

**A Prospective Examination of the Contribution of Postnatal Maternal
Depression and Personality to Aggressive Behaviour in Young Children**

A thesis submitted to The University of Manchester for the degree of
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Abstract

The University of Manchester,
Fay Huntley, Doctor of Philosophy (PhD)
A Prospective Examination of the Contribution of Postnatal Maternal Depression and
Personality to Aggressive Behaviour in Young Children
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Early-onset aggression in children has been linked to later difficulties in childhood and adulthood. Understanding of the antecedents and mechanisms that may lead to this early-onset aggression is still somewhat limited and, in this study, the roles of mothers' depression and personality disorder symptoms (personality dysfunction) were investigated. Three questions were addressed: Does postnatal maternal depression predict children's aggression independently of mothers' depression during pregnancy, current depression (present at the time of reporting), and potential confounders? Does maternal personality dysfunction predict children's aggression? Does mothers' personality dysfunction account for associations between mothers' depression and child aggression? It was also examined whether mothers' relationship establishment with an antisocial partner would mediate associations between personality dysfunction and child aggression. **Methods** As part of a wider study, a consecutive, community-based sample of first-time mothers were followed longitudinally from pregnancy to age 2.5 years (30 months). Mothers completed the Edinburgh Postnatal Depression Scale at 32 weeks gestation, and at 5, 8, 28 and 58 weeks postnatally, and when the children were 30 months. Longitudinal Latent Class Analysis was used to model mother's postnatal depression symptoms. Personality disorder symptoms and relationship establishment were assessed using semi-structured interviews in pregnancy. Child aggression was assessed using the Child Behaviour Checklist (CBCL) and an interview designed to assess physical aggression at 30 months. A total of 244 mothers completed both aggression outcomes. **Results** A trajectory characterised by elevated maternal depression symptoms was significantly associated with child aggression when examined separately. However, mothers' postnatal depression did not independently predict children's aggression when examined with current depression and one of the confounders, psychological abuse within relationships. Mothers' borderline personality dysfunction significantly predicted CBCL aggression after accounting for postnatal depression and confounding variables, with both borderline dysfunction and current depression contributing jointly to child aggression. The associations between mothers' borderline personality dysfunction and children's physical aggression did not remain when psychosocial confounders were included in the models. No evidence was found for mediation via mothers' relationship establishment and presence of an antisocial partner, but both were significantly associated with children's CBCL aggression. **Conclusions** The findings are the first to demonstrate the importance of mother's borderline personality dysfunction in the development of aggression in young children, particularly in predicting the broad aggression construct measured using the CBCL. The evidence for the role of postnatal depression was inconclusive, whilst current depression was a significant predictor. Mothers' borderline personality dysfunction evidenced a significant prediction to aggression after accounting for depression. Further, mother-reported levels of psychological abuse, relationship establishment and an antisocial partner all emerged as significantly associated with children's aggression. The findings have implications for practitioners working with pregnant and postpartum women by indicating a number of factors associated with children's aggression, which could be readily assessed and targeted for intervention. In particular, the findings suggest that screening of borderline personality disorder symptoms may be beneficial.

Declaration

No portion of the work referred to in the thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

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Dedication and Acknowledgements

I would like to dedicate my thesis to my family (Mum, Richard, Zoe, Rory, Dad, Eileen) who have been a constant source of support and who I am very lucky to have.

I would like to thank my supervisors Prof Jonathan Hill and Prof Andrew Pickles for their guidance, encouragement and assistance that has spanned from when I first developed my research proposal to every aspect of completing the study and writing up the findings. I have learnt a huge amount from both of them and been fortunate to work with them and have them both as my supervisors. I am also grateful to my advisor, Dr Ming Wai Wan, and tutor Dr Roger Webb for advice and practical guidance throughout the past 3 years.

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Preface

This study was conducted whilst I was employed as a full time research assistant on the Wirral Child Health and Development Study. I was responsible for administering approximately 50% of the interviews with mothers when the children on the study were aged 30 months. In addition, I was responsible for coding and data entry of measures used in the present study, mainly for the other 50% of mothers I did not interview.

In relation to my research background, I have worked as a research assistant with Prof Hill for the past 5 years. Initially I worked on a Randomised Controlled Trial for forensic clients who had received personality disorder diagnoses, before moving to the Wirral Child Health and Development Study after I had formulated a research proposal in order to study for the PhD. Before this I worked as a Forensic Psychologist in Training for the UK Prison Service where I gained an MSc in Applied Forensic Psychology.

A Prospective Examination of the Contribution of Postnatal Maternal Depression and Personality to Aggressive Behaviour in Young Children

The early years are a critical developmental period for the emergence of aggressive behaviour in children (Shaw, Hyde, & Brennan, 2012; Wakschlag, Tolan, & Leventhal, 2010), which may increase the risk for negative outcomes in later childhood and adult life (Tremblay, 2004). An understanding of the contributory factors to aggressive behaviour is clinically important to inform the assessment of risk, prevention strategies and intervention approaches (Hay, 2005). Given their central role in a child's early years, mothers' psychopathology and more enduring characteristics are important to examine, and likely to influence children's development via a number of mechanisms (Belsky, 1984).

The primary aim of the study was to disentangle the contributions of maternal postnatal depression and mothers' personality dysfunction (conceptualised in Section 1.5.2) to the broad construct of aggressive behaviour and physical aggression in children aged 30 months (described in Section 1.3.5). Whilst maternal depression has received a lot of research attention, an important omission is mothers' personality dysfunction, despite the fact that maternal depression and aspects of personality are often highly associated (Kim-Cohen, Moffitt, Taylor, Pawlby, & Caspi, 2005; Rutter & Quinton, 1984b). This raises the possibility that reported associations between mothers' depression and their child's outcomes may actually be accounted for by the presence of personality dysfunction (Rutter & Quinton, 1984b).

The second aim of the study was to examine whether any associations found between mothers' personality dysfunction and children's aggression were mediated via mothers' selection of an adverse environment. Personality dysfunction has been associated with interpersonal difficulties that may increase the likelihood of establishing relationships

with antisocial partners (Jaffee, Moffitt, Caspi, & Taylor, 2003; Rutter, Quinton, & Hill, 1990). Although the presence of an antisocial partner has been associated with behaviour problems in children (Blazei, Iacono, & McGue, 2008; Jaffee et al., 2003), previous research has not attempted to examine the mechanisms involved in the establishment of mothers' relationships with antisocial partners. There is some evidence that women with higher levels of personality dysfunction may be more likely to establish such relationships (Quinton, Pickles, Maughan, & Rutter, 1993) making this an important aspect to consider in relation to mothers with higher levels of personality dysfunction.

1.1 Overview, Outline of Background and Approach to Reviewing Literature

The first section of the background presents a series of methodological considerations that informed the implementation of the study and interpretation of results. In section 1.3, the construct of aggression in young children is discussed, with attention paid to the contrast between broad conceptualisations of aggressive behaviour and physical aggression. Thirdly, the issue of mothers' postnatal depression and associations with their children's aggression is discussed. In Section 1.5, the relatively under-studied area of mothers' personality functioning is explored, with an emphasis upon current gaps in the literature. This leads on to the discussion of a potential sequence of influence that could account for associations between mothers' personality functioning and children's aggression. Finally, the aims and hypotheses of the study are presented.

The background is based on the following general structure. There is a focus on prior research directly relevant to the hypotheses. Where there is a lack of research, indirect evidence has been considered. If available, studies with prospective designs were prioritised, as these allow for inferences to be made about the possible direction of

influence between factors. Where evidence has come from cross-sectional designs, this has been noted. Studies with samples of young children, aged under 5, were the focus as these were most relevant to the sample in the present study. Further, the first few years of a child's life may be a period of increased vulnerability (Serbin & Karp, 2004). Where there was limited evidence, findings from older samples were considered. Finally, to ensure relevance to the study hypotheses, the focus was on community rather than clinical samples. In the case of mothers' depression, the term used in the thesis generally refers to depression symptoms. Where clinical diagnoses have been used this is noted. Other constructs referred to in the thesis are conceptualised in the relevant sections.

1.2 Methodological Considerations in Developmental Psychopathology

Before presenting the background, methodological considerations relevant to research in developmental psychopathology that informed the study are discussed.

1.2.1 Multiple influences and complex relationships. A key aim of developmental psychopathology research is to investigate whether potential influences have independent associations with child outcomes in order to examine possible mechanisms, interactional processes, and pathways (Harrington, 2001; Rutter, 2011). These multiple influences can make it difficult to disentangle specific causal effects of any one variable upon child outcomes, and pose problems for researchers attempting to isolate which factors lead to, maintain and may reduce problems in childhood (Hill, 2002).

The study of development requires attention to both proximal and distal factors present in the environment (Bronfenbrenner, 2004). Overlapping *proximal* influences, such as maternal mental health or parenting style, along with *distal* influences such as socio-

demographic factors, all may contribute to development. Specifically, distal influences can predispose to proximal factors (Kumsta, Rutter, Stevens, & Sonuga-Barke, 2010).

Moreover, individuals may differ in their susceptibility to such environmental factors, with some more vulnerable than others (Belsky, Bakermans-Kranenburg, & Van IJzendoorn, 2007; Sameroff, 1983).

Environmental influences co-occur with genetic influences. Genetic influences can be direct whereby variants of behaviours are transmitted from parent to child (Jaffee, Strait, & Odgers, 2012), or indirect gene-environment interactions, where the interplay of genetic influences and environmental risk affect individuals' responsiveness to their environment (Caspi et al., 2002; Caspi, Hariri, Holmes, Uher, & Moffitt, 2010). Examining the role of genetic influences is complex, and generally requires large genetically-informed designs (i.e. with twin or adoptee samples) and biological measurement to allow testing of interactions and measurement of candidate genes (Raine, 2002). Therefore, in the case of the present study, associations found may at least in part be explained by unmeasured genetic effects.

There are also likely to be bi-directional influences between mothers and their children (Kochanska, Friesenborg, Lange, Martel, & Kochanska, 2004). In addition to mothers influencing their children, children are likely to influence their mothers, with child attributes such as temperament contributing to the dynamic parent-child relationship (Belsky, 1984). For example, levels of infant irritability have been found to predict onset of depression in mothers already identified as at risk of developing postnatal depression (Murray, Stanley, Hooper, King, & Fiori-Cowley, 1996). Similarly, Gross, Shaw, Burwell, & Nagin (2009) found that higher levels of non-compliance in boys, assessed during observations when they were 18 months old, predicted higher levels of mothers' depressive

symptoms when sociodemographic risk factors had been controlled for. In turn, mothers' higher depression symptoms predicted teacher and adolescent's reports of boy's delinquency and externalising problems after boys' initial levels of non-compliance were controlled for (Gross et al., 2009).

1.2.2 Timing. Examination of the timing of relationships between factors and outcomes, referred to as 'temporal relationships', using epidemiological, prospective designs is important to provide information about developmental processes and precursors (Rutter, Pickles, Murray, & Eaves, 2001). For example, prospective birth-cohort designs can provide information about the role of early exposures during pregnancy and the perinatal period, allowing researchers to identify potential mechanisms of risk, protective factors and patterns of growth (Glover, 2011; Serbin & Karp, 2004). Additionally, locating timing effects can inform decisions regarding when prevention or intervention may be most beneficial (Barker, Jaffee, Uher, & Maughan, 2011). However, longitudinal designs also raise specific methodological issues. One problem for prospective designs is that there may be an accumulative effect of factors, making it difficult to examine whether a timing effect has occurred (Hay, Pawlby, Waters, Perra, & Sharp, 2010). If timing effects are identified, this can suggest the role of different mechanisms that lead to vulnerability or resilience. However, in practice, they are difficult to isolate and require study over many years. Further, prenatal risks are often associated with postnatal risks, which may create a continuum of influence (Hill, 2002). This poses important challenges for researchers attempting to isolate pre or postnatal influences.

1.2.3 Confounding variables and mediation. Associations found between a predictor variable and an outcome may be accounted for by the influence of confounding variables, referred to as 'third variable effects' (Rutter et al., 2001). The potential role of

these variables makes it difficult to conclude whether a specific predictor, as opposed to a correlated factor, is influencing the outcome (Jaffee et al., 2012). For example, sociodemographic variables such as low income or smoking during pregnancy are often associated with maternal psychopathology, and it could be these factors that result in aggression in children (Barker, Copeland, Maughan, Jaffee, & Uher, 2012; Fergusson, Woodward, & Horwood, 1998; Roza et al., 2009; Tremblay et al., 2004). Moreover, aspects of relationship discord within families, including relationship breakdowns and violence, which are considered risk factors for children's antisocial behaviour (Farrington, 2005), are often correlated with women's depression (Hammen & Brennan, 2002) and personality difficulties (Rutter & Quinton, 1984b). Thus, in the developmental context, it may be individual or sets of confounding variables that confer risk to children, rather than the main variables of interest. This issue highlights the importance of designs that control for confounders. However, studies can not control for all potential confounders, a problem referred to as 'omitted variable bias' (Jaffee et al., 2012).

The role of potential mediators is also important to consider. In contrast to a confounding variable, which is proposed to precede and result in the predictor of interest, a mediator is conceptualised as resulting from the predictor and contributing to observed changes in the outcome (Baron & Kenny, 1986). To address this, statistical analyses can be used to aid examination of whether an effect is carried by a main predictor or whether there is an indirect effect through mediators (Baron & Kenny, 1986; Kumsta et al., 2010). Mediation can be complete or partial. Partial mediation is often considered most likely in developmental psychopathology due to the multiple influences likely to contribute to children's development (Rutter et al., 2001).

1.2.4 Measurement of psychopathology. Whether psychopathology should be measured using a categorical (discrete diagnoses) or dimensional (levels of traits or symptoms on continuous dimensions) approach has been extensively debated, and has received a large amount of research attention (Markon, Chmielewski, & Miller, 2011; Rutter, 2011). It is currently of interest in the context of recent changes made to the widely-used classification system, the Diagnostic and Statistical Manual of Mental Disorders [DSM] (American Psychiatric Association, 2000).

Based upon a medical model, the DSM conceptualises psychopathology constructs as located within the individual that are represented as disease or illnesses (Rutter, 2011). Accordingly, it can be used to make diagnoses based upon rules regarding the presence of specific symptoms. If these symptoms are assessed as present, and have caused distress or impairment, the construct under assessment is said to be present (Kamphuis & Noordhof, 2009). A practical utility of categorical diagnoses is that they can aid communication, for example about treatment needs, by indicating what constructs are being dealt with. They also allow for comparisons between cases and non-cases to be made in both clinical practice and research (Maughan, 2005; Rutter, 2011).

However, it is increasingly recognised that psychopathology can be effectively conceptualised dimensionally, with degree or level of symptoms that do not meet formal diagnostic criteria being taken into account (Gotlib, Lewinsohn, & Seeley, 1995). The consideration of these ‘subthreshold’ levels of symptoms is important as they are also likely to cause impairment and distress. Angold, Costello, Farmer, Burns, & Erkanli (1999) have referred to individuals who experience subthreshold symptoms as ‘impaired but undiagnosed’, and point out that these individuals may experience as many difficulties as those who receive clinical diagnoses. For this reason, dimensional assessment of symptoms

associated with psychopathology constructs, including personality disorder, is now considered highly relevant to general population samples (Pickles & Angold, 2003).

With the emphasis upon dimensional measurement in general population samples, self-report questionnaires; where respondents are asked to indicate the presence or absence of symptoms associated with a construct of interest, have become the most widely-used method of measuring mother and child factors (Pickles & Angold, 2003). These measures have utility in quantifying symptoms and yield scores well suited to statistical analyses (Markon et al., 2011). However, they do not take into account the social context or severity of impairment that may be associated with the constructs of interest (Hill, Harrington, Fudge, Rutter, & Pickles, 1989). These limitations of self-report scales have informed the development of the investigator-based approach (Rutter & Brown, 1966), which is based on the premise that information beyond frequency of symptoms is important in assessing whether a construct is present. This approach has been applied to the assessment of personality functioning, violence, and child behaviour problems, where it is considered beneficial to assess differentiation, qualitative markers and functioning over time (Hill et al., 1989; Rutter & Brown, 1966; Wakschlag et al., 2010).

Measures that employ the investigator-based approach involve the administration by trained interviewers of standardised semi-structured interviews, where respondents are asked for detailed descriptions of behaviours. These descriptions are then rated by researchers trained to reliability in coding procedures. Further information about the investigator-based method is given in Section 2.3.3.2. Two examples of investigator-based measures are the Liverpool Violence Assessment (Nathan, Rollinson, Harvey, & Hill, 2003) and the Adult Personality Functioning Assessment (Hill et al., 1989), which have demonstrated utility in assessing violent behaviour in adult forensic samples, and in the

assessment of personality functioning in clinical and community samples. The Liverpool Violence Assessment has been used with adults to elicit detailed descriptions of violence across social contexts (family, partners, and social interactions), and has demonstrated high inter-rater reliability and associations with officially-recorded criminal behaviour (Nathan et al., 2003). The Adult Personality Functioning Assessment, which yields ratings of an individual's functioning across a range of social domains, has been validated against a well-established measure of personality disorder in a clinical sample (Hill, Fudge, Harrington, Pickles, & Rutter, 2000), and has demonstrated good inter-rater reliability and subject-informant agreement (Hill et al., 2008).

1.2.5 Summary: Methodological considerations in developmental psychopathology. Research in developmental psychopathology can be highly complex, with a range of methodological issues to take into account. The issues discussed above have informed the design and implementation of the study. In particular, the specific challenges and limitations have informed the interpretation of results and consideration of implications and future work. These are discussed in section 4.2.

1.3 Aggression in Young Children

1.3.1 Defining aggression. There is no single definition of what constitutes aggression in children (Loeber & Hay, 1997; Tremblay, 2010). Conceptualisations range from the wider construct of externalising problems, including attention difficulties, noncompliance, temper tantrums and verbal aggression (Shaw, Keenan, & Vondra, 1994) to the characterisation of specific behaviours, for example the use of physical force (Hay, Castle, & Davies, 2000) and specific acts such as biting, hitting, and slapping (Tremblay, 2010). In the present study, the term 'aggressive behaviour' is used to refer to the broad

construct, whilst 'physical aggression' is used to distinguish behaviour that involves physical acts. The term aggression is used to refer to these two conceptualisations.

1.3.2 Why study children's aggression? The emergence of aggression in infancy is considered part of normative development, reported in children as young as 12 months (Côté, Vaillancourt, LeBlanc, Nagin, & Tremblay, 2006; Van Zeijl et al., 2006) and part of children expressing anger or frustration (Tremblay et al., 1999; Tremblay, 2004). Whilst the majority of children will desist from early aggression (Tremblay et al., 1999) evidence suggests that behaviours in young children who show a tendency towards more frequent aggression demonstrate moderate to strong continuity (Shaw et al., 1994) as well as prediction to later, often clinically-significant, problems (NICHD, 2004). It is hypothesised that varying longitudinal patterns arise from different developmental processes and pathways (Côté, Vaillancourt, Barker, Nagin, & Tremblay, 2007).

Children displaying the highest levels of early-appearing aggression (Odgers et al., 2008) may be at increased risk for 'life-course persistent' antisocial problems (Moffitt, 1993; Odgers et al., 2008). The broad construct of aggressive behaviour has been examined in a number of large, prospective designs and found to be associated with increased risk of adolescent and adult antisocial behaviour, including mental health difficulties (Shaw et al., 2012), juvenile delinquency and risk-taking (Fanti & Henrich, 2010), adult criminality and violence (Farrington, 1995), and interpersonal problems (Fergusson et al., 1999). Despite a large amount of research attention in examining the course of children's aggression over time, understanding of the specific antecedents and mechanisms leading to early-appearing problems in the youngest children is still somewhat limited (Hay, Hurst, Waters, & Chadwick, 2011; Jaffee et al., 2012). As infancy is a critical developmental period, targeted prevention or intervention approaches at this time

may be more effective and of more long-term benefit (Webster-Stratton & Reid, 2010), underlining the need for research in this area.

There is some evidence to suggest that differences in rates of aggression by gender can be observed in young children (Hay, 2007; Loeber & Hay, 1997). However, this finding is not consistent, with some studies reporting no significant differences in rates of mother-reported aggression between boys and girls (Hay, 2000). Data was not analysed by gender in the present study, and the focus was upon disentangling the relative contribution of mothers' depression and personality to their child's levels of aggression. It is acknowledged in the discussion that this may be an important area for future research.

1.3.3 Physical aggression. Not all children who display the broader aspects of aggressive behaviour, or occasional physical aggression, will show frequent physical aggression (Baillargeon et al., 2007; Loeber et al., 1993). Moreover, there is a body of evidence suggesting distinctions between non-aggressive and aggressive antisocial behaviours, with each hypothesised to have different correlates, covariates and outcomes (Burt, 2012; Maughan, Pickles, Rowe, Costello, & Angold, 2000). Tremblay (2010) has proposed that physical aggression is negatively associated with age. From this perspective, it has been noted that physical aggression shows a tendency to peak in early infancy, from as young as 12 months, then begins to decrease. It is thought that this decrease is a result of children learning how to inhibit such behaviours, better regulate their emotions, and apply more appropriate problem-solving skills (Hay, 2005; Hay et al., 2011; Tremblay et al., 1999). As with aggressive behaviour, elevated levels of early-appearing physical aggression have been found to predict later violence and may be relatively stable over time (Baillargeon et al., 2007; Tremblay et al., 2004). Further, there may be specificity in predictions from physical aggression when compared to other forms of aggressive

behaviour. Broidy et al. (2003) for example, found that elevated physical aggression in childhood, measured in children from age 5, significantly predicted levels of adolescent violent and nonviolent behaviours when hyperactivity and oppositionality were controlled for.

Overall, the early years are a period of significant change, and a crucial time for targeted prevention (Webster-Stratton & Reid, 2010). However, prevention and intervention can be limited by a lack of research with very young children (Hay et al., 2011). Both young children's aggressive behaviour and physical aggression are important to research and address as both confer risk for later difficulties. These considerations directly informed the aims of the study.

1.3.4 Domain-based conceptualisations. Domain-based conceptualisations are based on the premise that the characteristics of children's behaviours vary depending upon the demands of different social domains (Wakschlag et al., 2010). This can lead to behaviours being expressed in a variable manner, according to the social interaction context in which they are exhibited (Crick & Dodge, 1994; Hill, 2002). This is an important area of study as variations in patterning of behaviours may be associated with different influences, mechanisms and correlates (Bugental, 2000). For example, different kinds of relationships make distinct demands upon emotion regulation and communication skills, which are likely to involve different underlying developmental processes (Pettit, Lansford, Malone, Dodge, & Bates, 2010). In the case of children's physical aggression, behaviours expressed in the family context may differ in their antecedents and pathways as compared to aggression expressed outside of the home, for example, in children's social interactions with peers (Hay, Payne, & Chadwick, 2004). Additionally, whilst some children's aggression may be pervasive across contexts, others may only engage in such

behaviours towards siblings or children outside the family under certain circumstances (Dirks, De Los Reyes, Briggs-Gowan, Cella, & Wakschlag, 2012; Halperin, McKay, & Newcorn, 2002; Wakschlag et al., 2010).

A small body of research with child and adult samples has suggested that there may be domain specificity in physical aggression. In an observational study of 84 children aged between 6 – 13 years, mean age 10.2 years, attending a 6-week summer-camp, Shoda & Wright (2004) identified children whose patterns of aggression varied by social domain. Whilst some children tended to display aggression when approached by peers but not by adults, others showed the opposite pattern. The authors did not examine whether there were specific predictors of these differences, but noted that although children's patterns differed between domains, there were similarities in children's behaviours within a given domain. For example, in the frequency and nature of aggression expressed towards either peers or adults. This suggested that the variations found were not random, but may reflect underlying differences in the expression of aggression according to context (Pettit et al., 2010; Shoda & Wright, 2004).

Pettit et al. (2010) used data from a prospective design with a general population sample of mother-child dyads (n= 497) to examine predictions from potential antecedents of physical aggression to levels of violence expressed within different social domains by the children followed up into adulthood. They measured maternal reports of harsh parenting practices when the children were aged 5, levels of social rejection reported by classroom peers for the study children at age 8, and physical violence from the children's partners in romantic relationships at age 18. Additionally, the authors measured levels of violence expressed by the study children towards peers and partners using self-report measures when the children were aged 23-24 years. Predictions from the constructs

measured to later violence indicated some domain specificity in relation to violence towards peers, but not romantic partners. Whilst levels of harsh parenting at age 5 and physical violence from a partner at age 18 significantly predicted violence towards peers and romantic partners, levels of social rejection by classroom peers only predicted violence towards peers, and not romantic partners.

In adult samples, it has been suggested that there may be distinct pathways to violence against romantic partners as compared with violence expressed in other contexts (Hill & Nathan, 2008; Saunders, 2003). Hill & Nathan (2008) assessed 54 men serving prison sentences for violent offences. Using assessments of offending history, psychopathology and the Liverpool Violence Assessment (referred to in Section 1.2.4), along with retrospective recall of child problems and history of maltreatment, the authors found variations in reported violence across social and partner domains. These forms of violence appeared to have different antecedents, with child conduct problems and antisocial personality disorder symptoms significantly predicting violence in social contexts but not violence towards partners, whilst retrospective reporting of exposure to inter-parental violence accounted for a large amount of variance (20%) in partner-directed violence. Exposure to inter-parental violence made a small contribution to social violence after child conduct problems and antisocial personality disorder symptoms were controlled for, illustrating that there may be distinct and overlapping contributory factors to violence (Pettit et al., 2010). Whilst drawing firm conclusions is limited when based upon retrospective data, these findings suggested that there may be particular risk factors for violence expressed in different domains (Hill & Nathan, 2008).

Investigations into contextual variation highlight the possibility of domain-specific patterns in physical aggression. Further study into patterns and processes that may

underpin them is required to assess whether a domain-based approach can contribute to the understanding of physical aggression. This is particularly relevant in samples of young children, when aggression is likely to first emerge, as investigations during this period allow for factors that may precede and contribute to the developmental course of physical aggression to be examined.

1.3.5 Measurement of aggression in the present study. In light of the above considerations along with the issues related to measuring psychopathology (Section 1.2.4), outcome measures that characterised both the wider construct of children's aggressive behaviour and specifically physical aggression were used in the study. To aid comparison with previous research, the broadband aggressive behaviour scale from a widely-used and validated questionnaire, The Child Behaviour Checklist (Achenbach & Rescorla, 2000) was used. In addition, physical aggression was measured using an investigator-based interview approach, which enabled examination of physical aggression displayed within different domains (The Severe Aggression Measure). Both measures are described in Section 2.3.3.

1.3.6 Summary: Aggression in young children. The early-onset of aggressive behaviour and physical aggression may put children at risk of later difficulties. Evidence from samples of young children is limited and more research is needed into antecedents and mechanisms in the early years. In regard to physical aggression, there may be variations in its expression across social domains. If this is the case, there may be specific pathways that underlie these variations, the study of which may contribute considerably to current understanding. Predictions from two plausible maternal predictors of children's aggression were examined in this study. Therefore, the next section presents literature

regarding mothers' postnatal depression, and how postnatal depression may be relevant to aggression in young children.

1.4 Maternal Depression: General Overview

The higher prevalence of diagnosed depression and elevated symptoms in women as compared to men has been well-documented (Almeida & Kessler, 1998; Kessler, 2003). Rates of depression in females have been found to peak during the childbearing years (Kessler, 2006) and some studies have found increases in prevalence following the birth of a baby (Cox, Murray, & Chapman, 1993). However, there is inconsistent evidence regarding whether having a child confers a higher risk of depression per se, as studies comparing rates for women during the perinatal period with samples of same-age non-childbearing women have provided mixed evidence (Gavin et al., 2005).

Mothers' depression warrants attention because of its potential consequences for children's emotional, cognitive and behavioural development (Deave, Heron, Evans, & Emond, 2008; Field, 2011; Goodman & Gotlib, 1999; Goodman & Gotlib, 2002), the mother-child relationship (Field, 2010; Murray et al., 1996) and wider family functioning (Hammen et al., 1987; Webster-Stratton, 1990). In relation to children's aggression, there is evidence to suggest that there are associations between mothers' depression and children's externalising behaviours. A recent meta-analysis including 111 studies, mostly cross-sectional in design, that examined associations between mothers' depression and broadband measures of externalising problems reported significant, small (mean $r = .21$), effect sizes (Goodman et al., 2011). Further, remission in mothers' depression following treatment has been significantly associated with reductions in children's externalising symptoms in designs that have utilised randomised controlled trials (Gunlicks &

Weissman, 2008). Evidence from these controlled designs provides some evidence that mothers' depression may be a contributory factor in children's development of externalising behaviours.

