationship between abuse experience and maternal sensitivity, as abuse is binary. However, due to the predictor variable being binary, coded with dummy numbers (no abuse=0 or abuse=1), the main association meets the assumption of linearity by definition, as there are only two possible data points, defining a straight line (Hardy, 1993).

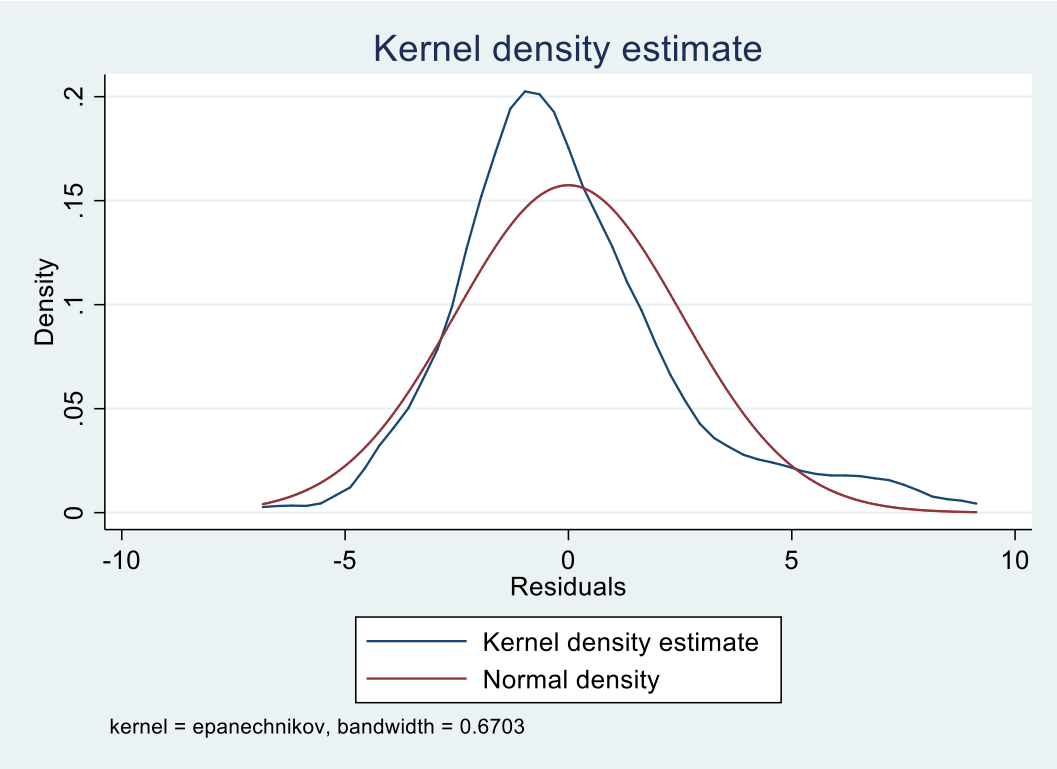
Normality of residuals

After running the primary regression model, I generated values for the residuals, and then produced a kernel density plot (Appendix Figure 1) to examine the distribution of residuals with a normal density distribution overlaid. A visual inspection of this graph suggested no serious deviation from a normal distribution.



Appendix Figure 1: Kernel density plot of residuals for the regression of maternal sensitivity score on experience of abuse

Another plot was calculated for the full regression model (Appendix Figure 2). Although there was some deviance from the normal distribution, this may be expected with the large number of variables included in the model with a relatively small number of participants.



Appendix Figure 2: Kernel density plot of residuals for the regression of maternal sensitivity score on experience of abuse and all other variables in the full regression model

Multicollinearity

With the full regression model, I calculated a variance inflation factor (VIF) for all variables included (Appendix Figure 3). A rule of thumb is that a variable with a VIF greater than 10 merits further investigation for multicollinearity in the model, where two variables may be near perfect linear combinations of one another. The Stata output table of VIF values for the full model is included below; there were no VIF values greater than 5.

```
. vif
```

Variable	VIF	1/VIF
1.abuse_pl~p	1.37	0.727338
age_at_bas~e	1.52	0.659680
2.ethnibin	1.65	0.606373
1.migrant	1.44	0.693699
incomgroup		
2	2.63	0.379580
3	4.44	0.225387
2.employbin	1.38	0.726622
2.edubin	1.61	0.621311
1.rel_stat	1.79	0.557830
sps_prosum	2.32	0.431579
1.anydis	1.27	0.787667
sap_bin	1.36	0.733931
pds_prosum	1.86	0.538565
epd_3m_pro~m	1.34	0.743986
oh_01	1.79	0.559752
Mean VIF	1.85	

Appendix Figure 3: Stata output of the variance inflation factor (VIF) for all variables included in the model

Appendix 17: Table of missing data sensitivity analyses

Variable	Level	Odds Ratio	*p* value	95% confidence interval
Abuse *n=197*	No	*ref*		
	Yes	1.16	.65	0.61 – 2.25
Maternal sensitivity *n=197*	*Continuous*	0.80	<.01	0.69 – 0.92
Age *n=197*	*Continuous*	0.95	.10	0.90 – 1.01
Ethnicity *n=197*	White	*ref*		
	Not-White	3.41	<.01	1.70 – 6.46
Migrant status *n=197*	UK-born	*ref*		
	Migrant	2.05	.03	0.96 – 3.63
Previous children *n=197*	No	*ref*		
	Yes	0.75	.39	0.40 – 1.43
Income *n=159*	0-15k	*ref*		
	15-45k	0.66	.58	0.15 – 2.86
	46k+	0.43	.24	0.10 – 1.73
Employment *n=195*	Paid work	*ref*		
	Not working	4.60	<.01	2.32 – 9.12
Education *n=197*	No degree	*ref*		
	University degree	.24	<.01	0.12 – 0.47
Relationship status *n=197*	Single	*ref*		
	In a relationship	0.57	.22	0.24 – 1.40
Social support *N=191*	*Continuous*	0.98	.18	0.95 – 1.01
Mental disorder *N=195*	No	*ref*		
	Yes	0.61	.14	0.32 – 1.18
Positive PD screen (SAPAS) *N=197*	No	*ref*		
	Yes	1.63	.16	0.83 – 3.20

Table continued on next page

Table of missing data sensitivity analyses (continued)

Variable	Level	Odds Ratio	*p* value	95% confidence interval
Depression symptoms (3m) *N=197*	*Continuous*	0.99	.87	0.94 – 1.06
Anxiety symptoms (3m) *N=164*	*Continuous*	0.94	.59	0.73 – 1.20
Trauma symptoms *N=189*	*Continuous*	1.02	.24	0.99 – 1.05
Hazardous alcohol use *N=190*	No	*ref*		
	Yes	0.26	.03	0.08 – 0.90
Hazardous substance misuse *N=193*	No	*ref*		
	Yes	1.04	.94	0.38 – 2.80
Smoking *N=197*	No	*ref*		
	Yes	5.18	.03	1.19 – 22.52
Planned pregnancy *N=197*	Planned	*ref*		
	Unplanned	2.49	<.01	1.29 – 4.79
Previous miscarriages/stillbirths *N=196*	No	*ref*		
	Yes	1.39	.34	0.71 – 2.75
Previous terminations *N=197*	No	*ref*		
	Yes	1.57	.19	0.80 – 3.09
Premature baby *N=197*	No	*ref*		
	Yes	0.81	.80	0.16 – 4.03