To conceptualise how maternal depression may lead to difficulties for children, Goodman & Gotlib (1999) proposed an integrative developmental model. The model was based on the tenet that a complex and dynamic interplay exists between features of parenting in mothers who are depressed and the presence of wider factors that also influence infants. Four mechanisms are identified in the model: (1) heritability, (2) dysfunctional neuroregulatory mechanisms, (3) exposure to mothers' negative/maladaptive cognitions, behaviours or affect, and (4) exposure to stressful environments. Goodman & Gotlib proposed that variations in these mechanisms mediated associations reported in the literature between maternal depression and child outcomes (For an in-depth review of literature relating to this model see Goodman & Gotlib, 1999 and Goodman, 2007). Additionally, the model addresses potential moderating factors that may increase or decrease risk to infants; (1) paternal health and/or involvement with the child, (2) the course and timing of maternal depression, and (3) individual children's characteristics. The model highlights the complexity involved in examining the role of mothers' depression in regard to their child's development, and underlines how mothers' depression may influence different children in different ways. A key premise of the model is the importance of examining the proposed mediating and moderating factors relevant to depression as well as the fact that it has occurred (Goodman & Gotlib, 1999), and this informed the design of the present study.

1.4.1 Mothers' depression in the postnatal period.

1.4.1.1 Overview of section. In the following section, reported associations between mothers' postnatal depression and children's aggression are discussed. It has been suggested that postnatal depression may pose a specific risk for the development of children's behaviour problems (Murray et al., 1996). However, there is also evidence to suggest that elevated or persistent levels of depression across time that result in children being exposed to mothers' depression on multiple occasions, may be more risky (Hammen & Brennan, 2003). Establishing if postnatal depression makes a specific contribution requires measurement of depression outside of the postnatal period (Hill, Murray, Leidecker, & Sharp, 2008). Depression during the postnatal period often shows significant associations with depression at other times (Hay et al., 2010) and studies that have focused on postnatal depression often have not included depression during pregnancy, which could have influenced reported outcomes. Further, studies have not always controlled for depression symptoms present when mothers report on their child's behaviours. These issues make it difficult to conclude whether postnatal depression makes independent predictions to children's behaviours, and are discussed further in the following section.

1.4.1.2 Why might postnatal depression influence children's aggression?

Postnatal depression has been of particular interest based on the premise that exposure at this time may be particularly harmful to children, particularly through the possible influence upon parenting and early interactions (Field, 2010; Murray et al., 1996). Moreover, it has been hypothesised that mother-child attachment relationships may also be most vulnerable to disruption in this period (Lyons-Ruth, Bronfman, & Parsons, 1999). For example, mothers' depression in the postnatal period may have a particularly negative impact upon mothers' engagement, responsiveness and sensitivity towards their infant,

factors that have been associated with infants' emotion regulation and attention capacities (Cummings & Davies, 1994; Hay, Murray, & Cooper, 1997; Hay et al., 2001). Difficulties in children's regulatory and attentional processes have in turn been associated in the literature with children's aggression (Hay, 2005).

An early study that examined the effects of postnatal depression, measured categorically against DSM criteria, was that of Murray, Sinclair, Cooper, Ducournau, & Turner (1999). They screened a large community sample of women for depression symptoms at 6 weeks postpartum and conducted diagnostic interviews with mothers whose scores had suggested 'probable' depression when their children were 2 months old. This yielded a sample of 58 women identified as depressed at 2 months postpartum who were compared with a group of 42 non-depressed women from the same sample.

After establishing this sample for prospective study, the researchers assessed the mother-child dyads when the children were 18 months and 5 years of age. Measurement included an interview to assess further episodes of maternal depression in the 12 months prior to follow-up assessment, and a validated scale to assess levels of mother-reported child behaviour problems that included aggressive behaviours. When the children were aged 5, mothers' postnatal depression significantly predicted their children's levels of behavioural problems, and this effect remained when the presence of later episodes of depression that met DSM criteria were controlled for. In other words, mothers who had been depressed at 2 months postnatally reported significantly higher levels of behaviour problems when their children were 5 years old than those mothers who had not been depressed, regardless of whether they had experienced any further episodes of depression. However, the study design did not include the assessment of depression during pregnancy. This is a key limitation given that depression during pregnancy has been found to predict

postnatal depression (Evans, Heron, Francomb, Oke, & Golding, 2001). Additionally, evidence has suggested that prenatal depression may be more common than postnatal (Field, 2011).

In a study that accounted for depression during pregnancy, Hay, Pawlby, Angold, Harold, & Sharp (2003) measured mothers' postnatal depression at 3 months, along with depression during pregnancy and when the children were aged 1, 4 and 11. In this prospective community sample (n= 122), the presence of depression was measured against DSM criteria whilst child outcomes measured at age 11 were represented using a composite score made up of child and mother-reported violent behaviours elicited from an established psychiatric interview measure. In a series of structural equation models, Hay et al. found that mothers' postnatal depression significantly predicted levels of children's violence at age 11 when mothers' depression during pregnancy and measured at the later time points was controlled for.

These studies provide evidence for the suggestion that postnatal depression is associated with children's aggression. However, there are some key issues that require attention in order to address whether postnatal depression per se is a key risk. Depression is increasingly understood as a recurrent illness with symptoms that often show chronicity over time (Beshai, Dobson, Bockting, & Quigley, 2011). In the case of mothers' depression, this may result in some children being exposed to elevated levels of mothers' symptoms that persist and vary, which may be more risky for their development (Goodman & Gotlib, 1999). For example, in Hay et al.'s study just seven mothers in the postnatally depressed group experienced postnatal depression only.

A related issue is the importance of subthreshold levels of symptoms that can be as impairing as levels that meet clinical diagnostic criteria (Gotlib et al., 1995). Impairing but subthreshold symptoms of maternal depression may be more risky than individual episodes, particularly if they are prolonged (Hammen & Brennan, 2003). Although the samples used by Murray et al. and Hay et al. were drawn from the community, mothers in the depressed groups met DSM criteria for depression at specific assessment points in the first postnatal year. This evidence does not allow for conclusions to be made regarding whether children of mothers with persistent subthreshold difficulties are at increased risk compared to mothers with lower levels or no symptoms of depression. Whilst some studies have reported associations between mothers' depression symptom levels measured using scales in the postnatal period and externalising outcomes, these have been cross-sectional (Downey & Coyne, 1990) or have measured depression symptoms at only one postnatal time point (Barker et al., 2011). Therefore, these are limited in providing evidence regarding temporal relationships. Studies that have provided evidence about the course of mothers' depression at a number of time points are discussed in the following section.

1.4.2 Chronicity of mothers' depression. The National Institute of Child Health and Human Development (1999) examined links between mothers' symptoms of maternal depression and child outcomes when children were 36 months (n=1215). Mothers were assessed at 5 time points: when children were 1, 6, 15, 24 and 36 months. On the basis of mothers' scores on the validated Center for Epidemiologic Studies Depression Scale [CES-D] (Radloff, 1977), mothers were allocated to one of three groups; 'never depressed', 'sometimes depressed' and 'chronically depressed'. The never depressed group did not score above the recommended cut-off score for probable depression at any assessment point. The sometimes depressed group scored above the cut-off at between 1 and 4 assessment points, and the chronically depressed group scored above the cut-off point at 4 or 5 assessment points. When child outcomes at 36 months were examined, mothers in the

chronically depressed group reported significantly higher rates of total behaviour problems for their children on the Child Behaviour Checklist. Mothers in the sometimes depressed group reported higher rates than never depressed mothers, but less than the chronically depressed mothers (NICHD, 1999).

Hammen & Brennan (2003) found that children whose mothers experienced more chronic depressive symptoms that had been assessed at 4 time points were more likely to be rated by their mothers as having higher levels of behaviour problems than those whose mothers' symptoms were not chronic. In a sample of 4953 mothers and children, mothers' depression was assessed in pregnancy, immediately after birth, when children were 6 months of age and when the children were 5 years old. Child behaviour problems were assessed using a shortened version of the Child Behaviour Checklist that yielded a total behaviour problems score. Chronicity was defined in terms of number of testing episodes at which mothers reported either moderate or severe depression. Severity was defined in relation to how many items an individual endorsed, and those who endorsed four or more items were defined as more severely depressed (Hammen & Brennan, 2003). Severity and chronicity were found to significantly interact when their association with child behaviour problems was analysed, suggesting that both characteristics in combination exerted an influence upon children's outcomes. This underlines the need to consider varying patterns of mothers' depression when considering its influence upon child outcomes.

These studies highlight the potential utility in considering variations in mothers' depression. However, only predictions to the wide broadband measures of children's behaviours were assessed in the investigations. As discussed in Section 1.3.4, these broad measures capture a range of difficulties and do not inform questions about aggressive behaviour or physical aggression specifically. Further the division of the samples into

groups by researcher-driven criteria is problematic due to potential subjective decisions and potential lack of replication (Feldman, Masyn, & Conger, 2009). Such methods also do not allow for variability and unpredictable change in symptoms over time to be represented (Campbell, Morgan-Lopez, Cox, & McLoyd, 2009). These issues have informed the trajectory modelling approach to maternal depression, a method employed in the present study, and findings based on this approach are discussed in the next section.

1.4.3 Trajectories of maternal depression. A recent area of interest in the study of mood disorders including depression is the application of different forms of latent class analysis (Mora et al., 2009; Muthén, 2004; Nandi, Beard, & Galea, 2009) to describe trajectories or classes of symptoms over time (Nagin & Odgers, 2010). The approach has been extensively used to examine the developmental course of child behaviour problems and antisocial behaviours (Moffitt, 1993; Odgers et al., 2008; Shaw et al., 2012). The method allows for subgroups of individuals with similar symptom profiles to be identified according to observed variations in their symptoms measured longitudinally (Muthén, 2004).

Drawing upon this approach, a small number of studies have modelled the course of mothers' depression symptoms measured prospectively and found that groups of women following a similar course of symptoms across time can be identified (Mora et al., 2009; Sutter-Dallay, Cosnefroy, Glatigny-Dallay, Verdoux, & Rasclé, 2012). To date, only a few studies have gone on to examine whether these groups show different associations with child outcomes (Campbell, Matestic, von Stauffenberg, Mohan, & Kirchner, 2007; Campbell et al., 2009), and only one has examined outcomes in children under 5 years of age (Cents et al., 2012).

Campbell et al.(2009) used data drawn from a subset of mother-child dyads participating in the NICHD Study of Early Child Care and Youth Development that included assessments of mothers' depression symptoms at up to 10 time points beginning when children were aged from 1 month to 12 years old (n= 1357). Outcomes for the children were measured when the children were 15 years old, and included children's self-report on an externalising behaviours scale, made up of aggression and delinquency items. Mothers' depression symptoms were measured using the CES-D. The authors applied a cut-off point of 16 and above to characterise 'high' levels of symptoms, which in previous research has shown predictive validity in identifying depression that met clinical criteria.

Using a latent class modelling approach, the authors identified a 5 class model that was a good fit to data when compared with models made up of three to six classes. The classes were labelled as follows: 'chronic' (a small group with scores well above the cut-off across all assessment points, n=66), 'moderately elevated' (a group reporting lower levels than the chronic group, above the cut-off, that fluctuated and were below the cut off in the first postpartum year, n=145), 'early-decreasing' (a group with raised scores in the first two years postpartum that started to decrease below the cut-off after 24 months, n=59), 'stable subclinical' (a group always just below cut-off but higher than those in the very low group, n=416), and 'never depressed' (a group with very low scores across all assessment points, n=671). When prediction from mothers' membership of the depression classes to adolescents' reports of their own externalising symptoms was examined, adolescents whose mothers' symptoms were characterised as chronic, moderately elevated, or stable subclinical reported higher levels of externalising problems than those whose mothers were in the never depressed class. These significant associations remained when sociodemographic variables, education, marital status and ethnicity, were controlled for. Thus, mothers whose depression symptoms were either above or just below the cut-off but

persisted across time were more likely to have children who reported higher levels of externalising behaviours than mothers with lower levels of depression symptoms across time.

Cents et al. (2012) went on to model trajectories of mothers' depression assessed from pregnancy onwards, in a sample of 4167 mothers and children assessed at 4 points (pregnancy, 2 months postnatally, 6 months postnatally, and 36 months postnatally). Mothers' depression symptoms were measured on a 6-item self-report scale. Predictions to child externalising behaviours, rated by mothers and fathers on the Child Behaviour Checklist, were examined when children were 36 months old. Based upon estimation of models made up of between three and six classes, the authors identified a 4-class model as the best fit to the data. The classes were labelled as: 'high' (a small group with consistently high scores across all assessment points, n=62), 'moderate' (a group reporting lower levels than the high group just below the established cut-off, n=457), 'low' (a group with low symptoms who reported higher levels than the never depressed postnatally but did not meet cut-off at any point, n=2221), and 'never' (a group that reported no or very few symptoms across time, n=1427).

In prediction to child outcomes, Cents et al. (2012) found that each of the high, moderate and low trajectories were significantly associated with higher levels of externalising problems, as compared to the never trajectory. When current depression symptoms were accounted for, both mothers' depression trajectory membership and current symptoms made small independent predictions, with comparable beta coefficients, to externalising problems. The associations remained when the contribution of sociodemographic confounders were controlled for. These findings suggested that the presence of any depression symptoms across time were associated with levels of children's

externalising behaviours at 36 months of age, but did not show that children of mothers in the chronic group specifically were at more risk.

In both studies, analyses of associations between the depression classes and psychosocial risks demonstrated that mothers in the higher class were more likely to be single, of low-income, had left education at a young age or reported the presence of previous depression. These associations provided support for the differentiation of the groups identified by the modelling. However, these risk factors did not predict child outcomes once trajectory membership was added into the model. The findings of the studies discussed indicate that there is some utility in modelling mothers' depression over time, and in examining whether particular classes show specific predictions to child outcomes. However, depression during pregnancy was either not measured or was included in the trajectory modelling, based upon the premise that persistent symptoms since pregnancy may have been more risky to children (Cents et al., 2012). However this is problematic. If the postnatal period is a particularly risky time for exposure specific influence cannot be examined by combining it with depression during pregnancy and depression occurring beyond the first year. Given these considerations, it seems reasonable to examine predictions from depression present during pregnancy and that occurred in the postnatal period separately. Secondly, whilst Cents et al. (2012) controlled for mothers' depression present at the time they reported on their child's behaviour, this index of symptoms was also included in the trajectory modelling, which may have resulted in the observed differences between the classes being attributable to the concurrent effect of current mood. Thirdly, the studies only tested predictions to broadband externalising outcomes, which (as discussed in Section 1.3) lack specificity.

1.4.4 Methodological and conceptual issues in the study of postnatal

depression. The studies considered in this section provide tentative evidence regarding two points. Firstly, there is some suggestion that mothers' postnatal depression could increase the risk of aggression in children. Secondly, elevated depression symptoms across time may predict children's behaviour problems. Therefore, it is unclear whether postnatal depression per se is a risk. Whilst the evidence regarding the course of mothers' depression symptoms could weaken the argument for a specific contribution from postnatal depression, on the other hand, raised levels across the first postnatal year could confer a specifically increased risk.

In addition, there are at least four other methodological and conceptual issues that require further consideration in the study of postnatal depression. First, there is a lack of studies with samples of very young children. As discussed in Section 1.3, this is a time where children may be particularly vulnerable to risks that could lead to the development of aggression, and where prevention or intervention may be most effective (Serbin & Karp, 2004; Tremblay, 2010). Further, in their recent meta-analysis, Goodman et al. (2011) report larger effect sizes for associations between maternal depression and children's externalising problems in samples of younger children. Second, the issue of the timing of influences requires further consideration. As discussed in Section 1.2.2, potential timing effects of influences are of interest because independent effects at different times may suggest different mechanisms or pathways. For example, biological pathways may be indicated by specificity of influence during pregnancy whereas associations between depression occurring in the postnatal period and child outcomes may suggest environmental mechanisms (Glover, 2011).

Thirdly, a limitation of earlier studies that report predictions from mothers' depression in the postnatal period and child behaviour is that a limited number of potential confounders were considered. For example, Murray et al. (1999) only examined predictions with child gender and social class included in analyses, and Hay et al. (2003) included single parent and socioeconomic status as their identified confounders. Maternal depression is often associated with a range of other factors such as young age, lack of education (Barker et al., 2012), smoking or substance misuse (Marcus, Flynn, Blow, & Barry, 2003), and interpersonal difficulties such as discord with partners or lack of social support (Hammen & Brennan, 2001). These variables may constitute an additional, indirect risk by adding stressors to an adverse child-rearing environment or pose a direct risk to children's development. In other words, they may contribute to the development of aggressive behaviour independently of postnatal depression, or as mediators in risk pathways.

In illustration of this point, in a large population based study of mother-child dyads (n=3,298), Barker et al. (2012) found that depressive symptoms measured once in the antenatal period (32 weeks gestation) and 1.5 years postnatally each made small independent contributions to child externalising problems measured when children were aged between 7 and 8. However, when a cumulative score of prenatal psychosocial risk made up of items assessing socioeconomic status, marital status, teenage mother status, substance use, cigarette smoking and difficulties with the police was accounted for, higher scores on this index reflecting a higher level of risk significantly predicted children's externalising behaviours and clearly reduced the contribution from mothers' pre and postnatal depression.

In separate analyses performed using the same sample of mother-child dyads discussed in Section 1.4.1.2, Hipwell, Murray, Ducournau, & Stein (2005) went on to examine predictions from mothers' postnatal depression to observed laboratory ratings of children's aggressive behaviour, including verbal and physical aggression during short peer-play interactions. Whilst the authors found that children of mothers depressed in the postnatal period displayed significantly higher rates of aggression during play than children whose mothers had not been depressed postnatally, when parental conflict over the past year was entered into the regression model, the prediction from postnatal depression was clearly reduced and no longer significant. These results may suggest that parental conflict was mediating the relationship between mothers' depression and child aggression. Or the presence of parental conflict may have conferred a direct risk to children's aggression. Nevertheless, the findings highlight the potential importance of considering wider influences such as features of mothers' relationships.

Finally, the issue of depression symptoms present at the time of mothers reporting on their children's behaviours (referred to as 'current depression' in the study) is important for at least three reasons. It has been proposed that the presence of depression symptoms may lead to a negative bias in mothers' perceptions of behaviour and therefore bias their reports. This has been referred to as the depression-distortion hypothesis (Richters, 1992) and studies using structured equation modelling to examine multiple reports of behaviour have provided evidence for this hypothesis (Boyle & Pickles, 1997; Fergusson, Lynskey, & Horwood, 1993). Secondly, if mothers are experiencing depression at the time of reporting on their child's behaviours this depression may currently be affecting their parenting or other features of the child's environment and leading to current behaviour problems in the children under study. Therefore, it would not be surprising that there would be a cross-sectional association between mothers' depression symptoms and their

children's reported outcomes. Third, reported associations could index the cumulative effects of depressive symptoms. Whilst clinical DSM diagnoses present in the previous year have been controlled for in some studies, the presence of maternal depression symptoms at the time of reporting has received less attention and is often not controlled for in the reported statistical analyses.

1.4.5 Summary: Maternal depression. Overall, there is some evidence that maternal depression in the postnatal period is associated with aggression in young children. Recent research has suggested that the characteristics of chronicity of depression may be important. However, issues remain to be addressed. Studies have often not considered the role of prenatal depression and depression at the time of reporting, in terms of whether they make an independent contribution, when examining the role of postnatal depression; therefore it remains unclear whether depression in the postnatal period independently predicts child outcomes. Further, there is mixed evidence regarding the role of confounders. Finally, research in very young children is limited. A systematic comparison of prenatal depression, postnatal depression and depression at the time of reporting, after accounting for common confounding variables such as socioeconomic status and relationship discord, would help clarify whether postnatal depression poses a specific risk for the development of aggression in very young children.

1.5 Maternal Personality Dysfunction

In investigating the influence of mothers' depression, features of maternal personality disorder are relevant because depression and personality disorders often co-occur (Hirschfeld, 1999). It is possible therefore that reported associations between mothers' depression and child outcomes may in fact be explained by features of mothers'

personality dysfunction. The present study was designed to examine this possibility, namely whether (1) personality disorder symptoms contributed to children's aggressive behaviour and (2) whether this contribution accounted for associations between maternal depression and children's aggressive behaviour. In this section, to place these aims in context, the construct of maternal personality dysfunction is reviewed, and research regarding associations with child outcomes is presented.

Antisocial and borderline personality disorders are often the most widely studied. In terms of associations with depression, associations between maternal depression and self-report antisocial personality disorder symptoms have been reported in samples of mothers (Davies, Sturge-Apple, Cicchetti, Manning, & Vonhold, 2012; Kim-Cohen et al., 2005). Similarly, both borderline personality disorder diagnoses and levels of symptoms have been associated with higher levels of depression in mothers (Herr, Hammen, & Brennan, 2008; Newman, Stevenson, Bergman, & Boyce, 2007).

1.5.1 Overview of personality disorder and dysfunction. The concept of 'personality dysfunction' stems from the study of personality disorder. Personality disorder is defined according to the DSM as rigid patterns of cognition, emotionality, interpersonal functioning and behaviour that deviate from the norms of society and exert a pervasive negative effect on functioning across numerous social domains, including work, relationships and daily coping (Alwin et al., 2006; American Psychiatric Association, 2000). There are ten types of personality disorder that were originally presented in DSM, organised into three clusters and each are defined against a set of specific traits or symptoms.

Antisocial and borderline personality disorders form part of ‘Cluster B’ of the DSM criteria, referred to as the ‘dramatic-emotional’ group. They are conceptualised as sharing the key features of impulsivity, interpersonal difficulties and emotional dysregulation (Alwin et al., 2006). Antisocial personality disorder is characterised by a disregard for and violation of the rights of others present from age 15, childhood conduct disorder symptoms such as truanting, stealing and fighting before 15, and instances of illegal behaviour (American Psychiatric Association, 2000; Hare, Hart, & Harpur, 1991). Borderline personality disorder is characterised by a pattern of emotion and affect-regulation difficulties, risky behaviour including self-harm and persistent disruption in interpersonal relationships (Hill et al., 2011; Stepp, Whalen, Pilkonis, Hipwell, & Levine, 2012).

As discussed in Section 1.2.4, before the introduction of DSM-V, clinical work and research into personality disorder was often guided by a categorical DSM based approach to classify and diagnose disorders. However, it is increasingly recognised that the difficulties captured by the personality disorder categories can be considered dimensionally (Kamphuis & Noordhof, 2009; Maughan, 2005; Pickles & Angold, 2003) i.e. there are varying degrees of dysfunction in that likelihood of the presence of problems associated with personality disorder diagnoses increases as the number of symptoms present increase. Therefore, personality disorders can be examined at the symptom-level as ‘personality dysfunction’. This is the approach taken to examine mothers’ personality in this study. The dimensional, symptom-based approach is likely to be more relevant and generalisable to community samples, where rates of diagnosable personality disorder are low (Pickles & Angold, 2003). Using this approach, symptoms associated with each personality disorder are conceptualised as existing on a continuum, and research supports the premise that a range of symptomology is present in community samples (Daley, Burge, & Hammen, 2000). Higher levels of these symptoms are likely to have more consequences for an

individual's functioning in key domains, which has resulted in clinicians and researchers increasingly using dimensional approaches to examine personality disorder features (Hill et al., 2011).

1.5.2 Mothers' personality dysfunction. There are at least three ways in which mothers' personality dysfunction may exert an effect upon child outcomes. Firstly, evidence from family studies suggests there may be genetic transmission and children may inherit genes that make them vulnerable to the development of certain difficulties (Herr et al., 2008). Secondly, the presence of personality dysfunction may negatively affect the mother-child relationship and quality of care-giving (Conroy, Marks, Schacht, Davies, & Moran, 2010; Johnson, Cohen, Kasen, Ehrensaft, & Crawford, 2006; Kim-Cohen et al., 2006). These difficulties can confer risk for children in developing aggression, and may interact with genetic vulnerabilities (Shaw et al., 1994; Stepp et al., 2012). The presence of personality disorders in mothers and fathers have been associated with higher levels of parental possessiveness, controlling behaviours and hostile parenting when compared to parents without personality disorder (Johnson et al., 2006). Moreover, mothers of children aged between 3-6 years with higher levels of self-reported antisocial and borderline personality disorder symptoms have been rated as exhibiting significantly lower levels of responsiveness during observed mother-infant interaction tasks than controls or mothers who were depressed (Wilson & Durbin, 2012). Thirdly, wider psychosocial difficulties such as economic deprivation, relationship dysfunction, history of trauma or abuse, and difficulties with substance abuse, are common correlates of personality disorders (Barnow, Spitzer, Grabe, Kessler, & Freyberger, 2006; Daley et al., 2000; Lyons-Ruth, 2008), all of which have shown associations with children's aggression (Hay et al., 2011; Hill, 2002).

1.5.3 Mothers' personality dysfunction and child outcomes. Understanding the contribution of mothers' personality dysfunction to their child's development is limited by a lack of research. This is despite an early pioneering study by Rutter & Quinton (1984b) who examined longitudinal associations between parents' personality dysfunction and their children's emotional and behavioural problems. The findings of this study have directly informed the present study and so are discussed in detail below.

Rutter and Quinton (1984b) used a 4-year prospective design to follow a subset randomly selected from a consecutive sample of clinically-referred mothers and fathers (n=137). Participants had recently shown psychiatric difficulties as indicated by recent psychiatric services contact, and had children aged 15 years or under (n=292). All parents had received psychiatric diagnoses in the past year and were grouped into those with psychosis (n= 24), those with affective or emotional disorders (n=57) or those with personality dysfunction (n= 53). Personality dysfunction was assessed using an investigator-based approach that enquired about the presence of personality disorder symptoms and whether symptoms had caused impairments in parents' social and interpersonal functioning in adulthood. Children's emotional, behavioural and conduct problems were assessed by scores derived from teacher-report scales administered yearly and investigator-based interviews conducted with both mothers and fathers at baseline and with mothers at subsequent assessment points (1,2,3, and 4 years). The design also utilised a 'classroom comparison' control group that consisted of an age and sex-matched group of children from the study children's schools.

When compared at baseline with the classroom comparison and psychosis or affective disorders groups, the children of parents with personality dysfunction were significantly more likely to be rated as displaying emotional or behavioural disturbances by

both teachers and parents. Further, there was a non-significant trend towards children of parents with any personality dysfunction specifically showing higher levels of conduct-type problems in particular. These associations were apparent for both antisocial and non-antisocial personality dysfunction. Longitudinally, persistent behavioural problems rated by teachers and parents were more frequent for those children whose parents had any personality dysfunction than those in the psychosis, affective disorders or classroom comparison groups.

In addition, there were psychosocial differences found between the psychosis, affective disorders and personality dysfunction groups. The personality dysfunction group was significantly more likely to have had persistent social impairment over the 4-year period, and were twice as likely to have experienced marital discord or breakdown, and to have had a spouse with their own psychiatric difficulties. Rutter and Quinton (1984b) also attempted to examine whether there were specific effects by type of personality dysfunction. To do this, they compared the contribution of antisocial symptoms with symptoms collapsed across the remaining personality disorders, and found no differences in outcomes between the groups. However, they did not specify the nature of the 'other' personality dysfunction group, and had relatively small groups. The issue of influence upon children by type of personality dysfunction is discussed in the next section.

1.5.4 Specific features of mothers' personality dysfunction: Antisocial and borderline dysfunction. Determining whether, and how, specific types of maternal personality dysfunction contribute to children's aggression is necessary to inform understanding of risk, conceptualise potential pathways of influence, and inform practical interventions. However, very few studies look at more than one type of dysfunction or consider whether different features of difficulties have independent effects. For example, a

literature review did not reveal any studies that have controlled for borderline dysfunction when examining that of antisocial symptoms or vice versa, despite the fact that antisocial and borderline personality disorders are often highly associated (Grant et al., 2008). This issue informed the research aims of the study.

As described in Section 1.5.1, antisocial and borderline personality disorders are included in the ‘dramatic-emotional’ cluster and characterised by impulsivity, interpersonal difficulties and emotional dysregulation (Alwin et al., 2006). These features may be particularly relevant to consider in relation to how mothers’ personality dysfunction could influence the mother-child relationship and their children’s behaviour. Both antisocial and borderline personality disorder share social-interactive characteristics that may negatively impact mother-child attachment and interactions, influence parenting skills, or lead to difficulties in mothers’ relationships and the wider social context (Conroy et al., 2010; Herr et al., 2008; Hill et al., 2008; Hill et al., 2011). Further, children’s aggressive behaviours and physical aggression are expressed within social relationships. From a social learning perspective, children whose parents have problems in social interactions may learn such to express the same problematic behaviours through processes of imitation, modelling and reinforcement (Shaw et al., 2012). These relational aspects of the two personality disorders are also of interest because they involve skills that can be specifically targeted in applied settings. With this in mind, research relating to mothers’ antisocial and borderline dysfunction and child outcomes is discussed below.

1.5.4.1 Mothers’ antisocial personality dysfunction and child outcomes. There are a number of possible ways mothers’ antisocial symptoms could influence their child’s aggression. There may be a direct transmission of aggressive behaviour from mothers with antisocial symptoms, either through genetic pathways, or from children being exposed to

aggression from their mothers, for example through physical maltreatment (Jaffee et al., 2012). Alternatively, mothers' antisocial symptoms may increase the likelihood of hostile or coercive parenting practices (Hill, 2002), which may mediate the influence from mothers' antisocial symptoms to child outcomes. It has also been proposed from a clinical perspective, that a parent with antisocial-type difficulties might not perceive fighting, and other antisocial behaviors as problematic and therefore, may not attempt to address these behaviours in their children (Patterson & Stouthamer-Loeber, 1984). Moreover, there is evidence to suggest assortative mating, in that women with antisocial-type difficulties may be more likely than others to cohabit with partners with similar difficulties (Jaffee et al., 2003; Quinton et al., 1993). This presents further genetic and environmental risks to children.

Whilst a small body of research with adolescent (Hay et al., 2010), and school-age children (Frick, Lahey, Hartdagen, & Hynd, 1989; van der Molen, Hipwell, Vermeiren, & Loeber, 2011) has suggested that either mothers' conduct problems before the age of 15, or adult antisocial behaviours show associations with children's behaviour difficulties, very few have investigated associations in young children. A literature search identified two recent studies that examined associations between mothers' antisocial personality dysfunction or conduct symptoms and aggression in very young children. These are discussed below.

Hay et al. (2011) measured a range of potential risk factors, including categorical DSM diagnoses of depression and mothers' reports of their own conduct symptoms, during initial assessments carried out during pregnancy in a community sample of 271 mother-infant dyads. When the infants were between 11-15 months, dyads attended a simulated birthday party involving up to three other families where children's peer interactions were

observed. During these observations instances of behaviours indicative of aggression in the infants such as the use of force against objects or peers were coded. In addition, mothers completed a short aggressive behaviour scale. Analyses using a series of regression models showed that there were independent effects of both depression in pregnancy and mothers' conduct symptoms on maternal-reported aggressive behaviour after controlling for depression prior to pregnancy, sociodemographic risk and smoking in pregnancy. For the observed use of force during peer interactions there was some differentiation: only mothers' depression during pregnancy made a significant contribution to force against objects, whilst only mothers' conduct symptoms significantly contributed to force against peers.

In a prospective design, Davies et al. (2012) examined predictions to oppositional behaviours measured using the Child Behaviour Checklist in a high-risk sample of 201 mother-child dyads, with children aged on average 26 months. Mothers were recruited from a service for disadvantaged families, and followed up after one year. Mothers' antisocial personality dysfunction was measured using a standardised computer-based interview that assessed presence of DSM criteria, levels of social impairment, and past history of symptoms. These scale scores were then combined to produce a composite antisocial personality dysfunction score. Mothers' depression was assessed in the same way. In initial cross-sectional analyses mothers' antisocial personality and depression were significantly associated at the bivariate level. In path analyses, after controlling for maternal depression, mothers' antisocial personality significantly predicted children's ODD symptoms and levels of inter-parental aggression, a measure made up of physically aggressive acts and instances of discord. In prediction to ODD symptoms one year later, the contribution from antisocial personality was not significant, whilst inter-parent aggression made a significant contribution, after controlling for maternal depression. These

findings suggested that mothers' antisocial personality dysfunction may have had an indirect influence upon children's behaviour, independent of maternal depression, via its association with parent relationships.

1.5.4.2 Mothers' borderline personality dysfunction and child outcomes. A

literature search yielded no prospective studies of potential associations between mothers' borderline personality dysfunction and young children's aggression. Indirect evidence that borderline personality dysfunction may confer risk of children developing aggression is available from a small body of studies that have found associations between mothers' borderline personality disorder and their interactions with their infants; cross-sectional comparison of group differences in samples of older children; and the study of mothers' negative emotionality and neuroticism in relation to parenting or child outcomes.

Interpretation of this evidence suggests that mothers' borderline personality dysfunction is an important topic for study in the context of children's development.

1.5.4.2.1 Mothers' borderline personality disorder and mother-child interactions.

Features of borderline personality disorder, such as difficulties in emotion-regulation and effectively managing interpersonal processes, may negatively affect mother-child attachment and interactions. This in turn constitutes a potential risk factor for difficulties in parenting that can lead to child behaviour problems (Campbell, 1995; Lyons-Ruth et al., 1999). It has been suggested that this is particularly relevant to young children, as their experience of disruptions in the early mother-child relationship may be more salient at this time (Kochanska et al., 2004).

Crandell et al., (2003) found mothers who had received diagnoses of borderline personality disorder were more likely than controls to be rated as insensitive and intrusive

in their behaviours and speech during observed interactions with their 2 month old infants. During a task that involved free-play followed by a stressor, referred to as the Still-Face task (Crandell et al., 2003; Weinberg & Tronick, 1996), where mothers are instructed to become unresponsive to their infants for a short time by maintaining a still face, infants of mothers with diagnoses were less responsive, showed more dazed looks and were more likely to often look away from their mothers than those of control mothers who had not received diagnoses. In a follow-up study of the same sample, when the infants were aged 12 months, infants of the mothers with borderline personality disorder diagnoses were more likely to be rated as displaying disorganised attachment, a form of insecure attachment in mother-child relationships characterised by contradictory behaviours, apprehension and fear (van Ijzendoorn, Schuengel, & Bakermans-Kranenburg, 1999) during the Strange-Situation paradigm (Hobson, Patrick, Crandell, Garcia-Perez, & Lee, 2005). These differences remained when levels of maternal intrusiveness were controlled for.

Although these studies were based upon small clinical samples, the findings suggest that the presence of borderline personality disorder difficulties in mothers may be problematic for mother-child attachment processes and interactions. Low maternal sensitivity has been associated with externalising problems in young children (Morrell & Murray, 2003). Additionally, high maternal intrusiveness has been associated with lower levels of reactive control in children, a component of emotion regulation that may be relevant to the development of aggressive behaviour (Graziano, Keane, & Calkins, 2010). The presence of disorganised attachment has also been found to predict higher levels of both mother and observer-reported externalising problems in children (Lyons-Ruth et al., 1999; van Ijzendoorn et al., 1999).

1.5.4.2.2 Mothers' borderline personality dysfunction and adolescent samples.

Cross-sectional associations between mothers' borderline personality symptoms and aggression, or its related constructs, have been reported in studies of adolescent samples. In a community sample of children aged between 11-18, made up of 23 mothers who had either met DSM criteria for borderline personality disorder or had been rated as exhibiting four or more symptoms, compared with 168 controls with no personality dysfunction or depression, and 47 with depression diagnoses only, Barnow et al. (2006) examined group differences in a range of child outcomes. They found that the children of mothers with borderline personality disorder or dysfunction were reported as displaying higher levels of delinquency and aggressive behaviour on the Child Behaviour Checklist according to both mother and children's own report than the children of controls and of mothers' with depression.

Similarly, Herr et al. (2008) found that adolescent children (n=354) of mothers endorsing higher levels of borderline personality disorder symptoms were rated by teachers, mothers and self-reported poorer psychosocial outcomes. These outcomes referred to levels of fearful attachment cognitions, stress within the mother-child relationship, and social-communication difficulties with peers. Differences between the groups were found when compared to children of mothers with clinical levels of depression but no borderline symptoms, and healthy controls. In regression, predictions from mothers' borderline symptoms remained after the presence of co-occurring depression diagnoses was controlled for. Whilst children's aggression was not measured in this sample, the outcomes measured may be indicative of the type of emotional and interpersonal problems that can lead to aggressive behaviour.

1.5.4.2.3 Mothers' neuroticism and negative emotionality. Neuroticism is conceptualised as a tendency towards emotional reactivity and instability (Morse et al., 2009). Negative emotionality is an aspect of temperament, thought to underpin neuroticism, and can be defined as a proneness to unpleasant emotions such as fear, anger or nervousness (Watson & Clark, 1992). These constructs are likely to be relevant to mothers with borderline-type difficulties, as high levels of neuroticism and negative emotionality have been identified as a central characteristic of borderline personality disorder (Glenn & Klonsky, 2009).

In a recent meta-analysis of 30, mainly cross-sectional studies that examined associations between mothers' personality and parenting, Prinzie, Stams, Geert, Dekovic, Reijntjes, & Belsky (2009) found that higher levels of maternal neuroticism were associated with mother-reported and observed levels of less warm and less structured parenting. One of the studies included that of Clark, Kochanska, & Ready (2000) who in a community sample, found that mothers' levels of neuroticism, measured on a self-report scale, significantly predicted more forceful and controlling behaviours during observed parenting interactions when children were aged 9 months (n=112).

In a longitudinal study also included in the meta-analysis, Kochanska, Clark, & Goldman (1997) examined prospective predictions from a maternal self-report measure of traits associated with negative emotionality to child behaviour and attachment relationships in a community sample of 103 mother-child dyads. These dyads were initially recruited when the children were aged 33 months from a general population sample, and followed up at 46 months. Kochanska et al. used a range of measures to assess mothers' parenting, mother-child interactions, and children's behavioural outcomes, that included observations and maternal report. In regression, higher levels of mothers' negative emotionality

significantly predicted higher levels of expressed negative affect from mothers during observed interactions and lower levels of adaptive child outcomes measured using a composite created from ratings of angry affect, defiance, and compliance. Higher levels of mothers' negative emotionality were also significantly associated with infant's insecure attachment. These predictions remained significant when observed parenting skills were controlled for.

However, other studies have not found associations between neuroticism and mothers' parenting or interactions with their children. For example, in a prospective study with a community sample, Smith et al. (2007) assessed mothers' personality using a self-report scale when their children were aged 18 months (n=246). When the children were 30 months, aspects of mothers' parenting, namely ratings of sensitivity and intrusiveness, and their expressed emotion, conceptualised as the number of positive and negative verbal and nonverbal expressions during observations, were coded in mother-child free-play sessions. The authors found that mothers' levels of neuroticism did not significantly predict observed maternal sensitivity or intrusiveness, and was not significantly associated with mothers' expressed emotion at 30 months.

These findings suggest there may be a link between mothers' negative emotionality (or neuroticism) and parenting measured in cross-section or child outcomes measured prospectively. However, the evidence base is small with some studies not reporting associations. Moreover, none of these studies controlled for mothers' depression, which could be problematic as depression is often highly associated with levels of neuroticism. However, due to these associations it can also be confounded with neuroticism (Watson & Clark, 1992).

1.5.4.2.4 Summary: Mothers' borderline personality dysfunction and child outcomes. There is some indirect evidence that mothers' borderline personality dysfunction may be a risk factor for children's development of aggression. However, research is limited, and consists of mostly cross-sectional designs. This has not allowed for thorough testing of the contribution from mothers' borderline difficulties to child outcomes, or the examination of correlates of borderline personality dysfunction. Whilst evidence from adolescent samples highlights associations between mothers' borderline personality dysfunction and children's behavioural problems, the cross-sectional designs do not allow for conclusions regarding the nature of associations. For example, findings could be explained by influences of the parent on the child, child on the parent, or common influences upon both. An important question is whether mothers' borderline personality dysfunction predicts independently of other factors proximal to mothers, including depression, antisocial personality dysfunction and potential confounders, which have received more research attention.

1.5.5 Summary: Mothers' personality dysfunction. There is a limited body of evidence regarding mothers' personality dysfunction. This is despite the fact that mothers' personality dysfunction may cause impairment for mothers across contexts and has shown associations with depression and psychosocial risks (Hobson et al., 2009; Prinzie et al., 2004; Rutter & Quinton, 1984b). Difficulties in social-interaction and relating, along with the presence of antisocial behaviour and emotional dysregulation are key features of antisocial and borderline personality dysfunction. They are also likely to be highly relevant to the functioning of mothers in relation to their parenting and interactions with their children. Difficulties and disruptions in parenting are considered a key risk in the development of conduct problems in children (Paterson, 1984; Paterson & Sanson, 1999). The mother-child relationship is particularly prominent in the early years, which as

previously discussed, may represent a critical period for the development of children's aggression (Tremblay, 2010). Therefore, it is possible that the presence of antisocial or borderline personality dysfunction may be an important risk factor for adverse outcomes in children. However, it is difficult to conclude whether this is a case as a result of the limited research base, characterised by a lack of prospective studies with young children.

1.6 How Might Mothers' Personality Dysfunction Influence Children's Aggression?

Relationship Establishment and Antisocial Partners

As discussed in Section 1.2, there are many potential pathways of influence between mother and child psychopathology. Pathways from mothers' personality dysfunction to their child's outcomes are under-researched. Based upon previous literature, one possible process concerns the nature of mothers' relating that could increase the likelihood of an antisocial partner, and therefore pose a risk to their child's development. It is hypothesised in this study that this sequence might account for the associations between mothers' personality dysfunction and child aggression. These aspects of mothers' relating and the hypothesised sequence are discussed in the following section.

1.6.1 Risky relationship establishment. The establishment of successful romantic relationships is a key interpersonal task in adulthood that makes multiple demands on an individual in terms of choice of partner, participation in the relationship, need for prosocial behaviours and restraint from antisocial behaviour (Pettit et al., 2010). There is evidence to suggest that women with personality disorder diagnoses or higher levels of dysfunction are more likely to experience difficulties in romantic relationships (Herr et al., 2008; Quinton et al., 1993). For example, Daley et al. (2000), found that the presence of personality dysfunction, measured dimensionally using a self-report scale of symptoms, significantly

predicted difficulties in romantic relationships in a community sample of 142 women, aged between 16 and 19 years at recruitment, followed prospectively over 4 years. Romantic relationship difficulties were assessed in terms of levels of self-reported stress within the current or most recent relationship, satisfaction reported by the women's partners, number of relationship breakdowns, occurrence of unplanned pregnancy, and levels of verbal or physical abuse. Total levels of personality dysfunction across the 10 DSM types were significantly associated with each form of relationship difficulty. In addition, when the contribution of personality dysfunction by cluster was examined, cluster B, which includes antisocial and borderline personality difficulties, made a significant independent contribution to each aspect of relationship difficulty whilst clusters A and C did not. These associations remained when levels of depression symptoms were controlled for.

Whilst certain behaviours associated with personality difficulties, such as problems in emotion regulation, are likely to contribute to difficulties within already-established relationships (Glenn & Klonsky, 2009), it has also been proposed that women with personality dysfunction may have difficulties in how they initially construct their romantic relationships (Daley et al., 2000). In addition, on the premise of assortative mating (Jaffee et al., 2003; Rutter & Quinton, 1984b) it has been proposed that women may consciously or unconsciously select similar individuals whose difficulties are congruent with their own behaviours (Jaffee et al., 2012; Rutter & Quinton, 1984a; Rutter et al., 1990).

As discussed in Section 1.5.4, antisocial and borderline-type difficulties are characterised by impulsivity and a lack of planning. These features may make it more likely for women with such difficulties to behave more impulsively in their establishment of relationships. For example, cohabitating with partners very early in a relationship or engaging in behaviours that increase the likelihood of unplanned pregnancies. In particular,

borderline personality disorder has been associated with insecure attachment and intense feelings towards others, including idealisation (Hill et al., 2011; Morse et al., 2009). These characteristics may lead to the establishment of relationships and the making of decisions in those relationships without planning and consideration (Daley et al., 2000; Glenn & Klonsky, 2009; Hill et al., 2008). Further, social selection may lead to mothers with difficulties in interpersonal functioning to select partners with similar problems that are likely to present problems for relationships. As noted by Jaffee (2012), these processes are often unconscious and combined with impulsivity, could lead to women failing to recognise early appearing problems in newly established relationships.

These aspects of relationship establishment are referred to in the study as risky relationship establishment. It seems reasonable to suggest that risky relationship establishment may have negative consequences for the children of mothers with personality dysfunction. For example, establishing relationships with early-appearing problems or characterised by impulsivity may increase the risk of later conflict and violence between mothers and their partners, that have been associated with poorer child outcomes (Cummings, Goeke-Morey, & Papp, 2004). Further, these relationships may be more likely to result in relationship breakdown, separation, and single motherhood which have often been demonstrated to predict children's behaviour problems (Lamb, 2004; O'Connor, Dunn, Jenkins, Pickering, & Rasbash, 2001).

Rutter & Quinton (1984a) reported evidence to suggest that women with personality difficulties may show risky relationship establishment. They examined the interpersonal functioning of 89 women raised in care homes, compared with a group of 41 controls raised in their family home in the same area. The group of women raised in care homes were significantly more likely to exhibit personality dysfunction than controls.

Along with other factors, the authors explored the concept of 'planning' within this group. Planning in romantic relationships was defined as 'marriage' after an acquaintance of more than 6 months, plus a positive choice of partner, not due to external pressure or as a means of escape from a difficult situation (Rutter & Quinton, 1984a) and presence or absence of planning was assessed using the investigator-based interview approach. In analyses predicting relationship difficulties, women in the care home group who were rated as displaying higher levels of planning were significantly more likely than those displaying lower levels and the control group to have 'marital support' and the presence of a supportive relationship (close, confiding and without discord) with a non-antisocial spouse. Subsequently, in regression, the presence of marital support was significantly negatively associated with an investigator-based measure of general social functioning, suggesting that planning was a mediating variable. Although this aspect of planning had been included in a composite with planning in work decisions, the findings offer a tentative suggestion that the presence of personality dysfunction may increase the likelihood of women demonstrating a lack of planning in romantic relationships. In turn, this lack of planning could lead to the establishment of a relationship with an antisocial partner. The presence of antisocial partners have been associated with continuity in women's own conduct problems, whilst the presence of supportive, non-antisocial partners has been found to support more optimal social functioning over time in those with personality difficulties (Quinton et al., 1993). In relation to mothers, the potential consequences of risky relationship establishment may also pose a risk for effects upon their children. With this in mind, the potential implications of the presence of an antisocial partner are discussed next.

1.6.2 Antisocial partners. As discussed above, risky relationship establishment may make the presence of an antisocial partner more likely for mothers with personality dysfunction. In turn, the presence of an antisocial partner can lead to contextual problems,

for example, discord or separation, and a lack of support for mothers. Further, the presence of an antisocial partner may exacerbate mothers' own difficulties because problems in one person sets up patterns of relationship interactions or creates stresses that predispose a worsening of disorder in the spouse (Rutter & Quinton, 1984b). It is also possible that there may be direct transmission of behaviour problems from antisocial partners to their child, through either genetic pathways (Rhee & Waldman, 2002) or via social learning processes. Moreover, families that include one or more antisocial parents may be more likely to experience higher levels of social disadvantage and other sociodemographic risks (Farrington, 1995).

Previous research has documented associations between the presence of antisocial fathers and children's externalising behaviours. Jaffee et al. (2003) analysed data from 1116 5-year olds and their parents drawn from a large prospective twin study (The Environmental Risk Longitudinal Study). They found that fathers with the highest levels, above the 85% percentile of distributions, of lifetime antisocial behaviour, as measured by maternal report against DSM-IV criteria, were significantly more likely to have children with higher levels of conduct problems at age 5. This prediction remained but was attenuated by the addition of mothers' own levels of antisocial behaviour. Blazer et al. (2008) found similar results in two cohorts (732 children aged 11 and 606 adolescents aged 17 years) examined cross-sectionally. In both groups, fathers' levels of antisocial behaviour reported by mothers significantly predicted mothers' ratings of children's conduct disorder, oppositional defiant symptoms and levels of delinquency when associations with mothers' own antisocial behaviour and child outcomes were controlled for. Whilst these two investigations did not control for mothers' depression, in their study reported earlier, Hay et al. (2003) found that fathers' history of arrests made an

independent contribution to violence at 11 years when included in analyses with mothers' postnatal depression and depression at later time points.

1.6.3 Summary: Relationship establishment and antisocial partners. Based upon the above findings, it was hypothesised that a sequence whereby mothers' risky relationship establishment leads to the presence of an antisocial partner may represent a potential mechanism for the transmission of risk from mothers' personality dysfunction to children's aggression. The proposition that women with personality dysfunction may select adverse environments has been applied to account for associations found between mothers' and partners' antisocial behaviour and child outcomes. However, the preceding processes such as the establishment of mothers' relationships are rarely studied. This issue was addressed in the present study.

1.7 Rationale, Aims, and Hypotheses of the Present Study

1.7.1 Rationale. Based upon reviewing the research base, the present study was designed to address the lack of research with children under 5 years of age. From a developmental perspective, the early years are an important time to investigate antecedents of children's aggression that may have long term consequences. Factors proximal to mothers are a likely source of influence upon young children. Although mothers' depression has received a large amount of research attention, questions concern whether postnatal depression makes a specific contribution to children's aggression when other characteristics of depression and confounders are accounted for. Furthermore, the role of elevated symptoms across time is of interest. Personality dysfunction and depression are often associated, raising the question of whether associations between mothers' depression and child outcomes could be accounted for by mothers' personality functioning. Central

characteristics of antisocial and borderline personality dysfunction such as difficulties in emotion regulation and impulsivity may be risky for young children but these aspects of mothers' functioning are under-researched. If mothers' personality dysfunction does contribute to children's aggression, there are a number of pathways by which risk could be conferred. One such mechanism that can be proposed based on the literature involves mothers' wider social functioning, namely their relating with antisocial partners. Consideration of these issues informed the design of the present study and the aims and hypotheses detailed below.

1.7.2 Aims. The overarching aim of the study was to investigate the role of mothers' depression and personality dysfunction as predictors of young children's aggression. Specifically, the first aim was to disentangle the contributions of postnatal maternal depression and personality dysfunction, namely the contribution of antisocial and borderline traits measured dimensionally, to the development of children's aggression. Secondly, the current study was also designed to examine whether any associations between mothers' personality dysfunction and child aggression outcomes were mediated via the selection of an adverse environment, as measured by risky features of relationship establishment leading to the presence of an antisocial partner.

1.7.3 Hypotheses.

Hypothesis 1

Trajectories characterised by elevated postnatal maternal depression over time will be associated with higher child aggression at 2.5 years than trajectories of low postnatal depression.

Hypothesis 2

Mothers' personality dysfunction as indexed by higher levels of DSM antisocial and borderline personality disorder symptoms will be associated with higher levels of aggression in children aged 2.5 years.

Hypothesis 3

Mothers' personality dysfunction will predict levels of aggression in children aged 2.5 years independently of maternal depression.

Hypothesis 4

Links between mothers' personality dysfunction and children's aggression will be mediated via a mechanism of risky relationship establishment leading to presence of an antisocial partner.

Chapter 2 Method

The method begins with an overview of the sampling strategy and design of the wider study from which the sample for the present study was drawn. This includes information regarding ethical approval, recruitment and the relevant assessment waves. The generation and characteristics of the sample used in the thesis is then described. Section 2.3 contains information about the measures used. Finally, in Section 2.4, approaches to the data are described.

2.1 WCHADS Design Overview

The thesis reports a longitudinal study conducted as part of a larger investigation of prenatal and early infancy origins of conduct problems in children, the ‘Wirral Child Health and Development Study’ (WCHADS).

2.1.1 Ethical approval. The WCHADS is funded by the Medical Research Council and run in partnership with NHS Wirral, NHS Western Cheshire and Wirral University Teaching Hospital NHS Foundation Trust. It has received full ethical approval from Cheshire Local and North West 5 Research Ethics Committees (ref: 05/Q1506/107). A copy of the approval letter is shown in Appendix 1.

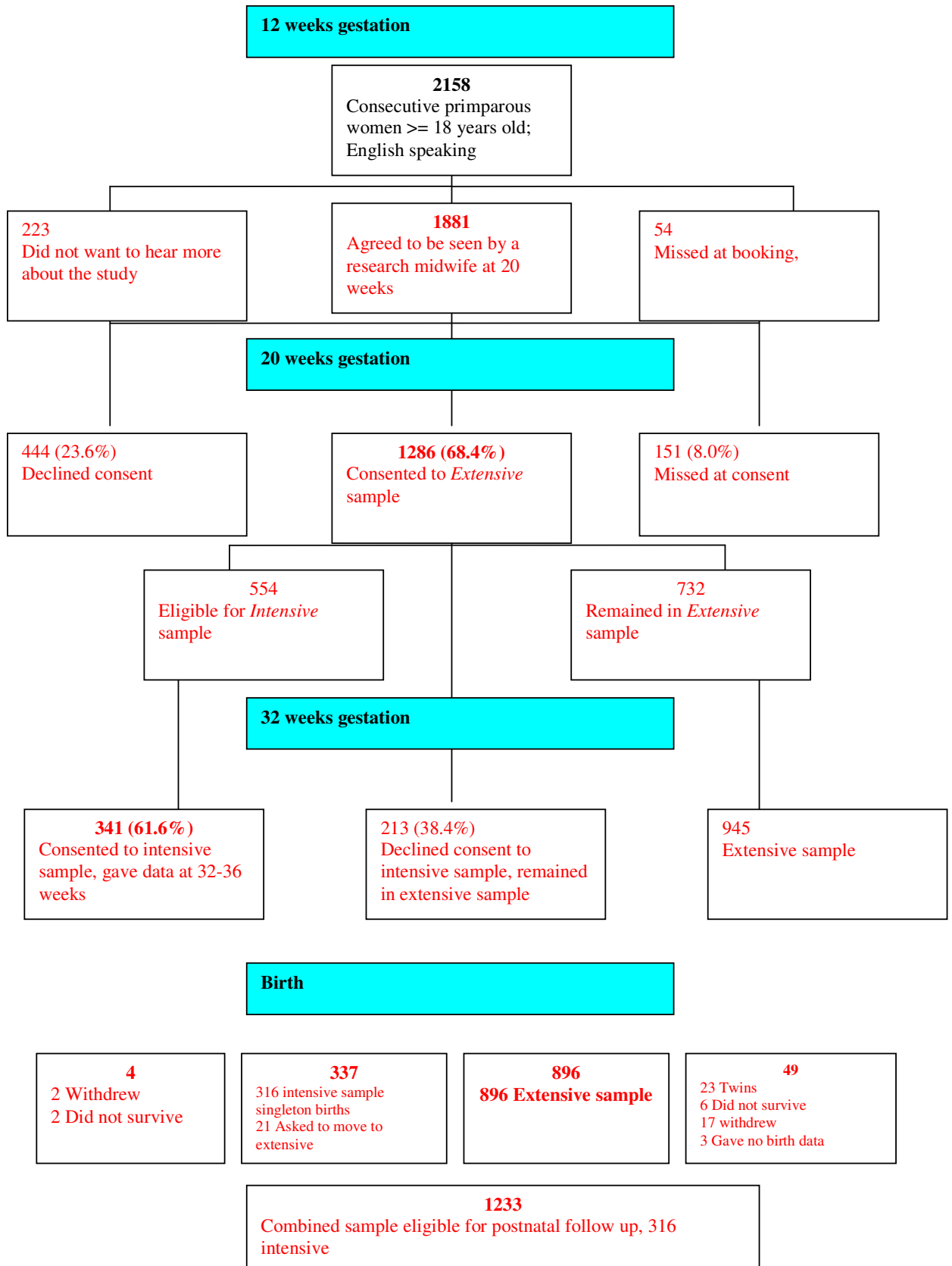
2.1.2 WCHADS recruitment and sample overview. The WCHADS sample was derived from a consecutive sample of 2158 women pregnant with their first child enrolled at a NHS hospital antenatal clinic between February 2007 and October 2008. This NHS hospital served a large well-defined geographical area in the Wirral. Women were approached at their 12-week appointment and asked if they would like to hear more about

the study at their 20-week scan. All women were told that the study was interested in children's early experiences and development, influences on children's emotions and behaviour, and the possible effects of stress in pregnancy. Women were eligible to participate in the study if they were aged 18-years or over. They were subsequently excluded if their baby had a gross congenital abnormality or did not survive. No exclusions were made on the basis of premature birth or low birth weight (<2500g), or late registration for antenatal care, as these events have been associated with prenatal stress in previous research. The sampling strategy and procedure at each assessment wave is described below.

2.1.2.1 WCHADS sampling strategy. The WCHADS used a two-stage epidemiological strategy and is made up of an extensive and intensive sample, both followed longitudinally in tandem. The aim of the extensive sample was to establish a consecutive general population sample for epidemiological study. A smaller intensive sample, over-representative of risk, was also identified for more frequent and in-depth measurement that could be weighted back to the extensive sample to derive population estimates.

The intensive sample was stratified by psychosocial risk on the basis of reported levels of mother and partner-perpetrated psychological abuse in mothers' current or recent relationship. All women who scored above threshold on a measure of psychological abuse in relationships previously associated with psychosocial risk (described in Section 2.3.2.3) and a random sub-sample of women scoring below threshold were identified for recruitment into the intensive sample. Figure 1 outlines recruitment into the extensive and intensive samples. The procedure for each phase is described in Section 2.1.3.

Figure 1 *Recruitment into the Extensive and Intensive Samples*



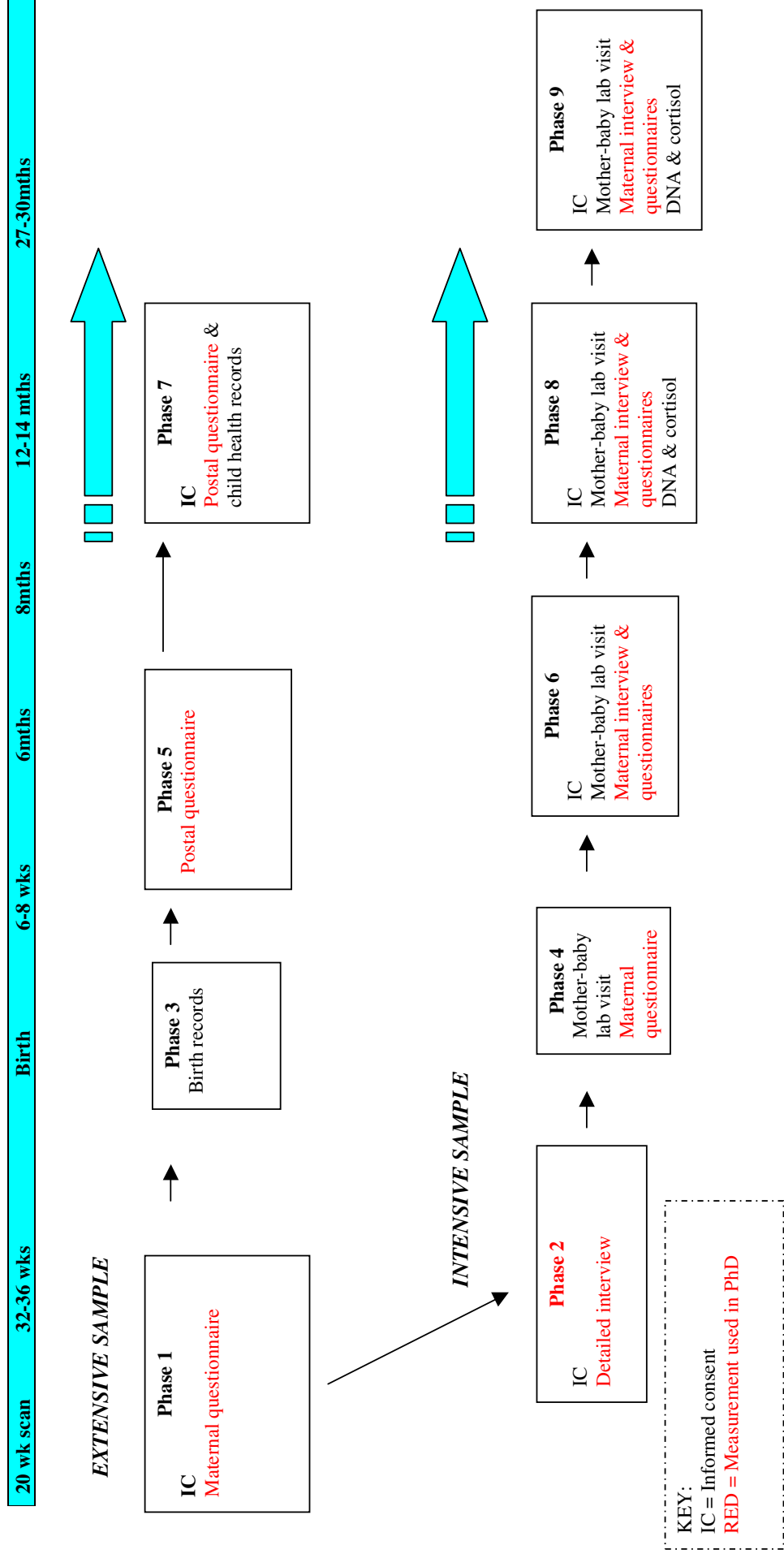
2.1.3 WCHADS procedure. The initial recruitment procedure and assessment waves of the study are described below. For each phase, the procedure relating to measures used is described. Figure 2 provides an overview of the extensive and intensive assessment waves and points of informed consent. Specific information about the measures used is presented in Section 2.3.

2.1.3.1 Antenatal care appointment (12 weeks gestation). Over a period of 21 months from March 2007 to December 2008, a consecutive sample of 2158 primiparous women booked in for their 12 week antenatal care appointment administered by the Wirral University Teaching Hospital. Of these, 2104 were approached about the study. Those who were happy to hear more ($n=1881$) were given an information sheet and told that they would be seen by a research midwife at their 20-week scan. A copy of the initial information sheet and consent form given to women at this time is shown in Appendix 2.

2.1.3.2 Phase 1 extensive sample (20 weeks gestation). In total, from the 1881 women happy to hear more about the study at 12-weeks, 1286 (68.4%) consented to take part at the 20-week scan. Women seen at this point who did not consent ($n= 444$) were asked for basic demographic information (postcode and age). Women who consented at this point completed a prenatal screen that involved a brief interview by a research midwife. The screen included administration of the scale measuring psychological abuse within relationships, which was used for stratification in the wider study.

Figure 2 Extensive and Intensive Assessment Waves and Points of Informed Consent in the WCHADS

Wirral Child Health and Development Study



Women were also given a basic overview of the extensive study. Along with the overall aims, research midwives explained that women would be asked to complete questionnaires about themselves and their babies when their babies were approximately 6 weeks and 12 months old. Women were told that participants reporting stress in pregnancy, and a certain amount of those not reporting stress would be invited to take part in a more detailed phase of the study that involved more in-depth interviews and their children being assessed at subsequent time points. Contact details and permissions to obtain antenatal, obstetric and neonatal records/ basic information from routine health visitor appointments were obtained for all women who consented, as well as basic socio-demographic data using a brief questionnaire (described in Section 2.3.2.1).

2.1.3.2.1 Comparison of consenters and non-consenters to the extensive sample.

Examination of the basic demographic information from the 444 women who did not consent to take part in the extensive sample at 20 weeks showed that those who declined were significantly younger (mean age 25.2 years, SD 5.9) than those who took part (mean age 26.7 years, SD 5.9) ($t(1927) = -5.3, p < .001$). Additionally, those who declined to take part were significantly more likely to belong to the most deprived social-deprivation group as identified using the Indices of Multiple Deprivation, 'IMD' (Noble et al., 2008), which are described in Section 2.3.2.1. Of those who declined, 47.5% were in the most deprived group compared to 41.3% who consented ($\chi^2(1) = 6.6, p < .01, O.R 1.28$). Analysis of ethnicity data at this point showed that 96.1% of women who agreed to take part in the extensive sample were White British. Therefore, there was a very low representation of ethnic minorities in the study.

2.1.3.3 Phase 2 intensive sample (32-36 weeks gestation). From the 1286 mothers who completed the prenatal screen, 554 were identified to be invited in to the

intensive sample. This included all women scoring above an identified threshold on the psychological abuse measure (n=283) and a random sample of those scoring below (n=271). These women were contacted at 30 weeks gestation and given information about the intensive phase. A copy of the Information Sheet and Consent Form for the Intensive Study is provided in Appendix 3.

341 (61.6%) women consented to take part in the intensive study whilst 213 (38.4%) declined and either remained in the extensive sample or requested to withdraw. All those who consented to the intensive sample were invited for interviews with trained research assistants between 32-36 weeks gestation. Interviews took place at the study base or as a home visit if preferred by the participant. Interviews lasted approximately 2-3 hours with additional appointments if necessary. During the interviews, mothers completed socio-demographic measures, questionnaire scales and semi-structured interviews. All research assistants were blind to mothers' psychological abuse scores at this time and at all subsequent phases. Participants received £20 in shopping vouchers as remuneration for their time.

2.1.3.3.1 Comparison of consenters and non-consenters to the intensive sample.

Statistical analyses of the demographic information for consenters and non-consenters to the intensive sample demonstrated that non-consenters were more likely to be younger ($U(43, 870) p < .001$). The significance value for deprivation score showed a trend towards being significant ($U(43, 870) p = .062$), with non-consenters' having higher scores (indicating more deprivation).

2.1.3.4 Phase 4 intensive sample (5 weeks postnatal). All mothers and babies in the intensive sample were invited to the study base for infant observations. Mothers

also completed a brief set of questionnaires about their mental health, and again received £20 shopping vouchers for their time.

2.1.3.5 Phase 5 extensive sample (6-8 weeks postnatal). Postal questionnaires were sent to all mothers in the extensive sample. Non-responders were followed up with a phone call and/or a second posting if appropriate. Upon return of the questionnaires mothers received a £10 shopping voucher as remuneration for their time.

2.1.3.6 Phase 6 intensive sample (6 months postnatal). All mothers and babies in the intensive sample were invited to the study base for infant observations and mother-infant interaction assessments. A questionnaire pack was also administered. In addition, a brief semi-structured interview was completed with mothers that covered the period from birth up to 6 months and measures assessing mental health, occurrence of stressful life events and aspects of relationships were administered. Mothers received £20 in shopping vouchers as remuneration for their time.

2.1.3.7 Phase 7 extensive sample (12- 14 months postnatal). Postal questionnaires were sent to all mothers in the extensive sample. As with earlier phases, non-responders were followed up with a phone call and/or a second posting if appropriate and upon receipt of the questionnaires mothers were sent £10 shopping vouchers for their time. Mothers were also asked for consent to continue contacting them as part of the extensive sample at this point.

2.1.3.8 Phase 8 intensive sample (12- 14 months postnatal). All mothers and babies in the intensive sample were again invited to the study base for infant observations, cognitive assessment, and mother-infant interaction tasks. Mothers also

completed two questionnaire packs asking about their child's health, behaviour and demographic information. At a separate appointment, mothers completed a semi-structured interview which covered the period from 6 months to 12-14 months postpartum. As with Phase 6, this interview assessed mothers' mental health, occurrence of stressful life events and aspects of relationships. The interview was generally administered as a separate home visit or appointment at the study base. Mothers received shopping vouchers (£40 in total) to cover the time taken for the two appointments. Mothers were also asked for their renewed consent to be contacted for the next phase of the study at this point.

2.1.3.9 Phase 9 intensive sample (27-30 months postnatal). All mothers and children in the intensive sample were contacted and asked to attend a child assessment which included mother-infant interaction assessments and completion of two questionnaire packs asking about their child's health, behaviour and demographic information. A further semi-structured interview covering the period since the Phase 8 assessment (12-14 months postnatal) was arranged at this appointment and conducted as a separate home or lab visit. As with the earlier phases, the interview assessed mothers' mental health, occurrence of stressful life events and aspects of relationships. In addition, mothers were asked to report upon their child's behaviour in a semi-structured interview format. As with Phase 8, mothers received shopping vouchers, £40 in total, to cover the time taken for the two appointments.

2.2 Sample Used in the Current Study

In this section, the generation of the two samples used is described along with a description of the sample characteristics.

2.2.1 Generation and characteristics of the samples used. Two samples were used in the study. Longitudinal Latent Class Analysis (LLCA; Muthen & Muthen, 2000; described in Section 2.4.3.2) was used to model mothers' postnatal depression symptoms. Whilst there are no formal recommendations about sample size in LLCA, larger samples are preferable if multiple classes are hypothesised to be present in the data. This is particularly relevant in epidemiological, non-clinical samples where there may be a wider range of variability in psychopathology scores (Nagin, 2009). As discussed in Section 1.4.3, previous studies have identified up to five classes of mothers' depression symptoms (Campbell et al., 2009). In view of this, mothers' depression symptoms from the wider extensive plus the intensive WCHADS sample were used. This is referred to as the trajectory analysis sample. Secondly, a sample referred to as the main thesis sample, made up of mothers who participated in the WCHADS intensive sample and completed assessments regarding their children's aggression between ages 27-30 months of age was used, to test the hypotheses stated in Section 1.7.3.

2.2.1.1 Trajectory analysis sample. The rationale and methodology of LLCA is described in Section 2.4.3.2. Mothers' depression scores measured using the Edinburgh Postnatal Depression Scale, 'EPDS' (Cox, Holden, & Sagovsky, 1987), were drawn from the 1286 mothers who had consented to either the intensive or extensive study at 32-36 weeks gestation. Of these, 289 were removed because their child did not survive to full term (n= 7), they had given birth to twins (n=23), they had only given data at the prenatal assessment waves (n= 239) or they had only given data at one point in the postnatal period (n= 20). This resulted in a trajectory sample of 997 mother-child dyads. Of those in the trajectory analysis sample, 77.9% (777/997) of mothers gave EPDS data at all four postnatal time points, whilst the remainder gave EPDS data at least twice, a

requirement of LLCA (Nagin, 2009). This is higher than rates reported by the previous studies (discussed in Section 1.4.3), which report rates of those giving data at each assessment point as follows; 54% (Cents et al., 2012) and 71% (Campbell et al., 2009).

Statistical analyses using non-parametric tests to compare the trajectory sample to the 1286 who had originally consented to take part at 32-36 weeks gestation showed that those not in the trajectory sample were significantly younger ($U(188,760) p < .001$), and were more deprived ($U(116,495) p < .001$). Sample characteristics for the trajectory analysis sample are presented in Table 2.2.1.1.

Table 2.2.1.1

Sample Characteristics of the Trajectory Analysis Sample

| Variables: | Mean | SD | Range | n |
|----------------------------------|-------|------|-------|-----|
| Maternal Age | 27.58 | 5.72 | 18-51 | 994 |
| IMD quintile | 2.31 | 1.30 | 1-5 | 994 |
| Age finished full time education | 18.29 | 5.21 | 14-30 | 997 |

Note. Maternal age= age at consent into study; IMD quintile = Indices of Multiple Deprivation quintiles indicating deprivation with 1 being ‘most deprived’ and 5 being ‘least deprived’.

2.2.1.2 Main thesis sample. The main thesis sample for hypothesis-testing was made up of the 246 mothers who attended the mother-child laboratory visit at Phase 9 of the WCHADS, when their child was aged between 27-30 months (mean age 30 months). There were 119 male children (48.4%) and 127 female children (51.6%). At this visit, mothers completed the Child Behaviour Checklist (as described in Section

2.3.3.1), one of the two outcome measures used in the study. Of these 246 mothers, 244 went on to complete the second part of the phase, the maternal interview, during which the second outcome measure (The Severe Aggression Measure; described in Section 2.3.3.2) was administered. This ‘main thesis sample’ was compared to the 341 mothers who originally consented to take part in the intensive sample on age and IMD score. Non-parametric tests showed that those mothers who did not complete the assessment for the main thesis sample were significantly younger than those who did ($U(45,613) p < .001$) but did not significantly differ on deprivation score ($U(35,734) p = .359$). Further sample characteristics are presented in Table 2.2.1.2.

Table 2.2.1.2

Sample Characteristics of the Main Thesis Sample

| Variables: | Mean | SD | Range | n |
|----------------------------------|-------|------|-------|-----|
| Maternal Age | 27.87 | 6.15 | 18-51 | 245 |
| IMD index | 2.27 | 1.27 | 1-4 | 246 |
| Age finished full time education | 18.44 | 5.42 | 14-30 | 246 |

Note. Maternal age= age at consent into study; IMD quintile = Indices of Multiple Deprivation quintiles indicating deprivation with 1 being ‘most deprived’ and 5 being ‘least deprived.’

2.3 Measures

The following section describes all measures used in the present study. A copy of each non-copyrighted measure is presented in Appendix 4. Descriptive statistics for each measure are shown in Appendix 5.

2.3.1 Maternal predictors.

2.3.1.1 *Depression Symptoms: The Edinburgh Postnatal Depression Scale*

'EPDS'; (Cox et al., 1987). *Administered prenatally at Phases 2 (32-36 weeks gestation) and postnatally at Phases 4 (5 weeks), 5 (6-8 weeks), 6 (6 months), 8 (12-14 months) and 9 (27-30 months).* The EPDS is a well validated 10-item self-report scale originally designed as a screen for postnatal depression (Cox et al., 1987), but frequently used as a measure of depressive symptoms at other times. The scale has been used with samples during pregnancy (Bergink et al., 2011), postnatally (Ji et al., 2011), and with mothers of children aged up to 4 years (Cox, Chapman, Murray, & Jones, 1996). Using the EPDS, mothers were asked to indicate how they had felt in the past seven days in response to 10 items relating to common depression symptoms. Each item was rated on a 4-point scale, with 7 items reverse scored. Total scores were then created by summing item responses, with higher scores reflecting increased severity of depression symptoms. When used as a screening tool, scores of 12 -13 are considered to indicate depression that would meet DSM criteria for major depression in clinical samples, whereas a score of 10 or over to suggest probable or risk of developing depression is considered more appropriate for community samples (Cox et al., 1987; Cox et al., 1993). A cut off score of 10-11 in the first few days after birth has been

found to show good prediction to postnatal depression diagnoses at 4-6 weeks postpartum (Teissèdre & Chabrol, 2004).

EPDS scores were used in two ways in the study. Firstly, EPDS scores from the four postnatal assessment points were used in the group-based trajectory modelling, for which mothers' total score across the four phases were represented by creating an ordinal variable (as described in Section 2.4.3.2.2). The rationale and approach to trajectory modelling is described in Section 2.4.3.2. Results of the modelling are presented in Section 3.1.1. Secondly, scores from Phase 2 (32-36 weeks gestation) and Phase 9 (child aged 27-30 months) were used in analyses to examine contributions from mothers' prenatal depression symptoms and symptoms present when mothers rated their child's aggression. Internal consistency for the EPDS was good in the present sample, and ranged from $\alpha = .85$ to $\alpha = .89$ across phases 2 to 9.

2.3.1.2 Personality Functioning: The Structured Clinical Interview for DSM-IV Axis II Disorders 'SCID II'; (First & Gibbon, 1997). Administered at Phase 2 (32-36 weeks gestation). The SCID II is a semi-structured interview designed to assess the presence of traits or symptoms associated with DSM-IV for each of the 10 personality disorders. The presence of each symptom is initially assessed through respondents completing a screen questionnaire of 'yes' or 'no' responses to questions relating to the trait. This is followed by an interview by a trained assessor to elicit further information regarding the traits respondents indicated as relevant to them. Presence or absence of each trait is coded on a 3-point scale based upon DSM criteria; a score of 1 indicates the trait is not present, a score of 2 indicates that subthreshold levels of the trait are present, and a score of 3 indicates that a trait is threshold or definitely present. In order to code presence of a trait, interviewers are required to explore with respondents the extent a

trait has been persistent and pervasive e.g. whether it has been present over the past five years, and has caused difficulties in a number of social domains.

The SCID II can be scored to produce categorical diagnoses of personality disorder or scores for each trait can be summed to produce continuous dimensional scores. Levels of traits that met criteria for diagnoses of personality disorder were anticipated to be very low in the WCHADS sample given the low base rate of personality disorder in community female samples. In view of this, the presence of DSM-defined antisocial and borderline personality disorder traits was assessed using a dimensional approach. The SCID II is made up of 22 questions designed to assess the presence of the 22 DSM-defined antisocial personality disorder traits, and 15 questions designed to assess the presence of the 9 borderline personality disorder traits. Mothers were first asked to complete the screen questionnaire to indicate presence or absence of each trait, which was followed by an interview by trained assessors to elicit further information for coding. Ratings were then made from audio recordings.

A number of studies report moderate to good internal consistency and high levels of inter-rater reliability for the SCID II. These have included samples where the SCID II has been used to produce dimensional scores (Maffei et al., 1997) and community samples (Torgersen, Kringlen, & Cramer, 2001), as well as clinical samples (First & Gibbon, 2004; Lobbestael, Leurgans, & Arntz, 2011). Internal consistency was good for both the antisocial ($\alpha = .81$) and borderline ($\alpha = .80$) scales. Prior to rating the main thesis sample, twenty audio recordings were rated independently by the researcher and a fellow rater for inter-rater reliability. Intraclass correlations for ratings of antisocial and borderline traits indicated excellent agreement at .90 and .91 respectively.

2.3.2 Potential confounding variables.

2.3.2.1 Demographic questionnaire. *Administered at Phase 1 (20 weeks gestation).* The demographic questionnaire was used to gather basic information including mothers' date of birth and age at consent, the age they had left full time education, and their relationship status. Responses regarding relationship status were collapsed into binary categories representing those who were single versus those who were in a relationship. Mothers were also asked for their postcode to derive socio-economic status using the Indices of Multiple Deprivation (Noble et al., 2008). According to this system, postcode areas are scored from most deprived (IMD of 1) to least deprived (IMD of 32,482) based upon deprivation in the area within seven domains: income, employment, health, education/training, barriers to housing and services, living environment and crime. Therefore, each mother had a continuous IMD score representing the classification of their postcode.

2.3.2.2 Smoking status. *Administered at Phase 2 (32-36 weeks gestation).* Mothers' self-reported smoking during pregnancy was measured using two items within a demographic questionnaire administered at 32-36 weeks gestation. Mothers were asked whether they had smoked during their pregnancy with the response options of: 0 (*None*), 1 (*Less than 10 cigarettes per day*), 2 (*Between 10 and 20*), and 3 (*More than 20*). Responses were collapsed into binary categories for data analysis representing those who had smoked in pregnancy versus those who had not.

2.3.2.3 The Dunedin Relationship Scale (Moffitt et al., 1997). *Administered prenatally at Phase 1 (20 weeks gestation) and postnatally at Phases 6 & 8.* The Dunedin Relationship Scale is a 20-item self-report scale made up of 2 items from the

widely used Conflict Tactics Scale (Straus, 1979) and 18 items designed by Moffitt et al. to assess controlling, demeaning, and other psychologically abusive behaviours in partner relationships. The scale has been found to have good internal consistency and bivariate associations ($r = .78$) with rates of physical violence in partner-relationships. Moffitt et al. also report good partner agreement, with reliability alpha coefficients (α) of .84 for agreement about mother's behaviour towards their partners and .87 for agreement about partner's behaviour towards mothers. Alpha values (α) for internal consistency in the study sample were moderate to good (Phase 1: Mother to partner .56, partner to mother .75; Phase 6: Mother to partner .77, partner to mother .86; Phase 8: Mother to partner .68, partner to mother .85).

Participants in the study were asked to respond with 'yes' or 'no' to a set of 39 questions that asked about whether positive and negative events from mother towards partner and then from partner towards mother had occurred in the past year. Positive events were included in order to embed the negative psychological abuse items. Item scores were then summed to produce a score for frequencies of acts associated with psychological abuse from mother to partner and partner to mother. Higher scores indicate higher levels of reported psychological abuse. As discussed in Section 2.1.3.2, the scale was initially administered at 20 weeks gestation as a broad indicator of prenatal risk to stratify the WCHADS sample. It was then repeated throughout the postnatal assessment waves to assess presence of psychological abuse during the period from birth to when the study child was aged 12 to 14 months. It is used in the present study as a marker of relationship difficulties, which was considered a potential confounder due to reported associations with depression symptoms and personality dysfunction.

For hypothesis testing, prenatal mother to partner and partner to mother psychological abuse scores were used when analyses used the prenatal maternal predictors. For analyses using postnatal maternal predictors, an overall postnatal score was calculated. Postnatal psychological abuse scores gathered at Phases 6 and 8 were summed and the mean calculated to provide a variable representing mean mother to partner and partner to mother psychological abuse scores covering from birth to when the study child was aged between 12-14 months.

2.3.3 Child outcome measures. Two measures were used in the present study to assess children's aggression when they were aged 30 months; the broadband aggressive behaviour scale of the Child Behaviour Checklist for children aged 1.5-5 years (Achenbach & Rescorla, 2000), and a newly developed investigator-based interview designed to examine pervasiveness, frequency and contextual variations in children's physical aggression (the Severe Aggression Measure). Both are described below.

2.3.3.1 The Child Behaviour Checklist Aggressive Behaviour Scale

(Achenbach & Rescorla, 2000). *Administered at Phase 9 (27-30 months).* The Child Behaviour Checklist, part of the Achenbach System of Empirically Based Assessment (Achenbach, Rescorla, & Maruish, 2011), is an established questionnaire used to measure emotional and behavioural problems in children and adolescents. It is widely used in research with community and clinical samples, and has been found to demonstrate good psychometric properties. The 1.5-5 years version has demonstrated good test re-test reliability (coefficient values of .87-.89), agreement between mother and father ratings (values ranging from .65 - .78), and has been shown to discriminate

between non-referred and referred children (Achenbach et al., 2008; Achenbach & Rescorla, 2000; Kristensen, Henriksen, & Bilenberg, 2010; Wakschlag et al., 2007).

The aggressive behaviour scale of the Child Behaviour Checklist was used in the present study. The scale is comprised of 19 items covering oppositional, disruptive, and verbal and physical aggressive behaviours. Respondents were asked to respond to items on a 3-point scale: 0 = *not true*, 1 = *somewhat or sometimes true*, 2 = *very true or often true*, about their child's aggressive behaviours over the past two months. Total scores for each subscale were then summed, with higher scores indicating more aggressive behaviours. Internal consistency for the scale in the present study was good ($\alpha = .88$).

2.3.3.2 The Severe Aggression Measure. Administered at Phase 9 (30 months).

2.3.3.2.1 Background to the Severe Aggression Measure. As discussed in Section 1.3.3, physical aggression in young children has shown stability (Baillargeon et al., 2007) and predictions to later antisocial difficulties that may continue into adolescence and adulthood (Broidy et al., 2003; Tremblay et al., 2004). Therefore, it is an important aspect of children's behaviour to assess. The most commonly used measures of children's aggression are scales that consist of a range of items, assessing attention problems, oppositionality and temper tantrums along with verbal and physical aggression. Whilst these are an extremely useful and effective index of aggressive behaviour in the wider sense, they do not distinguish physical aggression. Given this limitation, the Severe Aggression Measure was designed to provide ratings of physical aggression made from detailed descriptions elicited from interview.

The measure was based on the Parent Account of Child Symptoms measure (Taylor, Schachar, Thorley, & Wieselberg, 1986), which has been widely used to assess antisocial behaviours such as fighting and defiance; and has been demonstrated to predict later psychosocial outcomes (Scott, Spender, Doolan, Jacobs, & Aspland, 2001; Taylor, Chadwick, Heptinstall, & Danckaerts, 1996). The Parent Account of Child Symptoms and Severe Aggression Measure are both based on the use of investigator-based standardised interviewing (Hill et al., 1989; Rutter & Brown, 1966; Taylor et al., 1986). Using this approach, ratings are made from detailed descriptions of behaviours elicited in interview. Ratings are guided by manualised criteria regarding what information to take into account and assessors are trained through direct supervision and completion of administration and scoring examples. The administration of the interview involves using open questions to obtain sufficient information. Ratings, which take into account severity and pervasiveness, are then made from audio recordings (Hill et al., 1989).

As discussed in Section 1.3.4, contextual differences in children's physical aggression may be of interest as developmental mechanisms for aggression may vary by the social domain in which it occurs (Pettit et al., 2010; Shoda & Wright, 2004). For example, whilst aggression towards siblings could be influenced by family dynamics, aggression towards children outside the home may be influenced by peer interactions. Existing scales do not distinguish between the domains in which physical aggression is demonstrated. To address contextual variation, the Severe Aggression Measure enquires about a child's physical aggression within four domains: towards parents, other adults, children in the family and children outside of the family.

2.3.3.2.2 Administration and scoring of the Severe Aggression Measure. For the present study, the Severe Aggression Measure was administered as part of the maternal interview conducted with mothers when their children were aged between 27-30 months, by two assessors, the researcher and a colleague, who were trained and received regular supervision in using the investigator-based approach. Rating based upon defined criteria was carried out after the interview from audio recordings. Both raters were blind to the child's CBCL scores.

Using the measure, respondents are asked about examples of physical aggression from the child within each domain during the three months prior to interview. Flexible open-ended questions are used to elicit specific examples and gather information regarding the frequency and severity of aggression. The scales then allow for ratings of severity and frequency of aggressive acts to be made that when combined produce an overall score representing physical aggression scores within each domain. Higher scores indicate more pervasive and severe physical aggression. These domain scores are also summed to produce a total physical aggression score. Both the total physical aggression and specific domain scores were used in the thesis. These scores are presented in Appendix 5.

2.3.3.2.3 Reliability and validity of the Severe Aggression Measure. Given that the Severe Aggression Measure was a new measure used in the present study, the following section reports results relating to the examination of its reliability and validity that were carried out by the researcher.

Inter-rater reliability: Prior to rating the main thesis sample, twenty audio recordings were rated independently by the researcher and colleague. Inter-rater

agreement was good with weighted kappa scores (Cohen, 1968) for ratings on the overall physical aggression score and each of the four domains between $k = .84$ and 1.00.

Convergent validity: A measure is said to demonstrate convergent validity if it demonstrates associations with constructs that are expected to be related (Kline, 2000). To test convergent validity, associations between the Severe Aggression Measure and other measures of aggressive behaviour were examined. Associations between the total physical aggression score from the Severe Aggression Interview and two established scale measures of aggressive problems; the Child Behaviour Checklist and items from the Physical Aggression Scale (Baillargeon et al., 2007) were examined.

The Physical Aggression Scale consists of five items previously shown to yield a measure of physical aggression which showed stability in children from ages 17 to 29 months (Baillargeon et al., 2007). The items are: (a) kicks other children, (b) bites other children, and (c) hits other children, d) gets into many fights e) physically attacks others. As items (d) and (e) overlap with the Child Behaviour Checklist, in line with other studies (Broidy et al., 2003), the three items measuring physical aggression towards peers were used for validation. Each item was rated on a three-point scale: 0 = *not true*, 1 = *somewhat or sometimes true*, 2 = *very true or often true*. Scores on the items were highly skewed with '2' rated only on 6 occasions. Three ordered categories were therefore created for analyses; no items endorsed = 0 (labelled 'None'), one item rated '1' = 1 (labelled 'Sometimes'), two or more items rated '1' or any rated '2' = 2 (labelled 'Often'). The descriptive statistics for this scale are presented in Appendix 5. As shown in Table 2.3.3.2.2, there were significant small to moderate associations

between overall physical aggression score, CBCL aggression and scores on the peer aggression items.

Table 2.3.3.2.2

Correlations for Convergent Validity between Aggression Measures

| Variables | 1. | 2. | 3. |
|---|------|-----------------------|-----------------------|
| 1. Severe Aggression Measure total score | 1.00 | .35 <.001 n=231 | .40 <.001 n=221 |
| 2. Child Behaviour Checklist Aggression score | | 1.00 | .44 <.001 n=211 |
| 3. Peer Physical Aggression Items Score | | | 1.00 |

Note. Spearman's correlations used to account for skew and for ordinal peer physical aggression items.

Predictive validity: Predictive validity is demonstrated if a measure can predict an identified criterion that would be expected to be associated with it (Kline, 2000). Due to the multi-wave design of the WCHADS study, Child Behaviour Checklist aggressive behaviour scores were available for 204 mother-child dyads from the main thesis sample from assessments completed when the children were a mean age of 50 months old. Using this data, it was tested whether children's physical aggression scores from the Severe Aggression Measure at 30 months were associated with their aggressive behaviour rated by their mothers when they were on average 50 months old. In multiple

regression, total physical aggression scores significantly predicted Child Behaviour Checklist aggressive behaviour scores ($B=.04$, $SE=.01$, $\beta=.34$, $[CI .02,.05]$, $p<.001$). A correlation of $r=.30$ has been identified as an acceptable correlation coefficient for predictive validity analyses (Kline, 2000). This provides evidence for the predictive validity of the Severe Aggression Measure.

2.3.3.2.4 Summary: The Severe Aggression Measure. Reliability and validity analyses indicated that the Severe Aggression Measure had good inter-rater reliability and showed associations with other constructs and later child outcomes that provides preliminary support for its convergent and predictive validity. This indicated that the use of the Severe Aggression Measure for assessing physical aggression was appropriate for use in the study.

2.3.4 Potential mediating variables. As discussed in the background a mediation sequence was proposed between mothers' personality dysfunction, aspects of risky relationship establishment and presence of an antisocial partner (Section 1.6). The two measures used to assess mothers' relationship establishment and presence of an antisocial partner are described below.

2.3.4.1 The Establishment Interview. Administered at Phase 2 (32-36 weeks gestation). The 'Establishment Interview' from the Revised Adult Personality Functioning Assessment, 'RAPFA', (Hill et al., 2008) was used to measure risky relationship establishment. The RAPFA was developed from the original Adult Personality Functioning Assessment (Hill et al., 1989), a tool for measuring personality functioning based upon the assessment of a person's interpersonal functioning across a number of domains, including romantic relationships. The measure is investigator-based

and administered as a semi-structured interview. As with the Severe Aggression Measure, the approach involves trained assessors interviewing participants and probing for information to inform ratings made according to pre-defined criteria. The utility of the RAPFA in assessing relationship functioning and dysfunction has been demonstrated in community (Hill et al., 2011) and clinical samples (Morse et al., 2009) and has been validated against other established measures of personality (Hill et al., 2000). Good inter-rater reliability and subject-informant agreement has also been reported (Hill et al., 1989; Hill et al., 2008).

The Establishment Interview is part of the Romantic Relationships scale of the RAPFA, which measures aspects of interpersonal functioning within romantic relationships. The development of the establishment interview was based upon the construct of ‘planning’ in romantic relationships, as discussed in Section 1.6. To assess aspects of establishment using the measure, interviewers trained in the investigator-based approach enquire about the early stages of romantic relationships, with a focus upon how increases in involvement, such as moving in together or becoming pregnant, occurred and the presence of a range of difficulties.

Two aspects of risky establishment are rated from the interview: ‘Increased Involvement in Spite of Problems’, which reflects a increase in involvement that does not take into account problems, for example discord, violence, substance abuse, criminality, appearing in the developing relationship that impact upon the relationship, and ‘Increased Involvement without Attention to the Implications’, which reflects increased involvement without consideration of the meaning, context or implications of such steps. For example, a decision to cohabit that appears to be made on the basis of

convenience rather than on the basis of increased commitment. Information from the manual regarding these aspects is presented in Appendix 4.

To assess whether Increased Involvement in Spite of Problems was present interviewers were required to assess whether increases in involvement had occurred and then whether any problems as defined in the manual had been present before these increases (discord, violence, substance use, and criminality). The overall scale was rated using a binary ('present/absent) variable that reflected the presence or absence of any problems when increases in involvement occurred. 'Increased Involvement without Attention to Implications' was rated from information elicited in interview that focused on whether the increases described above occurred in the presence of 6 markers indicative of a lack of attention to implications. The markers interviewed included evidence of taking over a decision, a background of emotional involvement and consideration of future plans. The overall scale was rated on a binary (present/absent) variable that summarised whether 2 or more markers were present in relation to any of the increases in involvement.

The Establishment Interview was administered to mothers when they were between 32-36 weeks pregnant and mothers were asked about the early stages of their current (or recent if it had since ended) relationship in conception. Ratings for the study sample were then made by the researcher and two colleagues, both trained to reliability in the administration and rating of establishment interviews, from audio recordings. The researcher and colleagues only rated those mothers they had not conducted maternal interviews with, in order to remain blind to mothers' overall interpersonal functioning and reported relationship events. In a reliability study performed on 100 of the ratings

included in the main thesis sample, inter-rater agreement was very good ($k = .90$ and $.89$ for the two scales).

2.3.4.1 Partner antisocial behaviour checklist. *Administered at Phase 8 (12-14 months postnatal).* Mother's reports regarding their partner's history of antisocial behaviour were collected using a checklist administered by researchers during the Phase 8 maternal interview, when the children were between ages 12-14 months. Mothers were asked whether their current partner during conception had to their knowledge been involved with non-violent or violent antisocial behaviours since they were aged 18. If mothers responded yes to either of these they were then asked whether their partner had been imprisoned, convicted, charged or arrested for these behaviours, or whether these behaviours had not been detected by the police. Mothers answered yes or no to each of these questions. For the present study, information regarding the partner at the time of conception was used. The majority of mothers in the sample were still in relationships with the same partner who was present at conception (75%) so this was considered an adequate marker as to whether children had been exposed to an antisocial partner. For data analysis, a binary variable was created where any 'yes' response for one or more of the categories (imprisoned, convicted, charged, arrested, undetected) regarding non-violent or violent antisocial was used to indicate presence of an antisocial partner.

2.4 Approaches to the Data

In the following section, the approaches to data and analyses are described. Firstly, results of a-priori power calculations conducted to estimate sufficient sample sizes are described, along with discussion of the use and implications of multiple

comparisons. This is followed by description of the data analytic plan, including a summary of assumption checks carried out before hypotheses were tested.

2.4.1 Power analysis and sample size. Effect size conventions suggest that $r = .30$ is a moderate effect size for correlation coefficients (Faul, Erdfelder, Buchner, & Lang, 2009). A power analysis was conducted using G*Power 3.1.4 (Faul et al., 2009) for bivariate correlations, and indicated that a sample size of 134 was required to produce a power of 95% to detect Pearson's $r = .30$. As shown in Appendix 5, a number of the key variables were skewed. It is not possible to do a power analysis for non-parametric correlations so the recommended sample size produced by the analysis above was treated as a minimum requirement for the bivariate associations.

There are no formal recommendations for sample size in Longitudinal Latent Class Analysis. However, larger samples allow for a greater number of classes to be estimated and identified (Nagin, 2009). Previous research, as discussed in the background, has identified up to 5 classes of depressive symptoms. With this in mind, depression scores from the extensive and intensive samples were used to provide a large sample size for modelling patterns of scores across time.

For regression analyses, 0.15 is considered a medium effect size (Tabachnick & Fidell, 2012). Using G*Power 3.1.4 (Faul et al., 2009), a power analysis was conducted for linear multiple regression with a total of 8 predictors in the model, as this was likely to be the maximum number of candidate variables included in analyses. The power analysis indicated a sample size of 160 would be required to produce a power of 95% based on an effect size of $r^2 = 0.15$ and alpha of 0.05. Fewer predictors would increase the power of the test.

2.4.2 Multiple comparisons, interpretation of p and effect sizes. The planned use of multiple comparisons raised the issue of potential Type 1 errors as performing multiple analyses can increase the chances of finding a statistically significant result due to chance (Tabachnick & Fidell, 2012). Researchers often adjust the p value to address this problem, for example by applying Bonferroni corrections (Rice, Schork, & Rao, 2008). However, this approach can increase the likelihood of prematurely rejecting a potentially significant finding through the loss of statistical power and application of p values that are too stringent (Nakagawa, 2004). With this in mind, adjustments to account for multiple comparisons were not used. Instead, information derived from a combination of sources (e.g. size of bivariate associations, width of confidence intervals) was used to inform interpretations. Furthermore, the practical, clinical significance of results were also considered. The rationale behind this approach was to avoid over-emphasis upon the reporting of significant versus non-significant p values, which can be limited in the information they provide, particularly when multiple variables are measured (Nakagawa, 2004). Based upon this rationale, all p values were reported to three decimal places to aid the reader's interpretation. The conventional $p < .05$ value was employed to comment on significance but was not used as a stand-alone measure for interpretation. Additionally, p values approaching the conventional $p < .05$ and that were $< .10$ were noted, with potential implications of these trends considered.

According to widely-used conventions, $r = .10$ (accounting for 1% of variance) is considered small, $.30$ (accounting for 9% variance) is considered medium and $.50$ (accounting for 25% variance) is considered large for correlation coefficients (Tabachnick & Fidell, 2012). In line with recommendations in the literature, standardised beta values (β) were used to compare the relative contributions of

predictors included in regression models (Field, 2009). The statistic r^2 reflects the proportion of shared variance accounted for in the dependent variable by predictors included in regression models, and can be turned into a percentage to reflect the amount of variability (Field, 2009; Tabachnick & Fidell, 2012). Therefore, this was used in the present study to comment on the variance accounted for by the overall models in the multiple regression models. It should be noted that these values are often relatively small in developmental psychopathology research due to the multiple influences likely to be associated with developmental outcomes (Rutter, 2011).

2.4.3 Approaches to analysis. Preliminary analyses involved examination of descriptive statistics (reported in Appendix 4) and the assumption checks described below. As previously discussed, group based modelling techniques were used to characterise mothers' postnatal depression and the rationale behind using the approach is described in Section 2.4.3.2. Bivariate associations between variables were examined to determine the nature of relationships between the variables of interest. For hypothesis testing, regression models were constructed and are described in the relevant results sections. Finally, mediation analysis was used to test the proposed sequence discussed in Section 1.6. As described in Section 2.1.2.1, the wider WCHADS study uses a two stage stratified design in which a consecutive general population sample (the 'extensive' sample) is used to generate a smaller 'intensive' sample stratified by psychosocial risk. This enables weighting back to the extensive sample for general population estimates to be derived. Weighted analysis was not employed in the present study. Potential limitations of not using weighted analysis are noted in the discussion (Section 4.4.3).

2.4.3.1 Assumption and data checks.

2.4.3.1.1 Missing data. For all the key predictor and outcome variables, levels of missing data were very low. For each variable, missing data was less than 5%. Missing items on scale measures were replaced with the median score, as recommended for use with data that may be skewed (Acuna & Rodriguez, 2004). The number of individual items missing on any one scale was less than two.

2.4.3.1.2 Missing measures. As often expected in longitudinal designs, a small number of mothers in the main thesis sample did not complete a particular measure; either because they did not return a questionnaire at the child assessment or because the maternal interview was shortened in response to time limitations set by the mother. Where relevant, this is reflected in the n-values reported for each analysis. Where a different n-value is not stated analyses included all 246 mother-child dyads with Child Behaviour Checklist data or all 244 with Severe Aggression Measure data. The decision was made not to exclude mothers who had missed a measure as this could have introduced an element of bias and would have reduced the overall sample size.

2.4.3.1.3 Distribution of variables. The distributions of all variables were initially examined using histograms and calculation of skewness z-scores, calculated by skew/Standard Error of skew (Tabachnick & Fidell, 2012). These z-scores are reported for each variable along with the descriptive statistics in Appendix 4. Where variables were skewed, non parametric tests were employed to assess bivariate associations. Where hypothesis-testing required parametric tests, i.e. multiple regression, log transformation, a commonly used method for transforming variables with positive skew (Field, 2009) was used and the resulting distributions examined. In the case of the

Severe Aggression Measure, log transformation did not improve the distribution of the physical aggression scores. To address this, in line with recommendations the proposed regressions were performed and the plotted residuals, the difference between predicted and obtained values, for each were screened (Field, 2009; Tabachnick & Fidell, 2012). The residuals for the non-transformed total aggression score fitted the normal distribution curve, suggesting that this score could be used in multiple regression (Tabachnick & Fidell, 2012). However, the residuals for physical aggression towards other adults and family children remained skewed. To address this, scores at the higher end of the scales were collapsed to improve distribution.

2.4 3.1.4 Assumptions of multiple regression. Data to be used in regression analyses had all recommended assumption checks completed (Field, 2009). As described above, distributions of all variables were checked and issues addressed. All predictor variables were interval or categorical, outcome variables were continuous, and all had variance in values. Inspection of scatter plots for pairs of variables and residuals suggested that the requirements of linearity and homoscedasticity were met (Tabachnick & Fidell, 2012).

The issue of multicollinearity was a potential concern in the present study and this was examined during hypothesis-testing. Multicollinearity occurs when variables are too highly correlated, usually when r is above .90, and can result in unreliable regression models (Tabachnick & Fidell, 2012). This was checked using the following collinearity diagnostics; the variance inflation factor (VIF) and tolerance statistic (TS). VIF values over 10 may indicate problems, whilst TS values below 0.20 suggest multicollinearity is present (Field, 2009). For each regression model, VIF values were

below 2, and tolerance values above .60. This suggested that problems of multicollinearity were not a cause for concern in regard to the results of the study.

2.4.3.2 Use of Longitudinal Latent Class Analysis (Muthén, 2004).

2.4.3.2.1 Rationale. As discussed in Section 1.4.3, group-based modelling, including Longitudinal Latent Class Analysis (LLCA) has been used to characterise and model the course of psychopathology (Nagin & Odgers, 2010). The approach was developed to summarise and identify patterns present in symptoms or behaviours measured longitudinally (Nagin & Tremblay, 2005; Nagin & Odgers, 2010; Pickles & Angold, 2003). An advantage of LLCA compared to other group-based modelling techniques is that it is not based upon the assumption of continuous, normal distribution. Instead, it is assumed that groups or classes exist in the data that may follow different courses that vary over time (Feldman et al., 2009). Further, the modelling does not assume a common process of growth or decline but instead allows for irregularity and change, for example increases or decreases in symptoms over time (Nagin & Tremblay, 2001). Thus, the technique does not impose a structure on data but allows for patterns to emerge. This was particularly useful for modelling mothers' depression symptoms that were measured across assessment points, as it provided a systematic alternative to the creation groups based upon potentially subjective criteria, and did not impose growth or decline curves that could be restrictive (Nagin & Odgers, 2010). Further, the approach is well-suited to data from prospective studies as it is based upon the maximum likelihood function that allows for data missing at random being included. Therefore, participants with incomplete data across time can be retained in analyses as long as they have data from two assessment points available, which reduces the likelihood of bias in models (Nagin, 2009).

Using LLCA, the researcher was able to test whether hypothesised groups (referred to as classes or trajectories in the thesis) could be identified within the data-set. Multiple models can be specified using the approach and their fit tested against statistical and substantive criteria (as presented in Section 3.1.1). It is important to note that the classes identified in the modelling represent approximations of groups of individuals who have provided similar patterns of responses over time (Nagin & Tremblay, 2005). A key aim is to identify the smallest number of classes that can be used to meaningfully interpret the data (Muthén & Muthén, 2000). Once the most appropriate model is chosen, individuals are assigned to their most likely trajectory based upon posterior probabilities, which provide an estimate of an individual's likelihood of belonging to each trajectory. For example, in a model that fit the data well a mother who consistently reported high levels of depression symptoms across multiple assessment points would receive a low probability of belonging to the low trajectory, but a high probability of belonging to the high trajectory. Individuals are assigned to their most likely trajectory according to which they receive the highest posterior probability for, and a variable representing this assignment is extracted and used to examine predictions from individual's most likely trajectory membership to hypothesised outcomes.

2.4.3.2.2 Longitudinal Latent Class Analysis with mothers' depression scores in the present study. Measures of psychopathology in community samples are often skewed, with many participants reporting low levels of symptoms (Feldman et al., 2009). This was the case for mothers' Edinburgh Postnatal Depression Scale scores in the present study, and a large proportion of participants scored zero. These distributions can lead to biased model estimates and unreliable fit statistics (Nagin & Odgers, 2010). To address this issue, the use of ordinal variables to represent the actual distribution of

scores has been recommended (Feldman et al., 2009; Nagin, 2009). Therefore, four ordinal categories were created that were informed by the frequency distributions of mothers' depression scores in the trajectory sample (presented in Appendix 4). The categories created were scores between 0-2, 3-5, 6-9 and 10 and over. The results of the LLCA are presented in Section 3.1.1.

2.4.3.3 Statistical software. The majority of statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS) version 20.0 for Windows, with the exception of G*Power 3.1.5 (Faul et al., 2009) for power calculations and MPlus (Muthen & Muthen, 1998) for the LLCA.

Chapter 3 Results

The Results chapter is divided into three major sections. First, analyses performed to examine the contribution of postnatal depression to children's aggression are presented; this includes the results of the Longitudinal Latent Class Analysis. Secondly, analyses performed to examine the contribution of mothers' antisocial and borderline dysfunction are described, in addition to results regarding whether mothers' postnatal depression and personality dysfunction made independent contributions to aggression. Thirdly, analyses performed to test the potential mediation sequence between mothers' personality dysfunction, risky relationship establishment and the presence of an antisocial partner to children's aggression are presented. As previously discussed, two outcome measures were used to assess children's aggression. In the following sections to aid brevity and clarity, scores on the Child Behaviour Checklist Aggression scale are referred to as CBCL aggression whilst the Severe Aggression Measure is referred to as the physical aggression interview.

3.1 Mothers' Postnatal Depression and Children's Aggression

Hypothesis 1

Trajectories characterised by elevated postnatal maternal depression over time will be associated with greater child aggression at 2.5 years than trajectories of low postnatal depression.

This section begins with the results of the Longitudinal Latent Class Analysis (LLCA), used to characterise mothers' depression over the first postnatal year. This generated a trajectory variable representing maternal postnatal depression, which was

then used in hypothesis-testing. The LLCA section is followed by the results of bivariate analyses, performed to examine correlations between the variables of interest. Predictions from the trajectories to child aggression are then presented, which were performed in multiple linear regression. Analyses controlled for prenatal depression, because of possible confounding with postnatal depression, and for depression at the time of maternal reporting on child aggression ('current depression') because of possible reporting biases.

3.1.1 Longitudinal Latent Class Analysis (LLCA) of mothers' postnatal depression: Selection of the model. As described in Section 2.4.3.2, LLCA was used to model mothers' depression symptoms, measured using the Edinburgh Postnatal Depression Scale (EPDS) across the four postnatal assessment points. In line with previous studies (as discussed in Section 1.4.2), models with two to six classes were estimated. The aim of LLCA is to identify the optimal number of latent classes that underlie the data (Campbell et al., 2009). However, there is no single established method to guide model choice in LLCA. Therefore, as recommended in the literature (Feldman et al., 2009; Nagin & Odgers, 2010), several statistical fit indices were examined to select the most appropriate model. In addition, substantive issues of class size and parsimony were considered.

3.1.1.1 Statistical fit indices for model selection.

3.1.1.1.1 Bayesian Information Criteria, Entropy and the Lo-Mendell-Rubin Likelihood Ratio Test. The Bayesian Information Criteria (BIC) is the most commonly used statistic to assess model fit in LLCA (Nagin & Odgers, 2010). Lower BIC values are indicative of a better fit to the data (Nagin, 2009). Entropy is an index of

classification accuracy (Muthén, 2004). Values range from 0 (each individual has an equal probability of 1 for membership of *each* class in the model) to 1 (each individual has a probability of 1 for membership of a *specific single* class and probability of 0 for membership of the remaining classes). Therefore, higher entropy values indicate more accurate classification; values of 0.80 are considered high, 0.60 medium, and 0.40 considered low (Clark & Muthén, 2009). The adjusted Lo-Mendall-Rubin test. ‘LMR-B’ (Muthén, 2004), has also been used to assist model selection (Feldman et al., 2009). The LMR-B assesses whether an additional class makes a significant improvement to the model as compared to the solution that comes before. BIC, Entropy and LMR-B values for each model estimated with the trajectory sample are presented in Table 3.1.1.1.1.

Table 3.1.1.1.1

BIC, Entropy and LMR-B Values for the Two to Six Class LLCA Models

| Models estimated: | BIC | BIC ^a | Entropy | LMR-B | LMR-B <i>p</i> value |
|-------------------|---------|------------------|---------|--------|----------------------|
| Two-class | 5831.56 | 5752.16 | 0.60 | 390.82 | <.001 |
| Three-class | 5788.79 | 5668.10 | 0.72 | 131.07 | <.001 |
| Four-class | 5845.56 | 5683.58 | 0.69 | 32.63 | .026 |
| Five-class | 5916.85 | 5713.59 | 0.70 | 18.27 | .072 |
| Six-class | 5994.54 | 5749.99 | 0.63 | 12.53 | 1.00 |

Note. BIC= Bayesian Information Criteria; BIC^a = Sample size-adjusted BIC; LMR-B= Lo-Mendell- Rubin test.

The three-class model had the lowest BIC and highest entropy values suggesting it was the most adequate fit to the data. The LMR-B values indicated a significantly improved fit for the two-class model over a one class solution, whilst the three-class model was a significantly improved fit over the two-class model. The LMR-B also indicated an improved fit for the four-class model, but when taken into consideration alongside the BIC and entropy values, the three-class model appeared to offer the best fit to the data. To further inform model selection, substantive issues of class size, probabilities of individuals' class membership, and graphical plots were next examined. These are discussed in the following section.

3.1.1.2 Substantive issues for model selection.

3.1.1.2.1 Size of classes and class membership. Nagin (2009) recommends that model selection should involve the consideration of model parsimony along with the examination of statistical fit indices. A parsimonious model will ideally contain no more classes than necessary, will have sufficient numbers of cases within each class, and will summarise the data in a coherent manner (Nagin, 2009). As described in Section 2.4.3.2.1, LLCA produces posterior probability values, which refer to the probability of an individual with a specific profile being assigned to a particular class (Nagin, 2009). Examination of the average posterior probabilities for each class within the models enables researchers to assess whether the models provide an accurate representation of the sample's trajectories (Muthén, 2004). It is recommended that average posterior probability values for each class in each model should exceed 0.7, which indicates a good level of accuracy (Nagin & Odgers, 2010). Table 3.1.1.2.1 presents the class sizes and membership probabilities for each model.

Table 3.1.1.2.1

Class Size and Membership Probabilities for the Two to Six Class Models

| Model | Class | Size | | Probabilities |
|-------------|-------|------|--------|---------------|
| | | n | % | |
| Two-class | 1 | 525 | (52.6) | 0.87 |
| | 2 | 472 | (47.4) | 0.87 |
| Three-class | 1 | 333 | (33.4) | 0.91 |
| | 2 | 465 | (46.6) | 0.85 |
| | 3 | 199 | (20.0) | 0.93 |
| Four-class | 1 | 280 | (28.1) | 0.69 |
| | 2 | 169 | (16.9) | 0.86 |
| | 3 | 247 | (24.8) | 0.78 |
| | 4 | 301 | (30.2) | 0.91 |
| Five-class | 1 | 171 | (17.2) | 0.90 |
| | 2 | 231 | (23.2) | 0.73 |
| | 3 | 69 | (6.9) | 0.48 |
| | 4 | 221 | (22.1) | 0.70 |
| | 5 | 305 | (30.6) | 0.92 |
| Six-class | 1 | 134 | (13.4) | 0.71 |
| | 2 | 181 | (18.2) | 0.57 |
| | 3 | 175 | (17.5) | 0.60 |
| | 4 | 139 | (14.0) | 0.78 |
| | 5 | 306 | (30.7) | 0.91 |
| | 6 | 62 | (6.2) | 0.43 |

In relation to class size, the two- three- and four-class models had adequate sized groups, with a clear drop in group size in the five- and six-class models. All class membership probabilities for the two- and three-class models exceeded the minimum threshold of 0.7, whilst some values for the four- five- and six-class models began to drop below this value. The class membership values for the three-class model were the highest. Examination of the class sizes and probabilities therefore provided further support for retaining the three-class model. The final step in model selection was the examination of the graphical plots.

3.1.1.2.2 Examination of graphical plots. Graphical plots are commonly used in model selection to examine the size and course of classes. Using MPlus with ordinal categories only allows for category probabilities to be plotted (Feldman et al., 2009). These probabilities are distinct from posterior probabilities discussed above and are values that reflect the probability of a randomly chosen individual from each class belonging to the ordinal category in question. Graphical plots that illustrated the category probabilities for membership of the highest ordinal EPDS category (>10) were examined. A probability score on the Y axis reflects the likelihood of an individual from each class belonging to the ordinal category in question (in this case the highest EPDS category of >10). Appendix 7 shows the graphical plots produced for each model.

Visual inspection of the plots showed that in each model there was a smaller class with higher probabilities of belonging to the >10 EPDS category at each time point, providing support for the identification of a group with elevated scores across the postnatal period. The graphs showed that as classes were added to the models, this higher class remained and the addition of further classes was divided the groups with a

low likelihood of being in the >10 EPDS category, rather than showing any additional high classes.

3.1.1.2.3 Summary: LLCA model selection. Based upon examination of the fit indices the three-class model of mothers' depression appeared to be the most optimal when compared with two- four- five- and six-class models. Furthermore, the class sizes, probabilities of class membership and graphical plots that showed the number and form of the classes within each model, suggested that the three-class model was the most adequate characterisation of mother's postnatal depression symptoms. After selecting this model, the three classes were labelled 'high', 'low' and 'very low'. The 'high' group was made up of mothers who had a consistently higher likelihood of scoring >10 on the EPDS across the postnatal assessment points. Posterior probabilities showed that this was the most likely class for 20% of the trajectory sample. The class containing those who had a low likelihood of scoring >10, 46.6% of the sample, was labelled 'low'. Finally, the class of individuals with a very low probability of scores >10, 33.4% of the sample, was labelled the 'very low' class.

3.1.1.3 Trajectory membership for mothers in the main thesis sample. As discussed in Section 2.4.3.2.1, once an LLCA model is selected, a variable representing each participant's most likely class in the chosen model can be extracted from MPlus. This variable was used in subsequent analyses to represent mothers' depression symptoms during the first postnatal year. Table 3.1.1.3 presents the most likely class membership for the mothers in the main thesis sample.

Table 3.1.1.3

Mothers' Most Likely Class Membership in the 3-class LLCA Model for Mothers' Postnatal Depression (Main Thesis Sample)

| | n | % |
|----------------|-----|------|
| Very low class | 80 | 32.5 |
| Low class | 122 | 49.6 |
| High class | 44 | 17.9 |

3.1.2 Bivariate associations. In the following section, bivariate associations between the maternal depression and child aggression variables are presented. As mothers' depression, Child Behaviour Checklist and some physical aggression scores were skewed, with binary or ordinal variables, Spearman's correlations were used.

3.1.2.1 Associations between mothers' depression across time. Bivariate associations between mothers' postnatal depression class and both prenatal and current depression were moderate to large (Table 3.1.2.1a). Given reported associations between mothers' pre and postnatal depression in the literature, the prediction from mothers' prenatal depression to postnatal class membership was also examined (Table 3.1.2.1b). This was done using multinomial regression, with the very low class as the reference group, as the most likely trajectory variable was categorical with 3 levels. Results showed that mothers' prenatal depression significantly predicted postnatal class membership; mothers with higher prenatal depression scores were more likely to be in the low (OR 1.23) or high trajectory group (OR 1.52) than in the very low group.

Table 3.1.2.1a

Associations between Prenatal Depression, Postnatal Class and Current Depression

| Variable | Prenatal depression | Postnatal class | Current depression |
|------------------------|---------------------|-----------------|--------------------|
| 1. Prenatal depression | 1.00 | .50 | .37 |
| <i>p</i> = | | <.001 | <.001 |
| <i>n</i> = | | 245 | 242 |
| 2. Postnatal class | | 1.00 | .48 |
| <i>p</i> = | | | <.001 |
| <i>n</i> = | | | 243 |
| 3. Current depression | | | 1.00 |
| <i>p</i> = | | | |
| <i>n</i> = | | | |

Note. Spearman's correlations used for all; Prenatal depression = mothers' depression score at 32-36 weeks gestation; Postnatal class = ordinal variable representing mothers' most likely class membership from three-class trajectory model; Current depression = Mothers' depression score at time of reporting on their child's aggression.

Table 3.1.2.1b

Prediction of Mothers' Postnatal Class Membership from Mothers' Prenatal Depression

| | <i>B</i> | <i>SEB</i> | <i>OR</i> | <i>95%CI</i> | <i>p</i> |
|----------------------|----------|------------|-----------|--------------|----------|
| Low postnatal class | .21 | .04 | 1.23 | [1.14,1.33] | <.001 |
| High postnatal class | .42 | .05 | 1.52 | [1.37,1.69] | <.001 |

$R^2 = .26$ (Cox & Snell), $r^2 = .30$ (Nagelkerke)

Note. Multinomial regression used for analysis with very low as reference group.

3.1.2.2 Associations between mothers' depression and potential confounders.

Potential confounders were identified from previous literature. Bivariate associations between depressive symptoms and potential confounders are presented in Table 3.1.2.2. Where associations with psychological abuse were examined, prenatal scores were used for analyses with prenatal depression and postnatal scores used for analyses with postnatal class and current depression.

Mothers with higher levels of prenatal depression were younger, more likely to have smoked during pregnancy, were more likely to have been single during pregnancy, and reported higher levels of psychological abuse in their relationship. Postnatal depression class was significantly associated with levels of postnatal psychological abuse, whilst the association with smoking status in pregnancy showed a trend towards significance. Current depression was also positively associated with levels of psychological abuse. All correlations for r_s were small to moderate. Based on these results, a conservative approach to confounders was taken with all variables significantly associated with mothers' depression or that had showed a trend towards significance ($p < .10$) included in subsequent analyses.

Table 3.1.2.2

Correlations between Maternal Depression and Potential Confounders

| Variables: | Prenatal Depression | Postnatal Class | Current Depression |
|-------------------|------------------------|-----------------|--------------------|
| Age | -.21 | -.06 | -.04 |
| <i>p</i> = | .001 | .372 | .532 |
| <i>n</i> = | 232 | 233 | 230 |
| Deprivation | .01 | .02 | .04 |
| <i>p</i> = | .918 | .756 | .602 |
| <i>n</i> = | 233 | 234 | 231 |
| Smoking | .26 | .12 | .09 |
| <i>p</i> = | <.001 | .062 | .159 |
| <i>n</i> = | 229 | 230 | 227 |
| Cohabitation | -.20 | -.02 | -.06 |
| <i>p</i> = | .003 | .785 | .396 |
| <i>n</i> = | 232 | 233 | 230 |
| Education | -.10 | -.07 | -.01 |
| <i>p</i> = | .130 | .292 | .965 |
| <i>n</i> = | 233 | 234 | 231 |
| Mother to Partner | | | |
| Abuse | .37 | .15 | .25 |
| <i>p</i> = | <.001 | .019 | .065 |
| <i>n</i> = | 233 | 234 | 231 |
| Partner to Mother | | | |
| Abuse | .40 | .15 | .30 |
| <i>p</i> = | <.001 | .020 | <.001 |
| <i>n</i> = | 233 | 234 | 231 |

Note. Spearman's correlations used for all; Age= mothers' age at 20 weeks gestation (point of consent); Deprivation= Index of Multiple Deprivation score at 20 weeks gestation; Smoking = binary variable representing smoking status during pregnancy; Cohabitation = binary variable indicating cohabitation status at 32-36 weeks gestation; Education = mothers' age at leaving full time education; Mother to partner abuse = mother to partner psychological abuse score; Partner to mother abuse= partner to mother psychological abuse score.

3.1.2.3 Associations between mothers' depression and child aggression at 30 months.

3.1.2.3.1 Mothers' depression and CBCL aggression. Mothers' prenatal depression, postnatal class membership and current depression were significantly associated with children's levels of CBCL aggression (Table 3.1.2.3.1).

Table 3.1.2.3.1

Correlations between Mothers' Depression and CBCL Aggression

| Variables: | CBCL Aggression |
|----------------------|-----------------|
| Prenatal depression | .14 |
| <i>p</i> = | .035 |
| <i>n</i> = | 245 |
| Postnatal depression | .16 |
| <i>p</i> = | .012 |
| <i>n</i> = | 246 |
| Current depression | .23 |
| <i>p</i> = | <.001 |
| <i>n</i> = | 243 |

Note. Spearman's correlations used for all.

3.1.2.3.2 Mothers' depression and physical aggression across domains.

Children's total physical aggression across domains measured using the physical aggression interview was significantly associated with mothers' prenatal depression and postnatal depression class. The association between children's total physical aggression and current depression approached significance (Table 3.1.2.3.2).

Table 3.1.2.3.2

Correlations between Mothers' Depression and Children's Physical Aggression

| Variables: | Total aggression | Aggression Towards Adults | | Aggression Towards Children | |
|------------|------------------|---------------------------|--------------|-----------------------------|----------------|
| | | Parents | Other adults | Family children | Other children |
| Prenatal | .16 | .15 | .02 | .07 | .12 |
| <i>p</i> = | .012 | .020 | .750 | .282 | .067 |
| <i>n</i> = | 241 | 241 | 241 | 241 | 241 |
| Postnatal | .14 | .11 | .02 | .08 | .08 |
| <i>p</i> = | .031 | .088 | .775 | .240 | .240 |
| <i>n</i> = | 243 | 243 | 243 | 243 | 243 |
| Current | .13 | .13 | -.05 | .06 | .06 |
| <i>p</i> = | .054 | .050 | .453 | .334 | .354 |
| <i>n</i> = | 235 | 235 | 235 | 235 | 235 |

Note. Spearman's correlations used for all; Prenatal depression = mothers' depression score at 32-36 weeks gestation; Postnatal class = ordinal variable representing mothers' most likely class membership from three-class trajectory model; Current depression = Mothers' depression score at time of reporting on their child's aggression.

In relation to children's physical aggression towards adults, each aspect of mothers' depression showed associations with aggression towards parents that either met the $p < .05$ threshold or approached significance. Mothers' depression was not significantly associated with aggression towards other adults. In the case of aggression towards children, only mothers' prenatal depression showed an association that approached significance to their children's aggression towards other children.

3.1.3 Does Mothers' Postnatal Depression Predict Child Aggression?

In this section, the main analyses performed to test hypothesis 1 are presented. The section is structured to present results relating to children's CBCL aggression first, followed by prediction to total physical aggression and aggression towards parents measured using the physical aggression interview, as these were the only two domain scores that showed significant bivariate associations with mothers' depression.

As noted in Section 3.1, predictions from mothers' prenatal and current depression were examined along with predictions from postnatal class. Predictions from each depression variable were examined first in separate multiple linear regression models, and then where appropriate, jointly. For use as the dependent variable, CBCL aggression scores were transformed using $\ln(10 +)$ to address the skew of the data. As discussed in Section 2.4.3.1, assumption checks indicated that the total physical aggression and aggression towards parents scores were appropriate for use in multiple regression. Where the ordinal postnatal class variable was used, dummy variables were created for membership of the 'high' and 'low' classes, with the 'very low' class used as the reference category.

3.1.3.1 Predictions to CBCL aggression. The prediction to CBCL aggression from postnatal depression class is shown in Table 3.1.3.1. Also shown are predictions from prenatal and current depression examined in separate models.

Table 3.1.3.1

Prediction to CBCL Aggression from Prenatal, Postnatal and Current Depression

| Dependent Variable: CBCL Aggression | | |
|-------------------------------------|-----------------------|----------|
| Model | β [95% CI] | <i>p</i> |
| Prenatal depression (n= 245) | .14 [.01,.02] | .025 |
| Overall model: | $r^2 = .02, p = .025$ | |
| Postnatal Class | | |
| (n= 246) | | |
| High postnatal class | .20 [.05,.26] | .005 |
| Low postnatal class | .09 [-.03,.13] | .197 |
| Overall model: | $r^2 = .04, p = .011$ | |
| Current depression (n=243) | .25 [.01,.02] | <.001 |
| Overall model: | $r^2 = .06, p < .001$ | |

Note. All analyses performed using multiple linear regression; 95% CI = 95% confidence interval of β ; Prenatal depression = mothers' depression score at 32-36 weeks gestation; High postnatal class = Binary variable representing membership of the high postnatal depression class; Low postnatal class = Binary variable representing membership of the low postnatal depression class; Current depression = Mothers' depression score at time of reporting on their child's aggression at 27-30 months.

For mothers' postnatal depression class, the overall regression model was statistically significant, and this was accounted for by the dummy variable contrasting the high postnatal depression class with the very low class. There was however, a small but statistically significant association between prenatal depression and CBCL aggression, and a larger highly significant association between current maternal depression and CBCL aggression.

3.1.3.1.1 The independent contribution of mothers' pre and postnatal depression to CBCL aggression. As discussed in Section 1.4, depression in the postnatal period is often associated with depression in pregnancy. Given the association of prenatal depression with postnatal class, and the associations of each with CBCL aggression in the present sample, they were examined jointly in multiple linear regression, to examine whether postnatal depression made an independent contribution (Table 3.1.3.1.1).

Table 3.1.3.1.1 *Prediction from Mothers' Pre and Postnatal Depression to CBCL Aggression*
(*n*=245)

| Dependent Variable: | CBCL Aggression | |
|------------------------------|--|----------|
| Model | β [95% CI] | <i>p</i> |
| Pre and postnatal depression | | |
| Step 1 | | |
| Prenatal depression | .14 [.01,.02] | .025 |
| Overall model: | $r^2 = .02, p = .025$ | |
| Step 2 | | |
| Prenatal depression | .07 [-.01,.01] | .315 |
| High postnatal class | .16 [-.01,.24] | .053 |
| Low postnatal class | .07 [-.04,.13] | .323 |
| Overall model: | $r^2 = .04 \Delta r^2 = .02, p = .032$ | |

Note. All analyses performed using multiple linear regression; 95% CI = 95% confidence interval of β ; Prenatal depression = mothers' depression score at 32-36 weeks gestation; High postnatal class = Binary variable representing membership of the high postnatal depression class; Low postnatal class=Binary variable representing membership of the low postnatal depression class; Δr^2 = change in r^2 .

After accounting for prenatal depression, the contribution of the high depression class was somewhat reduced (the standardized coefficient dropped from .20 to .16) but almost significant ($p = .053$). The coefficient for prenatal depression dropped from .14 to .07. However, the range between the upper and lower bound confidence limits for the contribution of the high postnatal class was rather wide [-.04, .13], suggesting that the regression results may be imprecise (Tabachnick & Fidell, 2012). Therefore, the analysis did not clearly establish that postnatal class membership made an independent contribution; on the other hand it did not establish that the high class did not make an independent contribution.

As presented in Section 2.4.3.1.4, collinearity diagnostics produced in the regression models did not suggest problems of multicollinearity. Instead, one possible explanation was that prenatal and postnatal depression accounted for overlapping variance in CBCL aggression, which could not be conclusively assigned to either predictor. Alternatively, the use of categorical groups representing postnatal depression class may have resulted in reduced power. Potential interpretations and implications of these results are further considered in Section 4.2.5 of the discussion. Given the potential uncertainty of whether either pre or postnatal depression had an independent effect, further analyses with these variables as predictors involved the construction of separate models.

3.1.3.1.2 The contribution of mothers' current depression to CBCL aggression.

As discussed in Section 1.4.4, mothers' ratings of their child's behaviours may be biased by their current mood at the time of reporting, although it should be noted that there are other interpretations of such associations. With the potential for biasing in mind, the contributions of both prenatal and postnatal depression to children's CBCL

aggression scores were examined after controlling for mothers' current depression. The results are presented in Tables 3.1.3.1.2a and 3.1.3.1.2b.

Table 3.1.3.1.2a

Prediction to CBCL Aggression from Mothers' Prenatal Depression Controlling for Current Depression (n=242)

| Dependent Variable: | | CBCL Aggression | |
|-------------------------------|--|-----------------|--|
| Model | β [95%CI] | p | |
| Prenatal & current depression | | | |
| Step 1 | | | |
| Current depression | .25 [-.01-.02] | <.001 | |
| Overall model: | $r^2 = .06, p < .001$ | | |
| Step 2 | | | |
| Current depression | .23 [-.01-.02] | .001 | |
| Prenatal depression | .06 [-.01-.01] | .349 | |
| Overall model: | $r^2 = .07 \Delta r^2 = .01, p < .001$ | | |

Note. All analyses performed using multiple linear regression, 95% CI = 95% confidence interval of β ; Prenatal depression= mothers' depression score at 32-36 weeks gestation; Current depression = Mothers' depression score at time of reporting on their child's aggression; Δr^2 = change in r^2 .

Table 3.1.3.1.2b

Prediction to CBCL Aggression from Postnatal Depression Class Controlling for Current Depression (n=243)

| Dependent variable: | CBCL Aggression | |
|--------------------------------|--|----------|
| Model | β [95% CI] | <i>p</i> |
| Postnatal & current depression | | |
| Step 1 | | |
| Current depression | .25 [.01,.02] | <.001 |
| Overall model: | $r^2 = .06, p < .001$ | |
| Step 2 | | |
| Current depression | .22 [.01,.02] | .002 |
| High postnatal class | .10 [-.04,.19] | .184 |
| Low postnatal class | .03 [-.07,.10] | .725 |
| Overall model: | $r^2 = .07 \Delta r^2 = .01, p < .001$ | |

Note. All analyses performed using multiple linear regression; 95% CI = 95% confidence interval of β ; High postnatal class = Binary variable representing membership of the high postnatal depression class; Low postnatal class = Binary variable representing membership of the low postnatal depression class; Current depression = Mothers' depression score at time of reporting on their child's aggression; Δr^2 = change in r^2 .

When mothers' current depression score was controlled for, neither prenatal depression nor membership of the high postnatal class made a significant contribution to children's CBCL aggression scores. In contrast, current depression significantly predicted children's CBCL aggression in both models. Interpretations of these results are presented in Section 4.2.

3.1.3.1.3 Summary of the contribution of mothers' pre, postnatal and current depression symptoms to children's CBCL aggression scores. Whilst the contribution of mothers' postnatal depression symptoms was the focus of hypothesis one, it was important to consider the role of prenatal and current depression in analyses. The results demonstrated that mothers' pre and postnatal depressive symptoms significantly predicted children's CBCL aggression scores when examined in separate regression models. When entered into the same model, neither made a significant independent prediction to aggression, although the contribution of the high postnatal class approached significance. Thus, contributions from pre and postnatal depressive symptoms could not be conclusively disentangled. Potential interpretations of this result are considered in the discussion. When mothers' current depression was controlled for, prenatal depression or postnatal class membership no longer contributed to children's CBCL aggression scores, whilst current depression made a significant contribution. In the next section, the contribution of potential confounders of mothers' depression and their child's outcomes are examined.

3.1.3.1.4 The contribution of confounding variables to associations between mothers' depression and children's CBCL aggression scores. As reviewed in Section 1.4.4, a key question that is under-examined in studies of the possible consequences of exposure to postnatal depression is whether any associations are better accounted for by psychosocial factors commonly associated with depression. This section presents findings on possible confounders for maternal depression.

A conservative approach to examining confounders was taken, with all variables that showed a significant bivariate association with each depressive symptoms variable, or approached significance, examined. These were mothers' age at consent, whether mothers smoked during pregnancy, mothers' cohabitation status in pregnancy, and levels of mother to partner or partner to mother psychological abuse. The possible confounders were examined jointly in multiple linear regression. Analyses were performed by entering the confounders first as a group, followed by the relevant maternal depression variable. As Table 5.8 in Appendix 5 shows, several were associated with each other but none of the associations were high enough to raise concerns about multicollinearity. Using the conventional rule $n > 104 + m$, where m is the number of independent predictors (Tabachnick & Fidell, 2012), the size of n in each model was appropriate to test regression with the confounders all entered at step 1. Results of analyses controlling for potential confounders associated with prenatal and postnatal depressive symptoms are presented in Table 3.1.3.1.4a and Table 3.1.3.1.4b.

Table 3.1.3.1.4a

Prediction to CBCL Aggression from mothers' Prenatal Depression Controlling for Potential Confounders (n=240)

| Dependent Variable: | CBCL Aggression | |
|--|--------------------------------------|----------|
| Model | β [95% CI] | <i>p</i> |
| Prenatal depression & confounders | | |
| Step 1 | | |
| Age | -.09 [-.01,.01] | .185 |
| Smoking | .05 [-.07,.15] | .460 |
| Cohabitation | -.04 [-.15,.08] | .538 |
| Mother to partner psychological abuse | .07 [-.01,.03] | .329 |
| Partner to mother psychological abuse | .16 [.01,.03] | .023 |
| Overall model: | $r^2 = .07, p = .004$ | |
| Step 2 | | |
| Age | -.09 [-.01,.01] | .195 |
| Smoking | .05 [-.07,.15] | .472 |
| Cohabitation | -.04 [-.15,.09] | .596 |
| Mother to partner psychological abuse | .06 [-.01,.03] | .392 |
| Partner to mother psychological abuse | .16 [.01,.03] | .033 |
| Prenatal depression | .02 [-.01,.01] | .752 |
| Overall model: | $r^2 = .07 \Delta r^2 = -, p = .009$ | |

Note. All analyses performed using multiple linear regression; 95% CI = 95% confidence interval of β ; Age= maternal age at 20 weeks gestation (point of consent); Smoking= smoking status during pregnancy; Cohabitation= cohabitation status at 32-36 weeks gestation; Mother to partner psychological abuse= mother to partner psychological abuse score at 20 weeks gestation; Partner to mother psychological abuse= partner to mother psychological abuse score at 20 weeks gestation; Prenatal depression= mothers' depression score at 32-36 weeks gestation; Δr^2 = change in r^2 .

Table 3.1.3.1.4b

Prediction to CBCL Aggression from Mothers' Postnatal Depression Class Controlling for Potential Confounders (n=226)

| Dependent variable: | CBCL Aggression | |
|---------------------------------------|--|----------|
| Model | β [95% CI] | <i>p</i> |
| Postnatal depression & confounders | | |
| Step 1 | | |
| Smoking | .04 [-.07,.14] | .543 |
| Mother to partner psychological abuse | .22 [.01,.06] | .006 |
| Partner to mother psychological abuse | .09 [-.01,.03] | .240 |
| Overall model: | $r^2 = .09, p < .001$ | |
| Step 2 | | |
| Smoking | .03 [-.09,.13] | .679 |
| Mother to partner psychological abuse | .21 [.01,.06] | .009 |
| Partner to mother psychological abuse | .07 [-.01,.03] | .361 |
| High postnatal class | .12 [-.02,.20] | .120 |
| Low postnatal class | .05 [-.06,.11] | .509 |
| Overall model: | $r^2 = .10 \Delta r^2 = .01, p < .001$ | |

Note. All analyses performed using multiple linear regression; 95% CI = confidence interval of β ; Smoking = smoking status during pregnancy, Mother to partner psychological abuse = mother to partner psychological abuse mean postnatal score, Partner to mother psychological abuse = partner to mother psychological abuse mean postnatal score; High postnatal class = Binary variable representing membership of the high postnatal depression class; Low postnatal class = Binary variable representing membership of the low postnatal depression class; Δr^2 = change in r^2 .

Table 3.1.3.1.4a shows the analysis with psychological abuse during pregnancy, because that is the relevant potential confounder for prenatal depression. When the confounders were examined jointly in the first step, levels of psychological abuse that had occurred during pregnancy predicted children's CBCL aggression scores. This was not reduced by the addition, in the second step, of prenatal depression scores, which after accounting for confounders, made a very small and non-significant contribution to the model. Table 3.1.3.1.4b shows the analysis with psychological abuse during the postnatal period as this was the relevant confounder for postnatal depression. When the confounders were examined jointly in the first step, mothers' reports of their postnatal levels psychological abuse towards their partners predicted children's CBCL aggression scores. This was not reduced by the addition, in the second step, of postnatal depression trajectory variables. Mothers' membership of the high postnatal depression class no longer predicted children's CBCL aggression scores when the potential confounders were entered into the regression model.

Results of the analysis controlling for potential confounders associated with mothers' current depression score are presented in Table 3.1.3.1.4c. In the first step, with confounders examined jointly, mothers' postnatal reports of their abuse towards partners during the postnatal period significantly predicted children's CBCL aggression. This prediction remained in the second step, and current depression also significantly predicted CBCL aggression scores, with standardised coefficient values of .21 and .22 respectively. Therefore, both postnatal mother to partner psychological abuse and mothers' depression at the time of reporting on the CBCL were significant predictors of children's CBCL aggression scores.

Table 3.1.3.1.4c

Prediction to CBCL aggression from mothers' current depression controlling for potential confounders (n=226)

| Dependent Variable: | CBCL Aggression | |
|---------------------------------------|---|----------|
| Model | β [95% CI] | <i>p</i> |
| Current depression & confounders | | |
| Step 1 | | |
| Mother to partner psychological abuse | .22 [.01,.06] | .004 |
| Partner to mother psychological abuse | .10 [-.01,.03] | .196 |
| Overall model: | $r^2 = .09, p < .001$ | |
| Step 2 | | |
| Mother to partner psychological abuse | .21 [.01,.05] | .007 |
| Partner to mother psychological abuse | .06 [-.01,.03] | .457 |
| Current depression | .22 [.01,.02] | .001 |
| Overall model: | $r^2 = .10, \Delta r^2 = .01, p = .001$ | |

Note. All analyses performed using multiple linear regression; 95% CI = confidence interval of β ; Mother to partner psychological abuse = mother to partner psychological abuse mean postnatal score, Partner to mother psychological abuse = partner to mother psychological abuse mean postnatal score; Current depression = Mothers' depression score at time of reporting on their child's aggression; Δr^2 = change in r^2 .

3.1.3.1.5 Summary: The contribution of confounding variables to associations between mothers' pre, postnatal, and current depression and children's CBCL aggression. Neither mothers' prenatal depression nor postnatal depression class made significant contributions to children's CBCL aggression scores when levels of psychological abuse were added to the regression models. None of the other confounders considered made an independent contribution to children's CBCL-measured aggression. In contrast, mothers' current depression remained a significant predictor when postnatal psychological abuse was controlled for. None of the

contributions from the other potential confounders were significant. Interpretations of these results are discussed in Section 4.2. Results relating to physical aggression measured on the Severe Aggression Measure are presented in the next section, and follow the same presentation structure as used for children's CBCL aggression.

3.1.3.2 Predictions to physical aggression. Children's physical aggression was measured using the Severe Aggression Measure. Scores for children's total physical aggression across domains and physical aggression towards parents showed significant bivariate associations, or associations that approached significance, with mothers' postnatal depression class, along with mothers' prenatal and current depression. Therefore, as with analyses with CBCL aggression, predictions from mothers' postnatal depression class, plus mothers' prenatal and current depression, to these two outcomes were examined. Results of the initial separate regressions are presented in Table 3.1.3.2.

Table 3.1.3.2

Prediction to Total Physical Aggression and Aggression towards Parents from Mothers' Prenatal, Postnatal and Current Depression

| Dependent Variable: | Total Physical Aggression | | Aggression to Parents | |
|---------------------------------|---------------------------|------|-----------------------|------|
| Model | β [95% CI] | p | β [95% CI] | p |
| Prenatal depression (n= 241) | .14 [.01,.17] | .038 | .16 [.01,.10] | .015 |
| Overall model: | $r^2 = .02, p = .038$ | | $r^2 = .02, p = .015$ | |
| Postnatal class (n= 243) | | | | |
| High postnatal class | .20 [.40,2.58] | .005 | .18 [.15,1.29] | .014 |
| Low postnatal class | -.01 [-.86,.83] | .924 | -.07 [-.66,.22] | .325 |
| Overall model: | $r^2 = .02, p = .006$ | | $r^2 = .05, p = .003$ | |
| Current depression (n= 235) | .11 [-.01,.15] | .083 | .16 [.01,.09] | .017 |
| Overall model: | $r^2 = .01, p = .083$ | | $r^2 = .02, p = .017$ | |

Note. All analyses performed using multiple linear regression; 95% CI = 95% confidence interval of β ; Prenatal depression = Mothers' depression score at 32-36 weeks gestation; High postnatal class= Binary variable representing membership of the high postnatal depression class; Low postnatal class= Binary variable representing membership of the low postnatal depression class; Current depression = Mothers' depression score at time of reporting on their child's aggression.

The prediction from postnatal depression class to total physical aggression and aggression towards parents was small but statistically significant. This was accounted for by membership of the high postnatal class, whilst membership of the low moderate class did not predict total physical aggression or physical aggression towards parents scores. There was also a small significant contribution from prenatal depression to both total physical aggression and aggression towards parents. The prediction from current depression showed a trend towards significance for prediction to children's total physical aggression and was significantly associated with aggression towards parents. The amount of variance accounted for in each Severe Aggression Measure outcome was small.

3.1.3.2.1 The independent contribution of mothers' pre and postnatal depression to children's physical aggression. As with predictions to CBCL aggression, the independent contribution of mothers' pre and postnatal depressive symptoms were next examined jointly in multiple regression to determine whether postnatal depression made an independent contribution to total levels of physical aggression or aggression towards parents. Results of the analyses are shown in Table 3.1.3.2.1.

Table 3.1.3.2.1

Prediction from Mothers' Pre and Postnatal Depression to Children's Physical Aggression

| Dependent variable: | Total Physical Aggression (<i>n</i> =241) | | Aggression to Parents (<i>n</i> =241) | |
|------------------------------|---|----------|---|----------|
| Model | β [95% CI] | <i>p</i> | β [95% CI] | <i>p</i> |
| Pre and postnatal depression | | | | |
| Step 1 | | | | |
| Prenatal depression | .14 [.01,.17] | .038 | .16 [.01,.10] | .015 |
| Overall model: | $r^2 = .02, p = .038$ | | $r^2 = .02, p = .015$ | |
| Step 2 | | | | |
| Prenatal depression | .07 [-.05,.14] | .345 | .11 [-.01,.09] | .140 |
| High postnatal class | .16 [-.06,2.48] | .061 | .13 [-.14,1.16] | .126 |
| Low postnatal class | -.02 [-1.01,.78] | .803 | -.10 [-.76,.16] | .200 |
| Overall model: | $r^2 = .04, \Delta r^2 = .02, p = .019$ | | $r^2 = .06, \Delta r^2 = .04, p = .016$ | |

Note. All analyses performed using multiple linear regression; 95% CI = 95% confidence interval of β ; Prenatal depression = Mothers' depression score at 32-36 weeks gestation; High postnatal class= Binary variable representing membership of the high postnatal depression class; Low postnatal class= Binary variable representing membership of the low postnatal depression class; Δr^2 = change in r^2 .

With mothers' prenatal depression symptoms controlled for, the contribution of the high postnatal class was slightly reduced, but approached significance, for total physical aggression. For physical aggression towards parents, none of the contributions from the depression predictors approached or reached significance, although the overall model was significant. This can indicate an unreliable model, and the confidence intervals were wide. Thus, as with predictions to children's CBCL aggression scores, it could not be concluded that either made a significant independent contribution to

children's physical aggression. Possible interpretations and implications of this are discussed in Section 4.2.

3.1.3.2.2 The contribution of mothers' current depression to children's physical aggression. As detailed in Section 3.1.2.3, the association between mothers' current depression and both total physical aggression and aggression to parents approached significance. Thus, as with predictions to CBCL aggression, the contributions of both mothers' pre and postnatal depression to total physical aggression and aggression towards parents, after controlling for current depressive symptoms were examined (shown in Table 3.1.3.2.2a and Table 3.1.3.2.2b).

Table 3.1.3.2.2a

Prediction to Total Physical Aggression and Aggression towards Parents from Prenatal Depression, controlling for Mothers' Current Depression

| Dependent Variable: | Total Physical Aggression (<i>n</i> =235) | | Aggression to Parents (<i>n</i> =235) | |
|--|---|----------|---|----------|
| Model | β [95% CI] | <i>p</i> | β [95% CI] | <i>p</i> |
| Prenatal and current depression | | | | |
| Step 1 | | | | |
| Current depression | .11 [-.01,.15] | .084 | .16 [.01,.09] | .018 |
| Overall model: | $r^2 = .01, p = .084$ | | $r^2 = .02, p = .018$ | |
| Step 2 | | | | |
| Current depression | .07 [-.04,.13] | .322 | .11 [-.01,.08] | .125 |
| Prenatal depression | .12 [-.01,.17] | .084 | .14 [.01,.09] | .052 |
| Overall model: | $r^2 = .03, \Delta r^2 = .02, p = .050$ | | $r^2 = .04, \Delta r^2 = .02, p = .009$ | |

Note. All analyses performed using multiple linear regression; 95% CI = 95% confidence interval of β ; Current depression = Mothers' depression score at time of reporting on their child's aggression; Prenatal depression = Mothers' depression score at 32-36 weeks gestation; Δr^2 = change in r^2 .

Table 3.1.3.2.2b

Prediction to Total Physical Aggression and Aggression towards Parents from Postnatal Depression Class, controlling for Mothers' Current Depression

| Dependent Variable: | Total Physical Aggression (<i>n</i> =235) | | Aggression to Parents (<i>n</i> =235) | |
|--|---|----------|---|----------|
| Model | β [95% CI] | <i>p</i> | β [95% CI] | <i>p</i> |
| Postnatal class and current depression | | | | |
| Step 1 | | | | |
| Current depression | .11 [.01,.15] | .083 | .16 [.01,.09] | .017 |
| Overall model: | $r^2 = .01, p = .083$ | | $r^2 = .02, p = .017$ | |
| Step 2 | | | | |
| Current depression | .06 [-.05,.13] | .416 | .12 [-.01,.08] | .097 |
| High postnatal class | .16 [-.04,2.49] | .057 | .13 [-.09,1.19] | .091 |
| Low moderate class | -.01 [-.99,.84] | .870 | -.10 [-.77,.15] | .189 |
| Overall model: | $r^2 = .04, \Delta r^2 = .02, p = .036$ | | $r^2 = .06, \Delta r^2 = .04, p = .002$ | |

Note. All analyses performed using multiple linear regression; 95% CI = 95% confidence interval of β ; Current depression = Mothers' depression score at time of reporting on their child's aggression; High postnatal class= Binary variable representing membership of the high postnatal depression class; Low postnatal class= Binary variable representing membership of the low postnatal depression class; Δr^2 = change in r^2 .

For total physical aggression, when mothers' current depressive symptoms were entered in the first step of the model, the prediction from prenatal depressive symptoms approached significance, whilst mothers' current depression did not make an independent contribution. This was also the case when the contribution from the high postnatal class, after controlling for current depression, was examined. In the case of physical aggression towards parents, the prediction from prenatal depressive symptoms again approached significance after controlling for mothers' current depression, whilst mothers' current depression did not making a significant independent contribution. When postnatal class was examined, both current depression and the high postnatal class made contributions that approached significance, with a significant overall model. Given that the initial bivariate associations between mothers' current depression and these child physical aggression outcomes only approached significance, these results could suggest that ratings on the Severe Aggression Measure are less susceptible to the potential biasing effects of current depressive symptoms. This is discussed further in Section 4.2.1.3.2.

3.1.3.2.3 Summary: The contribution of mothers' pre, postnatal and current depression to children's physical aggression. Both mothers' pre and postnatal depression symptoms significantly predicted children's aggression interview-rated total physical aggression and aggression towards parents when examined in separate regression models. As with the predictions to CBCL aggression, when entered into the same model, neither made a significant independent prediction. Thus, the contributions from pre and postnatal depressive symptoms could not be conclusively disentangled. Potential interpretations of this result are considered in the discussion. After controlling for mothers' current

depression, the contributions of pre and postnatal depressive symptoms approached significance for aggression towards adults, whilst current depression did not predict. For aggression towards parents, the prediction from prenatal depressive symptoms again approached significance whilst current depression did not. When postnatal class was examined, both current depression and the high postnatal class made contributions that approached significance. Interpretations of these results are considered in Section 4.2.1.2 of the discussion.

3.1.3.2.4 The contribution of confounding variables to associations between mothers' depression and children's physical aggression. As with children's CBCL aggression, the next step in analyses was to examine whether postnatal depression class predicted independently of potential confounders. This was also tested for prenatal and current depressive symptoms. As discussed in Section 3.1.3.1.4, this was done to examine whether any of the original associations found between pre, post or current depression were better accounted for by psychosocial factors commonly associated with depression.

The potential confounders of prenatal and postnatal depression were entered at the first step of two multiple linear regressions as a group, followed by the relevant maternal depression variable. Results of analyses to both total physical aggression and aggression to parents after controlling for the relevant confounders are presented in Table 3.1.3.2.4a and Table 3.1.3.2.4b.

Table 3.1.3.2.4a

Prediction to Total Physical Aggression and Aggression towards Parents from Mothers' Prenatal Depression Controlling for Potential Confounders

| Dependent Variable: | Total Physical Aggression (<i>n</i> =236) | | Aggression to Parents (<i>n</i> =236) | |
|--|---|----------|---|----------|
| Model: | β [95% CI] | <i>p</i> | β [95% CI] | <i>p</i> |
| Prenatal depression & confounders | | | | |
| Step 1 | | | | |
| Age | -.05 [-.09,.04] | .471 | .01 [-.03,.04] | .831 |
| Smoking | .17 [.28,2.47] | .014 | .11 [-.13,1.03] | .126 |
| Cohabitation | -.15 [-2.68,.22] | .021 | -.16 [-1.44,-.15] | .016 |
| Mother to partner psychological abuse | .01 [-.16,.18] | .916 | .01 [-.09,.09] | .921 |
| Partner to mother psychological abuse | .18 [.05,.38] | .011 | .18 [.02,.19] | .015 |
| Overall model: | $r^2 = .12, p < .001$ | | $r^2 = .08, p = .003$ | |
| Step 2 | | | | |
| Age | -.05 [-.09,.04] | .469 | .02 [-.03,-.04] | .789 |
| Smoking | .17 [.28,2.47] | .014 | .10 [-.14,1.03] | .132 |
| Cohabitation | -.15 [-2.72,.20] | .023 | -.15 [-1.40,-.09] | .026 |
| Mother to partner psychological abuse | .01 [-.17,.19] | .901 | .01 [-.10,-.09] | .909 |
| Partner to mother psychological abuse | .18 [.05,.38] | .013 | .16 [.01,.19] | .027 |
| Prenatal depression | -.01 [-.10,.09] | .932 | .06 [-.03,.07] | .438 |
| Overall model: | $r^2 = .12, \Delta r^2 = -, p < .001$ | | $r^2 = .08, \Delta r^2 = -, p = .003$ | |

Note. All analyses performed using multiple linear regression; 95% CI = 95% confidence interval of β ; Age= maternal age at 20 weeks gestation (point of consent); Smoking= smoking status during pregnancy; Cohabitation= cohabitation status at 32-36 weeks gestation; Mother to partner psychological abuse= mother to partner psychological abuse score at 20 weeks gestation; Partner to mother psychological abuse= partner to mother psychological abuse score at 20 weeks gestation; Prenatal depression= mothers' depression score at 32-36 weeks gestation; Δr^2 = change in r^2 .

Table 3.1.3.2.4b

Prediction to Total Physical Aggression and Aggression towards Parents from Mothers' Postnatal Depression Class Controlling for Potential Confounders

| Dependent Variable: | Total Physical Aggression (<i>n</i> =224) | | Aggression to Parents (<i>n</i> =224) | |
|---------------------------------------|---|----------|---|----------|
| Model: | β [95% CI] | <i>p</i> | β [95% CI] | <i>p</i> |
| Postnatal class & confounders | | | | |
| Step 1 | | | | |
| Smoking | .13 [-.07,2.06] | .067 | .07 [-.29,.88] | .317 |
| Mother to partner psychological abuse | .19 [.06,.53] | .014 | .16 [.01,.26] | .054 |
| Partner to mother psychological abuse | .13 [-.02,.36] | .084 | .13 [-.02,.19] | .109 |
| Overall model: | $r^2 = .13$ $p < .001$ | | $r^2 = .08$, $p < .001$ | |
| Step 2 | | | | |
| Smoking | .10 [-.27,1.89] | .142 | .04 [-.43,.75] | .594 |
| Mother to partner psychological abuse | .19 [.06,.53] | .015 | .17 [.01,.27] | .038 |
| Partner to mother psychological abuse | .10 [-.06,.32] | .181 | .10 [-.04,.17] | .228 |
| High postnatal class | .14 [-.06,2.17] | .063 | .11 [-.17,1.04] | .153 |
| Low postnatal class | .01 [-.83,.86] | .964 | -.08 [-.70,.21] | .290 |
| Overall model: | $r^2 = .14$, $\Delta r^2 = .01$, $p < .001$ | | $r^2 = .14$, $\Delta r^2 = .01$, $p < .001$ | |

Note. All analyses performed using multiple linear regression; 95% CI = 95% confidence interval of β ; Smoking= smoking status during pregnancy; Mother to partner psychological abuse= mother to partner psychological abuse postnatal score; Partner to mother psychological abuse= partner to mother psychological abuse postnatal score; High postnatal class= Binary variable representing membership of the high postnatal depression class; Low postnatal class= Binary variable representing membership of the low postnatal depression class; Δr^2 = change in r^2 .

When the confounders associated with mothers' prenatal depression were entered in the first step of the regression model, mothers' smoking status during pregnancy, cohabitation status and prenatal psychological abuse (from partner to mother) significantly predicted children's total physical aggression. Mothers' smoking status and levels of prenatal psychological abuse (from partner to mother) predicted physical aggression towards parents. The prediction from prenatal depression at step two was very small and not significant, whilst the prediction from the confounders remained.

In the second model examining the contribution of confounders relevant to mothers' postnatal depression class, postnatal mother to partner levels of psychological abuse significantly predicted total physical aggression. Contributions from mothers' smoking status during pregnancy and partner to mother psychological abuse approached significance. For aggression towards parents, only mother to partner psychological abuse approached significance. When postnatal depression class was entered at the second step, the contribution of the high class to children's total physical aggression approached significance. The prediction from mother to partner psychological abuse scores was not reduced and remained significant. For aggression towards parents, only mother to partner psychological abuse was a significant predictor at the second step.

As presented in Table 3.1.3.2.4c, when the confounders associated with mothers' current depression were entered in the first step, postnatal psychological abuse from mother to partner significantly predicted both total physical aggression and aggression towards parents. The prediction from postnatal partner to mother psychological abuse approached significance. The contribution of mother to

partner psychological abuse was not reduced in predicting total physical aggression when current depression was entered into the model. The contribution from partner to mother psychological abuse was slightly attenuated. For aggression towards parents, the prediction from mother to partner psychological abuse was very slightly reduced and the contribution of current depression approached significance. The contribution from father to mother psychological abuse no longer approached significance.

Table 3.1.3.2.4c

Prediction to Total Physical Aggression and Aggression towards Parents from Mothers' Current Depression Controlling for Potential Confounders

| Dependent Variable: | Total Physical Aggression (<i>n</i> =224) | | Aggression to Parents (<i>n</i> =224) | |
|--|---|----------|---|----------|
| Model: | β [95% CI] | <i>p</i> | β [95% CI] | <i>p</i> |
| Step 1 | | | | |
| Mother to partner psychological abuse | .22 [.11,.57] | .005 | .19 [.03,.28] | .017 |
| Partner to mother psychological abuse | .15 [-.01,.38] | .055 | .13 [-.02,.19] | .096 |
| Overall model: | $r^2 = .11$ $p < .001$ | | $r^2 = .08$ $p < .001$ | |
| Step 2 | | | | |
| Mother to partner psychological abuse | .22 [.09,.56] | .006 | .18 [-.03,.18] | .024 |
| Partner to mother psychological abuse | .13 [-.03,.36] | .093 | .11 [-.03,.18] | .180 |
| Current depression | .08 [-.03,.13] | .219 | .12 [-.01,.08] | .068 |
| Overall model: | $r^2 = .12$, $\Delta r^2 = .01$, $p < .001$ | | $r^2 = .09$, $\Delta r^2 = .01$, $p < .001$ | |

Note. All analyses performed using multiple linear regression; 95% CI = 95% confidence interval of β ; Mother to partner psychological abuse= mother to partner psychological abuse postnatal score; Partner to mother psychological abuse= partner to mother psychological abuse postnatal score; Current depression = Mothers' depression score at time of reporting on their child's aggression; Δr^2 = change in r^2 .

3.1.3.2.5 Summary: The Contribution of Confounding Variables to Associations between Mothers' Pre, Postnatal, and Current Depression and children's physical aggression. To summarise, mothers' prenatal depression did not make an independent contribution to children's total physical aggression or aggression towards parents after controlling for confounders. With confounders controlled for and mothers' postnatal depression class entered into the model, membership of the high class approached significance for its contribution to children's total levels of physical aggression only. In contrast, postnatal mother to partner psychological abuse significantly predicted both children's total aggression and aggression to parents, whilst the other confounders examined did not. Finally, when confounders and mothers' current depression were examined in relation to the physical aggression outcomes, mothers' current depression did not contribute to children's total physical aggression, whilst postnatal mother to partner psychological abuse was a significant predictor. Mother to partner psychological abuse was also a significant predictor of aggression towards parents, whilst the contribution of mothers' current depression approached significance.

3.1.3.3 Overall summary: Does mothers' postnatal depression predict child aggression? To fully address the question of whether mothers' postnatal depression predicted children's aggression, the contribution of prenatal and current depression symptoms along with confounders were also examined. This was done to systematically test whether mothers' postnatal depressive symptoms predicted aggression independently of prenatal or current depression and potential confounders.

When first examined in separate regression models, membership of the high postnatal depression symptoms class made small but significant contributions to children's CBCL aggression and physical aggression summed across domains and towards parents, as measured using the Severe Aggression Measure. However, prenatal and current depression symptoms also predicted the aggression outcomes. When pre and postnatal symptoms were examined in the same model neither made a significant independent contribution. Possible interpretations of this result are addressed in the discussion (Section 4.2.1.3.1). Neither pre- nor postnatal depression predicted CBCL aggression after mothers' current depression was controlled for. This may suggest that current mood was having a biasing effect upon mothers' reports. However, there are alternative possible explanations and this is discussed in Section 4.2.1.3.2. Current depression did not predict physical aggression across domains measured on the Severe Aggression Measure. For aggression towards parents, both current depression and membership of the high depressive symptoms class made small contributions approaching significance. This may suggest that the Severe Aggression Measure is less influenced by current maternal mood or that current depression predicts more general aggressive problems as measured on the CBCL, rather than physical aggression.

When potential confounding variables were controlled for, mothers' pre or postnatal depression did not significantly predict CBCL aggression or physical aggression. In contrast, levels of psychological abuse made a significant independent contribution. The associations between mother's current depression remained along with that of psychological abuse for predictions to children's CBCL aggression. For predictions to physical aggression, mothers' smoking and cohabitation status during pregnancy, along with levels of partner to mother

psychological abuse, significantly predicted children's total physical aggression scores. For children's physical aggression towards parents, partner to mother psychological abuse significantly predicted aggression, with the contribution from mothers' cohabitation status and current depression approaching significance.

3.2 Mothers' Personality Dysfunction and Children's Aggression

Hypothesis two

Mothers' personality dysfunction as indexed by higher levels of DSM antisocial and borderline personality disorder symptoms will be associated with higher levels of aggression in children aged 2.5 years.

Hypothesis three

Mothers' personality dysfunction will predict levels of aggression in children aged 2.5 years independently of maternal depression.

This section begins with the results of bivariate analyses. Second, analyses performed in multiple regression to examine the contribution of mothers' personality dysfunction to children's aggression are described, followed, third by analyses performed to compare the contributions of mothers' personality dysfunction and that of depression considered in the previous chapter. As discussed in the Method, mothers' personality dysfunction, assessed using the SCID II, was treated dimensionally. Descriptive statistics for the personality dysfunction variables are presented in Appendix 5.

3.2.1 Bivariate associations. As in Section 3.1.2, all bivariate associations were examined using non-parametric statistics.

3.2.1.1 Associations between mothers' personality dysfunction and depression. Table 3.2.1.1 shows associations between mothers' antisocial and borderline personality dysfunction and their depression symptoms. Associations

were small to moderate, with the largest between mothers' borderline personality dysfunction and depression symptoms.

Table 3.2.1.1

Associations between Mothers' Antisocial and Borderline Personality Dysfunction and Depression

| Variable | 1. | 2. | 3. | 4. | 5. |
|---------------|------|-------|-------|-------|-------|
| 1. Antisocial | 1.00 | .43 | .29 | .16 | .14 |
| <i>p</i> = | | <.001 | <.001 | .013 | .034 |
| <i>n</i> = | | 243 | 242 | 243 | 240 |
| 2. Borderline | | 1.00 | .51 | .32 | .34 |
| <i>p</i> = | | | <.001 | <.001 | <.001 |
| <i>n</i> = | | | 244 | 245 | 242 |
| 3. Prenatal | | | 1.00 | .50 | .37 |
| <i>p</i> = | | | | <.001 | <.001 |
| <i>n</i> = | | | | 245 | 242 |
| 4. Postnatal | | | | 1.00 | .48 |
| <i>p</i> = | | | | | <.001 |
| <i>n</i> = | | | | | 243 |
| 5. Current | | | | | 1.00 |
| <i>p</i> = | | | | | |
| <i>n</i> = | | | | | |

Note. Spearman's correlations used for all; Antisocial = mothers' antisocial personality dysfunction score; Borderline = mothers' borderline personality dysfunction score; Prenatal = mothers' depression score at 32-36 weeks gestation; Postnatal = ordinal variable representing mothers' most likely class membership from three-class trajectory model; Current = Mothers' depression score at time of reporting on their child's aggression.

3.2.1.2 Associations between mothers' personality dysfunction and potential confounders. Bivariate associations between mothers' antisocial and borderline dysfunction scores and the potential confounders are presented in Table 3.2.1.2. Mothers' personality dysfunction was measured in the prenatal period, so prenatal psychological abuse scores were used in analyses. All potential confounders were significantly associated with the antisocial and borderline scores and were retained in subsequent analyses.

Mothers with higher antisocial and borderline personality dysfunction scores were younger and more deprived. They were more likely to have smoked during pregnancy, to be single at 20 weeks gestation and had left education at a younger age. Further, mothers with higher antisocial and borderline personality dysfunction scores reported higher levels of psychological abuse in their relationships during pregnancy. All r_s values were small to moderate. Based on these results, all potential confounding variables were included in relevant subsequent analyses

Table 3.2.1.2

*Correlations between Mothers' Personality Dysfunction and Potential**Confounders*

| Variables: | Antisocial | Borderline |
|-------------------------|------------|------------|
| Age | -.28 | -.27 |
| <i>p</i> = | <.001 | <.001 |
| <i>n</i> = | 242 | 244 |
| Deprivation | .27 | .16 |
| <i>p</i> = | <.001 | .014 |
| <i>n</i> = | 243 | 245 |
| Smoking | .34 | .27 |
| <i>p</i> = | <.001 | <.001 |
| <i>n</i> = | 239 | 241 |
| Cohabitation | -.24 | -.28 |
| <i>p</i> = | <.001 | <.001 |
| <i>n</i> = | 242 | 245 |
| Education | -.31 | -.21 |
| <i>p</i> = | <.001 | .001 |
| <i>n</i> = | 243 | 245 |
| Mother to Partner Abuse | .18 | .30 |
| <i>p</i> = | .004 | <.001 |
| <i>n</i> = | 243 | 245 |
| Partner to Mother Abuse | .26 | .39 |
| <i>p</i> = | <.001 | <.001 |
| <i>n</i> = | 243 | 245 |

Note. Spearman's correlations used for all; Antisocial = mothers' antisocial personality dysfunction score; Borderline = mothers' borderline personality dysfunction score; Age= mothers' age at 20 weeks gestation (point of consent); Deprivation= Index of Multiple Deprivation score at 20 weeks gestation; Smoking = binary variable representing smoking status during pregnancy; Cohabitation = binary variable indicating cohabitation status at 32-36 weeks gestation; Education = mothers' age at leaving full time education; Mother to partner abuse = mother to partner psychological abuse score; Partner to mother abuse= partner to mother psychological abuse score.

3.2.1.3 Associations between mothers' personality dysfunction and children's aggression at 30 months.

3.2.1.3.1 Mothers' antisocial and borderline personality dysfunction and CBCL aggression. There were significant positive associations between both mothers' antisocial and borderline personality dysfunction and children's CBCL aggression (Table 3.2.1.3.1).

Table 3.2.1.3.1

Correlations between Mothers' Antisocial and Borderline Personality Dysfunction and CBCL Aggression

| Variables | CBCL Aggression |
|------------|-----------------|
| Antisocial | .21 |
| <i>p</i> = | .001 |
| <i>n</i> = | 243 |
| Borderline | .34 |
| <i>p</i> = | <.001 |
| <i>n</i> = | 245 |

Note. Spearman's correlations used for all; Antisocial = mothers' antisocial personality dysfunction score; Borderline = mothers' borderline personality dysfunction score.

3.2.1.3.2 Mothers' antisocial and borderline personality dysfunction and children's physical aggression. Both mothers' antisocial and borderline personality dysfunction were associated with total levels of children's physical aggression measured using the physical aggression interview (Table 3.2.1.3.2).

Table 3.2.1.3.2

Correlations between Mothers' Antisocial and Borderline Personality Dysfunction and Children's Physical Aggression

| Variables: | Total Aggression | Aggression Towards Adults | | Aggression towards Children | |
|------------|------------------|---------------------------|--------------|-----------------------------|----------------|
| | | Parents | Other adults | Family children | Other children |
| Antisocial | .16 | .10 | .17 | .11 | .07 |
| <i>p</i> = | .011 | .110 | .008 | .079 | .285 |
| <i>n</i> = | 243 | 243 | 243 | 243 | 243 |
| Borderline | .21 | .18 | .18 | .21 | -.04 |
| <i>p</i> = | .001 | .006 | .005 | .001 | .520 |
| <i>n</i> = | 243 | 243 | 243 | 243 | 243 |

Note. Spearman's correlations used for all; Antisocial = mothers' antisocial personality dysfunction score; Borderline = mothers' borderline personality dysfunction score.

As also shown in Table 3.2.1.3.2, for children's physical aggression towards adults, each aspect of mothers' personality dysfunction showed associations with aggression towards parents and other adults that either met the $p < .05$ threshold or approached significance. In the case of aggression towards children, mothers' personality dysfunction was significantly associated with their child's aggression towards family children but not towards other children.

3.2.2 Does mothers' antisocial and borderline personality dysfunction predict child aggression? In this section, the main analyses performed to test hypotheses two and three are presented. The section is structured to present results relating to CBCL aggression first, followed by prediction to the physical

aggression interview domains that showed bivariate associations with mothers' personality dysfunction (total aggression, aggression towards parents, other adults and family children). The contributions from borderline and antisocial traits were first examined separately and then their independent contribution was tested.

3.2.2.1 Predictions to CBCL aggression. As previously discussed in Section 3.1.3, CBCL aggression scores were transformed using Ln (10 +) to address the skew of the data. The results of regression models examining the prediction from antisocial and borderline symptom scores separately, then both jointly to examine their independent contribution to CBCL aggression are presented in Table 3.2.2.1.

Table 3.2.2.1

Prediction to CBCL Aggression from Mothers' Antisocial and Borderline Personality Dysfunction

| Dependent Variable: CBCL Aggression | | |
|-------------------------------------|-----------------------|-------|
| Model | β [95%CI] | p |
| Antisocial ($n=243$) | .27 [.01,.03] | <.001 |
| Overall model: | $r^2 = .07, p < .001$ | |
| Borderline ($n=245$) | .35 [.02,.03] | <.001 |
| Overall model: | $r^2 = .13, p < .001$ | |
| Antisocial & borderline($n=243$) | | |
| Antisocial | .10 [-.03,.02] | .168 |
| Borderline | .30 [.01, .03] | <.001 |
| Overall model: | $r^2 = .13, p < .001$ | |

Note. All analyses performed using multiple linear regression; 95% CI = 95% confidence interval of β ; Antisocial = mothers' antisocial personality dysfunction score; Borderline = mothers' borderline personality dysfunction score.

When examined in separate models, the predictions from mothers' antisocial and borderline personality dysfunction to children's aggressive behaviour were moderate and highly significant. Mothers' antisocial personality dysfunction accounted for 7% of variance in children's CBCL aggression scores whilst borderline dysfunction accounted for 13% variance. When the contributions

of each were examined in the same model, the prediction from mothers' antisocial personality dysfunction was clearly reduced and became non-significant ($p = .168$). In contrast, mothers' borderline traits made a highly significant independent contribution to children's aggressive behaviour. Interpretations of this result are discussed in Section 4.2.2.3. On the basis of these results, only mothers' borderline personality dysfunction scores were retained for subsequent analyses with CBCL aggression concerning the role of mothers' depression and then confounders.

3.2.2.1.1 Does mothers' borderline personality dysfunction account for associations between depression and children's CBCL aggression? To address hypothesis three, the next step in analyses was to examine whether the associations found between mothers' depression and children's aggressive behaviour in the initial regression models presented in Section 3.1.3.1, were accounted for by mothers' borderline personality dysfunction. This was done for prenatal, postnatal class and current depression in three separate regression models to provide a thorough investigation of the relative contribution of each aspect of mothers' depression and borderline personality dysfunction. Results are presented in Table 3.2.2.1.1. The relevant depression variable for each analysis was entered at step 1, and the table shows the outcome of step 2 with the borderline variable added.

Table 3.2.2.1.1

Prediction to Children's CBCL Aggression from Mother's Borderline Personality Dysfunction Controlling for Mothers' Prenatal, Postnatal or Current Depression

| Dependent Variable | CBCL Aggression | |
|--|--|----------|
| Model | β [95%CI] | <i>p</i> |
| Prenatal depression & borderline (<i>n</i> =244) | | |
| Prenatal depression | -.08 [-.01,.01] | .261 |
| Borderline | .40 [.02,.04] | <.001 |
| Overall model: | $r^2=.13$ $\Delta r^2 = .11$, $p <.001$ | |
| Postnatal class & borderline (<i>n</i> =245) | | |
| High postnatal class | .06 [-.07,.15] | .456 |
| Low postnatal class | .04 [-.05,.10] | .530 |
| Borderline | .34 [.02,.03] | <.001 |
| Overall model: | $r^2=.13$ $\Delta r^2 = .10$, $p <.001$ | |
| Current depression & borderline (<i>n</i> =242) | | |
| Current depression | .15 [.01,.02] | .020 |
| Borderline | .30 [.01,.03] | <.001 |
| Overall model: | $r^2=.15$ $\Delta r^2 = .08$, $p <.001$ | |

Note. All analyses performed using multiple linear regression; 95% CI = 95% confidence interval of β Prenatal depression = mothers' depression score at 32-36 weeks gestation; High postnatal class = Binary variable representing membership of the high postnatal depression class; Low postnatal class = Binary variable representing membership of the low postnatal depression class; Current depression = Mothers' depression score at time of reporting on their child's aggression at 27-30 months; Borderline = mothers' borderline personality dysfunction score.

Neither mothers' prenatal depression nor postnatal depression class membership made a significant contribution to children's aggressive behaviour when mothers' borderline personality dysfunction was added to the regression models. The addition of mothers' borderline personality dysfunction clearly reduced the initial associations reported in Section 3.1.3.1 and they became non-significant. In the case of mothers' current depression, both made a significant prediction to children's aggressive behaviour although the addition of mothers' borderline personality dysfunction at step 2 reduced the association between mothers' current depression and children's CBCL aggression from $\beta = .25$ to $.15$. Mothers' borderline personality dysfunction accounted for an additional 8% of variance when entered in to the model with mothers' current depression. These results may suggest an additive effect for mothers' borderline personality dysfunction and mothers' depression, as when examined jointly they accounted for more variance than when either was considered separately. Potential interpretations of these results are considered in the discussion.

3.2.2.1.2 The contribution of confounding variables to associations between mothers' personality dysfunction and children's CBCL aggression. As presented in Section 3.2.1.2, mothers' borderline personality dysfunction was significantly associated with all of the potential confounders considered in the study. Although in the preceding analyses, mothers' borderline symptoms significantly predicted children's CBCL aggression, it was possible that the associations could be better explained by the role of confounders. Therefore, the prediction from mothers' borderline personality dysfunction to children's aggressive behaviour was tested with these confounders controlled for in the first step of the regression model. Results are shown in Table 3.2.2.1.2. To aid brevity

the results of step 2 only are presented, the confounders were entered as a group at step 1.

Table 3.2.2.1.2

*Prediction to CBCL Aggression from Borderline Personality Dysfunction
Controlling for Potential Confounders (n=240)*

| Dependent Variable | CBCL Aggression | |
|---------------------------------------|-------------------------------------|----------|
| | β [95%CI] | <i>p</i> |
| Borderline & confounders | | |
| Step 2 | | |
| Age | -.08 [-.01,.01] | .267 |
| Deprivation | .03 [-.01,.01] | .635 |
| Smoking | .01 [-.10,.12] | .884 |
| Cohabitation | .02 [-.10,.14] | .742 |
| Education | .05 [-.10,.01] | .499 |
| Mother to partner psychological abuse | .04 [-.01,.02] | .578 |
| Partner to mother psychological abuse | .06 [-.01,.02] | .415 |
| Borderline | .31 [.01,.03] | <.001 |
| Overall model: | $r^2=.14 \Delta r^2 = .07, p <.001$ | |

Note. All analyses performed in multiple linear regression; Age= mothers' age at 20 weeks gestation (point of consent); Deprivation= Index of Multiple Deprivation score at 20 weeks gestation; Smoking = binary variable representing smoking status during pregnancy; Cohabitation = binary variable indicating cohabitation status at 32-36 weeks gestation; Education = mothers' age at leaving full time education; Mother to partner abuse = prenatal mother to partner psychological abuse score; Partner to mother abuse= prenatal partner to mother psychological abuse score.

In the first step of the model, only levels of prenatal partner to mother psychological abuse significantly predicted children's aggressive behaviour. However, at the second step, mothers' borderline personality dysfunction accounted for this association. The model showed that associations found between mothers' personality dysfunction and children's CBCL aggression were not better accounted for by any of confounders.

3.2.2.1.3 Summary: The contribution from mothers' personality dysfunction to children's CBCL aggression. Mothers' borderline personality dysfunction significantly predicted children's CBCL aggression scores, independently of mothers' antisocial personality dysfunction. Whilst mother's antisocial personality dysfunction significantly predicted CBCL aggression in the initial regression model, this did not remain when the two aspects of personality dysfunction were examined together. Further, mothers' borderline personality dysfunction accounted for the earlier predictions from mothers' prenatal and postnatal depression to children's aggressive behaviour. Both mothers' borderline personality dysfunction and their current depression made significant contributions to CBCL aggression. The associations between mothers' personality dysfunction and children's aggressive behaviour were not better accounted for by confounders that had showed bivariate associations with mothers' borderline personality dysfunction. In the next section, predictions from mothers' personality dysfunction to children's physical aggression measured using the Severe Aggression Measure are presented.

3.2.2.2 Predictions to physical aggression. As shown in Section 3.2.1.3.2, mothers' antisocial personality dysfunction was significantly associated with children's total physical aggression across domains and aggression towards other

adults. Mothers' borderline personality dysfunction was associated with children's total physical aggression and aggression towards parents, other adults and family children. In view of this, predictions to these aggression interview outcomes were examined. As described in the method, none of the aggression interview variables were transformed. Assumption checks showed that two were acceptable for use in multiple regression and the scores for aggression towards other adults were collapsed to address the distribution. As with predictions to CBCL aggression, the contribution of each maternal personality variable was examined separately and then jointly. The results of the initial separate regression models are presented in Table 3.2.2.2.

Table 3.2.2.2 Prediction to Children's Physical Aggression from Mothers' Antisocial and Borderline Personality Dysfunction

| Dependent Variable: | Total Aggression | Aggression to Parents | Aggression to Other Adults | Aggression to Family Children |
|-------------------------|--|--|--|--|
| Model | β [95%CI] p | β [95%CI] p | β [95%CI] p | β [95%CI] p |
| Antisocial | .21 [.06, .24] .001 | | .15 [.01, .06] .024 | |
| Overall model: | $r^2 = .04, p = .001$ ($n = 244$) | | $r^2 = .02, p = .024$ ($n = 244$) | |
| Borderline | .22 [.08, .27] <.001 | .21 [.03, .13] .001 | .14 [.01, .06] .037 | .16 [.01, .10] .010 |
| Overall model: | $r^2 = .04, p = .001$ ($n = 243$) | $r^2 = .04, p = .001$ ($n = 243$) | $r^2 = .02, p = .037$ ($n = 243$) | $r^2 = .03, p = .010$ ($n = 243$) |
| Antisocial & borderline | | | | |
| Antisocial | .13 [-.02, .19] .103 | | .08 [-.01, .05] .200 | |
| Borderline | .15 [-.01, .22] .061 | | .10 [-.02, .05] .330 | |
| Overall model: | $r^2 = .06, p = .001$ ($n = 243$) | | $r^2 = .02, p = .050$ ($n = 243$) | |

Note. All analyses performed using multiple linear regression; 95% CI = 95% confidence interval of β ; Antisocial = mothers' antisocial personality dysfunction score; Borderline = mothers' borderline personality dysfunction score.

When first examined in separate models, mothers' antisocial personality dysfunction significantly predicted children's total aggression across domains and aggression towards other adults. The prediction from mothers' borderline personality dysfunction to children's total aggression and aggression in each of the three domains under study was also significant. The amount of variance in children's aggression accounted for by mothers' personality dysfunction was small. When entered into the same regression model for the relevant aggression outcomes that had both been associated with mothers' antisocial and borderline personality dysfunction, mothers' borderline personality dysfunction appeared to be contributing over mothers' antisocial personality dysfunction although neither contribution was significant at the $p < .05$ level and the contribution from mothers' antisocial personality dysfunction was just over the $< .10$ threshold applied in the study. Neither mothers' antisocial or personality dysfunction contributed to children's aggression towards other adults when examined in the same model, although the overall model approached significance. This can suggest an unreliable model and is considered in interpretation of the results.

3.2.2.2.1 Does mothers' borderline personality dysfunction account for associations between mothers' depression and children's physical aggression? As in Section 3.2.2.3, the next step in analyses was to examine whether mothers' personality dysfunction accounted for initial associations found between mothers' depression and children's physical aggression. Results are presented in Table 3.2.2.2.1. As presented in Section 3.1.3.2, mothers' prenatal, postnatal and current depression was associated with children's total physical aggression across domains and aggression towards parents. Therefore, predictions to these dependent variables were tested. The relevant depression variable for each analysis was entered at step 1, and the table shows the outcome of step 2 with the borderline variable added.

Table 3.2.2.2.1

Prediction to Children's Physical Aggression from Mothers' Borderline Personality Dysfunction controlling for mothers' pre, postnatal and current depression

| Dependent Variable | Total Physical Aggression | | | Aggression to Parents | | |
|---|---------------------------|-------------------------------------|-------|-------------------------------------|------|--|
| | Model | β [95%CI] | p | β [95%CI] | p | |
| Prenatal & borderline (n= 241) | | | | | | |
| Prenatal depression | | .02 [-.09,.11] | .785 | .05 [-.03,.07] | .491 | |
| Borderline | | .22 [.05,.28] | .005 | .18 [.01,.13] | .024 | |
| Overall model: | | $r^2=.05 \Delta r^2 = .03, p =.001$ | | $r^2=.05 \Delta r^2 = .02, p =.004$ | | |
| Postnatal & borderline (n=243) | | | | | | |
| High postnatal class | | .12 [.20,2.14] | .102 | .12 [-.13,1.08] | .125 | |
| Low postnatal class | | -.03 [1.01,.66] | .682 | -.08 [-.69,.18] | .246 | |
| Borderline | | .19 [.04,.24] | .006 | .16 [.01,.12] | .019 | |
| Overall model: | | $r^2=.07 \Delta r^2 = .03, p <.001$ | | $r^2=.07 \Delta r^2 = .02, p =.001$ | | |
| Current & borderline | | | | | | |
| Current | | .01 [-.08,.08] | .927 | .09 [-.02,.07] | .207 | |
| Borderline | | .24 [.08,.21] | <.001 | .19 [.02,.13] | .006 | |
| Overall model: | | $r^2=.06 \Delta r^2 = .05, p =.001$ | | $r^2=.05 \Delta r^2 = .03, p =.001$ | | |

Note. All analyses performed using multiple linear regression; 95% CI = 95% confidence interval of β Prenatal depression = mothers' depression score at 32-36 weeks gestation; High postnatal class = Binary variable representing membership of the high postnatal depression class; Low postnatal class = Binary variable representing membership of the low postnatal depression class; Current depression = Mothers' depression score at time of reporting on their child's aggression at 27-30 months; Borderline = mothers' borderline personality dysfunction score.

After controlling for the prediction from mothers' borderline personality dysfunction, neither mothers' pre, postnatal or current depression symptoms were significantly associated with children's physical aggression. Instead, mothers' borderline personality dysfunction was a significant predictor of both physical aggression outcomes.

3.2.2.2.2 The contribution of confounding variables to associations between mothers' personality dysfunction and children's physical aggression. In line with the approach taken for examining predictions from mothers' depression, the contribution of potential confounders relevant to mothers' personality dysfunction was examined. Analyses were performed for predictions from mothers' antisocial personality dysfunction to children's aggression towards other adults (Table 3.2.2.2.2a) and then for predictions from mothers' borderline personality dysfunction to children's aggression across domains and aggression towards parents, other adults and family children (Table 3.2.2.2.2b). To aid clarity in viewing the tables, just the second step of the regression models are presented. At the first step all confounders that had showed associations with mothers' personality dysfunction (identified in Section 3.2.1.2) were entered.

Table 3.2.2.2a

Prediction to Children's Physical Aggression from Mothers' Antisocial Personality Dysfunction Controlling for Confounders (n=234)

| Dependent Variable | Aggression to Other Adults | |
|---------------------------------------|---|----------|
| | β [95%CI] | <i>p</i> |
| Antisocial & confounders | | |
| Age | -.08 [-.03,.01] | .295 |
| Deprivation | .07 [-.01,.01] | .299 |
| Smoking | .12 [-.04,.62] | .087 |
| Cohabitation | -.16 [-.85,-.08] | .018 |
| Education | -.05 [-.03,.01] | .460 |
| Mother to partner psychological abuse | -.10 [-.09,.02] | .168 |
| Partner to mother psychological abuse | .07 [-.03,.07] | .346 |
| Antisocial | .04 [-.02,.04] | .549 |
| Overall model: | $r^2 = .11$ $\Delta r^2 = .01$, $p = .001$ | |

Note. All analyses performed using multiple linear regression; Age= mothers' age at 20 weeks gestation (point of consent); Deprivation= Index of Multiple Deprivation score at 20 weeks gestation; Smoking = binary variable representing smoking status during pregnancy; Cohabitation = binary variable indicating cohabitation status at 32-36 weeks gestation; Education = mothers' age at leaving full time education; Mother to partner abuse = prenatal mother to partner psychological abuse score; Partner to mother abuse= prenatal partner to mother psychological abuse score; Antisocial = mothers' antisocial personality dysfunction score; Δr^2 = change in r^2 .

Table 3.2.2.2b Prediction to Children's Physical Aggression from Mothers' Borderline Personality Dysfunction Controlling for Confounders (n=238)

| Dependent Variable: | Total Aggression | | | Aggression to Parents | | | Aggression to Other Adults | | | Aggression to Family Children | | |
|---------------------------------------|--------------------|------------------------------|--|-----------------------|------------------------------|--|----------------------------|----------------------------|--|-------------------------------|------------------------------|--|
| | β [95%CI] | <i>p</i> | | β [95%CI] | <i>p</i> | | β [95%CI] | <i>p</i> | | β [95%CI] | <i>p</i> | |
| Age | .04 [-.09,.05] | .556 | | .04 [-.03,.05] | .621 | | -.08 [-.03,.01] | .266 | | -.01 [-.03,.03] | .928 | |
| Deprivation | -.01 [-.02,.02] | .942 | | .01 [-.01,.01] | .848 | | .08 [-.01,.01] | .289 | | .05 [-.01,.01] | .507 | |
| Smoking | .16 [.20,2.46] | .021 | | .09 [.21,.99] | .198 | | .13 [-.04,.63] | .079 | | .13 [-.05, 1.03] | .072 | |
| Cohabitation | -.11 [-2.35,.28] | .121 | | -.12 [-1.29,.09] | .089 | | -.17 [-.87,-.08] | .019 | | .01 [.56, .69] | .842 | |
| Education | .02 [-.09,.06] | .776 | | -.05 [-.05,.03] | .500 | | -.05 [-.03,.01] | .466 | | .01 [-.03,.04] | .909 | |
| Mother to partner psychological abuse | .03 [-.14,.21] | .679 | | -.01 [-.09,.09] | .993 | | -.10 [-.09,.01] | .149 | | -.03 [-.10,.06] | .644 | |
| Partner to mother psychological abuse | .12 [-.03,.32] | .098 | | .14 [-.01,.18] | .071 | | .07 [-.03,.08] | .340 | | .07 [-.04,.12] | .351 | |
| Borderline | .09 [-.04,.18] | .210 | | .10 [-.02,.10] | .181 | | .02 [-.03,.04] | .836 | | .10 [-.02,.09] | .190 | |
| Overall model: | $r^2=.12$ | $\Delta r^2 = .01, p < .001$ | | $r^2=.09$ | $\Delta r^2 = .01, p = .005$ | | $r^2=.11$ | $\Delta r^2 = -, p = .001$ | | $r^2=.06$ | $\Delta r^2 = .01, p = .190$ | |

Note. All analyses performed using multiple linear regression; Age= mothers' age at 20 weeks gestation (point of consent); Deprivation= Index of Multiple Deprivation score at 20 weeks gestation; Smoking = binary variable representing smoking status during pregnancy; Cohabitation = binary variable indicating cohabitation status at 32-36 weeks gestation; Education = mothers' age at leaving full time education; Mother to partner abuse = prenatal mother to partner psychological abuse score; Partner to mother abuse= prenatal partner to mother psychological abuse score; Antisocial = mothers' antisocial personality dysfunction score; Δr^2 = change in r^2 .

Mothers' antisocial personality dysfunction did not significantly predict children's aggression towards other adults when the potential confounders were accounted for. Instead, their cohabitation status was significantly associated with children's physical aggression to other adults whilst the contribution from mothers' smoking status during pregnancy approached significance. Similarly, the potential confounders accounted for the associations found between mothers' borderline personality dysfunction and children's aggression, as shown in Table 3.2.2.2b. Mothers' cohabitation and smoking status showed associations with each physical aggression outcome, along with levels of psychological abuse (partner to mother) showing an association that approached significance for children's total physical aggression and aggression towards parents. Interpretations of these results are discussed in Section 4.2.5.3.

3.2.2.2.3 Summary of the contribution from mothers' personality dysfunction to children's physical aggression. Mothers' borderline personality dysfunction significantly predicted children's total physical aggression across domains, aggression towards parents, to other adults and family children. Mothers' borderline personality dysfunction also appeared to account for associations between mothers' antisocial personality dysfunction and children's total physical aggression. Independent contributions to aggression towards other adults could not be identified when the two personality variables were examined jointly. Mothers' borderline personality dysfunction accounted for the initial associations found between mothers' depression and children's physical aggression. Finally, when the contribution of confounders was examined, the significant predictions from mothers' personality dysfunction did not remain. Instead, levels of psychological abuse, mothers' prenatal cohabitation status and mothers' smoking during pregnancy showed associations with children's physical aggression.

3.2.2.3 Overall summary: Does mothers' personality dysfunction predict child aggression and account for the contribution from mothers' depression? The results of analyses performed to test whether mothers' personality dysfunction predicted children's aggressive behaviour and physical aggression suggest that mothers' borderline personality dysfunction is an important predictor of the wider construct of aggressive behaviour. Further it accounted for the contributions found from mothers' depression, and that of potential confounders. For children's physical aggression, the significant associations between mothers' borderline personality dysfunction and the domains under study, that had accounted for the initial associations found between mothers' depression and children's physical aggression, did not remain when the potential confounders were included in analyses. Interpretations of these results are considered in relation to the hypotheses in Section 4.2.2.3 and 4.2.3.1 of the discussion.

3.3 Risky relationship establishment and presence of an antisocial partner

Hypothesis four

Links between mothers' personality dysfunction and children's aggressive behaviour will be mediated via the presence of 'risky' relationship establishment and the presence of an antisocial partner.

In Section 1.6, a potential sequence was hypothesised whereby mothers' personality dysfunction increased the likelihood of either establishment of relationships without attention to the implications, or in spite of problems, which in turn made it more likely they would develop relationships with antisocial partners, which would be associated with child aggression. Therefore, the final step in analyses was to test this hypothesised sequence using mediation analyses. The process of mediation is discussed in Section 3.3.1.

Previous analyses demonstrated that mothers' borderline personality dysfunction predicted children's aggressive behaviour rated on the CBCL after controlling for mothers' pre and postnatal depression and confounding variables. Therefore, the following analyses were undertaken:

(1) To test whether risky relationship establishment mediated the link between borderline symptoms and aggression.

(2) To examine whether the presence of a deviant partner mediated associations between borderline symptoms and aggression.

(3) To test whether the hypothesised sequence was present by using recommended steps to examine the contribution of more than one mediator simultaneously (Kenny, 2012) (if results supported steps 1 and 2).

In the thesis, risky relationship establishment was measured using the Establishment Interview, which allows for ratings to be made regarding whether ‘Increased Involvement in Spite of Problems’ and/or ‘Increased Involvement Without Attention to Implications’ were present in relationship establishment. These ratings yield binary variables that reflect the presence or absence of the two types of risky establishment (i.e. no Increase in Spite of Problems or Without Attention to the Implications versus evidence of Increase in Spite of Problems or Without Attention to the Implications). A binary variable was also used to reflect ratings of the presence of a deviant partner. This variable represented whether mothers had reported ‘any’ or ‘no’ deviance for their partners. Descriptive statistics for the potential mediators are shown in Appendix 5.

3.3.1 Testing mediation. To test whether the potential mediators accounted for the associations found between mothers’ borderline personality dysfunction and children’s aggression, analyses were performed using a series of multiple regression models according to the widely used steps originally recommended by Baron & Kenny (1986). These steps are summarised in Figure 3. The results relevant to each step are presented in the following section.

Figure 3

Recommended Mediation Analysis Steps

Step 1: Show that the predictor variable is associated with the outcome; this suggests there is an effect that may be mediated.

Step 2: Show that the predictor variable is associated with the mediator variable i.e. treating the mediator as an outcome.

Step 3: Show that the mediator affects the outcome, controlling for the predictor variable.

Step 4: Show that the effect of the predictor variable on the outcome is zero according to the coefficient controlling for the mediator (complete mediation) or substantially reduced (partial mediation).

Kenny (2012)

3.3.2 Mediation model for mothers' borderline personality dysfunction, relationship establishment and children's CBCL aggression. In this section, the results of steps taken to examine whether risky relationship establishment mediated associations between mothers' borderline personality dysfunction and children's aggressive behaviour are presented.

3.3.2.1 Mediation step one: Show that the predictor variable is associated with the outcome; this suggests there is an effect that may be mediated. As presented in Section 3.2.2.1, mothers' borderline symptoms significantly predicted children's CBCL aggression ($\beta = .35$, 95%CI = [.02, .03], $r^2 = .13$, $p < .001$).

3.3.2.2 Mediation step two: Show that the predictor variable is associated with the mediator variable i.e. treating the mediator as an outcome. The results of analyses to test step 2 of the mediation model are presented in Table 3.3.2.2. Logistic regression was used to examine whether mothers' borderline symptoms significantly predicted the establishment mediators. Logistic regression was used on account of the establishment variables being binary.

Table 3.3.2.2

Prediction to Relationship Establishment from Mothers' Borderline Personality

Dysfunction (n=239)

| Dependent Variable | <i>B</i> | SE <i>B</i> | OR | 95% CI | <i>p</i> |
|---|---|-------------|------|-------------|----------|
| Involvement in spite of problems | .17 | .04 | 1.19 | [1.10,1.29] | <.001 |
| | $r^2 = .08$ (Cox & Snell), $.13$ (Nagelkerke) | | | | |
| Involvement without attention to implications | .11 | .04 | 1.12 | [1.04,1.20] | <.001 |
| | $r^2 = .04$ (Cox & Snell), $.06$ (Nagelkerke) | | | | |

Note. Analyses performed using logistic regression.

Mothers' borderline symptoms were significantly associated with presence of increased involvement in spite of problems or without attention to implications. In logistic regression, associations are shown using odds-ratios, which represent the change in odds of being in one of the categories of the dependent variable when the value of the predictor increases by 1 (Tabachnick & Fidell, 2012). Results of the logistic regressions shown in

Table 3.3.2.2, demonstrate that the odds of mothers being rated as showing increased involvement in spite of problems increased by an odds ratio of 1.19 with a one unit increase in borderline symptom score. Similarly, the odds of mothers rated as showing increased involvement without attention to implications increased by an odds ratio of 1.12.

3.3.2.3 Mediation step three: Show that the mediator affects the outcome, controlling for the predictor variable. Results relating to step 3 are shown in Table 3.3.2.3.

Table 3.3.2.3

Prediction to Children's CBCL Aggression from Mothers' Relationship Establishment Controlling for Mothers' Borderline Personality Dysfunction (n=226)

| Predictor Variable: | Involvement in spite of problems | | | Involvement without attention to implications | | |
|---------------------|--------------------------------------|-----------|----------|---|-----------|----------|
| | β | [95%CI] | <i>p</i> | β | [95%CI] | <i>p</i> |
| CBCL aggression | .21 | [.07,.27] | .002 | .15 | [.02,.17] | .019 |
| | $r^2=.12 \Delta r^2 = .01, p < .001$ | | | $r^2=.15 \Delta r^2 = .02, p < .001$ | | |

Note. Analyses performed in multiple linear regression. Each analysis controlled for mothers' borderline symptoms at step 1 of the regression.

Each establishment variable was significantly associated with children's aggression after controlling for mothers' borderline symptoms in the first step of the regression.

3.3.2.4 Mediation step four: Show that the effect of the predictor variable on the outcome is zero according to the coefficient controlling for the mediator (complete mediation) or substantially reduced (partial mediation). Results from the analyses performed to test the final mediation step for establishment and children's aggression are presented in Table 3.3.2.4.

Table 3.3.2.4

Prediction to Children's CBCL Aggression from Mothers' Borderline Personality Dysfunction Controlling for Relationship Establishment (n=226)

| Dependent variable | CBCL aggression | |
|---|---|-------|
| Model | β [95%CI] | p |
| Involvement in spite of problems | .21 [.07,.27] | .002 |
| Borderline | .29 [.01,.03] | <.001 |
| Overall model: | $r^2 = .17, \Delta r^2 = .08, p < .001$ | |
| Involvement without attention to implications | .15 [.02,.17] | .019 |
| Borderline | .33 [.02,.03] | <.001 |
| Overall model: | $r^2 = .15, \Delta r^2 = .10, p < .001$ | |

Note. All analyses performed using multiple linear regression. Results of the second linear regression step are shown, each mediator variable was initially entered alone at step one.

As presented at step 1 (Section 3.3.2.1), the initial regression for the contribution of mothers' borderline symptoms to child aggression measured on the child behaviour checklist showed a significant effect of mothers' borderline symptoms ($\beta = .35$, 95%CI = [.02, .03], $r^2 = .13$, $p < .001$). When this was compared with the results shown in Table 3.3.2.4, it was clear that the effect of mothers' borderline symptoms was only very slightly reduced when each establishment mediator was controlled for. Therefore, risky establishment did not mediate associations between mothers' borderline symptoms and their child's aggression measured on the child behaviour checklist.

3.3.2.5 Summary: does risky relationship establishment mediate associations between mothers' borderline symptoms and child aggression? Mothers' risky relationship establishment did not mediate the associations found between mothers' borderline symptoms and child aggressive behaviour measured using the child behaviour checklist. Whilst these results suggested that the original hypothesised sequence was not accounting for borderline and aggression associations, it remained possible that the presence of an antisocial partner mediated the associations independently of risky relationship establishment. This was tested following the same process as reported above, and is reported in Section 3.3.3.

3.3.3 Mediation model for mothers' borderline personality dysfunction, presence of an antisocial partner and children's CBCL aggression. In this section, the results of steps taken to test whether the presence of an antisocial partner mediated associations between mothers' personality dysfunction and their children's aggressive behaviour are presented.

3.3.3.1 Mediation step one: Show that the predictor variable is associated with the outcome; this suggests there is an effect that may be mediated. As presented in Section 3.3.2 above, mothers' borderline symptoms significantly predicted children's CBCL aggression ($\beta = .35$, 95%CI= [.02, .03], $r^2 = .13$, $p < .001$).

3.3.3.2 Mediation step two: Show that the predictor variable is associated with the mediator variable i.e. treating the mediator as an outcome. As with analyses for step 2 of the mediation model with the establishment mediators, logistic regression was used to examine whether mothers' borderline symptoms significantly predicted presence of an antisocial partner. Results of the regression are presented in Table 3.3.3.2.

Table 3.3.3.2

Prediction of Presence of an Antisocial Partner from Mothers' Borderline Personality

Dysfunction (n=239)

| Dependent variable | <i>B</i> | SE <i>B</i> | OR | 95% CI | <i>p</i> |
|-----------------------------------|----------|-------------|------|-------------|----------|
| Presence of an antisocial partner | .18 | .04 | 1.20 | [1.11,1.30] | <.001 |

$r^2 = .10$ (Cox & Snell), $.15$ (Nagelkerke)

Note. Analysis performed using logistic regression.

Mothers' borderline symptoms were significantly associated with presence of a deviant partner; the odds of mothers reporting the presence of an antisocial partner increased by an odds ratio of 1.20 with a one unit increase in borderline symptoms score.

3.3.3.3 Mediation step three: Show that the mediator affects the outcome, controlling for the predictor variable. Results relating to step 3 are shown in Table 3.3.3.3. The presence of an antisocial partner was significantly associated with children's aggressive behaviour after mothers' borderline symptoms score was controlled for.

Table 3.3.3.3

Prediction to Children's CBCL Aggression from Presence of an Antisocial Partner

Controlling for Mothers' Borderline Personality Dysfunction (n= 227)

| Predictor Variable: Presence of an antisocial partner | | |
|---|---|------|
| | β [95%CI] | p |
| CBCL aggression | .16 [.02,.20] | .016 |
| Overall model: | $r^2 = .15, \Delta r^2 = .02, p < .001$ | |

Note. Analyses performed in multiple regression; Analysis controlled for mothers' borderline symptoms at step 1 of the regression

3.3.3.4 Mediation step four: Show that the effect of the predictor variable on the outcome is zero according to the coefficient controlling for the mediator (complete mediation) or substantially reduced (partial mediation). Results from the analyses to test the final mediation step for deviant partner and children's aggression on the child behaviour checklist are presented in Table 3.3.3.4.

Table 3.3.3.4

*Prediction to Children's CBCL Aggression from Mothers' Borderline Personality**Dysfunction Controlling for Presence of an Antisocial Partner (n=227)*

| Dependent variable: | CBCL aggression | |
|-------------------------------|-----------------------|-------|
| Predictor variable | β [95%CI] | p |
| Presence of a deviant partner | .16 | .016 |
| Borderline | .30 | <.001 |
| Overall model: | $r^2 = .14, p < .001$ | |

Note. Results of the second linear regression step are shown, the mediator variable was initially entered alone at step one.

As presented in Section 3.3.2.1, mothers' borderline symptoms significantly prediction to child aggression measured on the child behaviour checklist ($\beta = .35, 95\%CI = [.02, .03], r^2 = .13, p < .001$). As with the establishment mediators, the effect of mothers' borderline symptoms was slightly attenuated when the presence of an antisocial partner was controlled for. Therefore, the presence of an antisocial partner did not mediate associations between mothers' borderline symptoms and their child's aggressive behaviour measured using the child behaviour checklist.

3.3.3.5 Summary: Does the presence of an antisocial partner mediate associations between mothers' borderline symptoms and child aggression? As with the results relating to risky relationship establishment, the presence of an antisocial partner did not mediate the associations found between mothers' borderline symptoms and child aggressive behaviour measured using the child behaviour checklist

3.3.4 Summary: Risky relationship establishment and presence of an antisocial partner. The results presented in this section suggest that whilst risky relationship establishment and presence of an antisocial partner did not mediate associations between mothers' borderline personality dysfunction and child aggression, they did make independent contributions. Mothers' borderline personality dysfunction was significantly associated with risky relationship establishment and antisocial partner, and it appeared that they may have had additive effects upon children's aggression. However, the effects upon aggression do not seem to be as a result of a sequence between them. Based upon these results, hypothesis 4 was not supported. Potential interpretations of these results are considered in the discussion (Section 4.2.4.1).

Chapter 4 Discussion

The discussion begins with an overview of the study aims and methodology. This is followed by a review of the results followed by interpretation of these results. The strengths and limitations of the study are then discussed. Finally, implications of the results are considered, along with suggestions for future work.

4.1 Overview of Aims and Methodology

The first aim of the study was to disentangle the contributions of maternal depression and personality dysfunction to the prediction of aggression in young children.

The following questions were examined:

- (1) Does postnatal maternal depression predict children's aggression independently of mothers' depression during pregnancy, current depression, and potential confounders?
- (2) Does maternal personality dysfunction predict children's aggression?
- (3) Does mothers' personality dysfunction account for associations between mothers' depression and child aggression?

As discussed in Section 1.6, risky relationship establishment and the presence of an antisocial partner were identified as possible mediators that may have, in sequence, accounted for associations between mothers' personality dysfunction and children's aggression. Therefore, the second aim was to examine whether any associations found between mothers' personality dysfunction and children's aggression were mediated via features of risky relationship establishment leading to the presence of an antisocial partner.

These aims were addressed using a sample of mother-child dyads drawn from the Wirral Child Health and Development Study followed prospectively from pregnancy to when their children were aged 30 months. A dimensional approach to the measurement of maternal predictors was used; mothers' depression symptoms were measured by questionnaire, whilst mothers' antisocial and borderline personality disorder symptoms were assessed using a standardised investigator based interview format. Data regarding a range of potential psychosocial confounders were also collected.

In relation to child aggression, two measures administered when the children were aged 2.5 years (30 months) were used. This approach was informed by the rationale that there may be utility in characterising both the wider construct of aggressive behaviour (e.g. including temper tantrums and non-compliance), and physical aggression. Therefore, a well-established questionnaire was used to measure the broadband construct of aggressive behaviour and a recently developed investigator-based interview to assess children's physical aggression. This measure produced a total physical aggression score, and ratings of physical aggression exhibited in four specific contextual domains; towards parents, other adults, family children and other children. Findings relating to the validity and utility of this measure are reviewed in Section 4.2.5.4.2.

4.2 Review of Results

In this section each hypothesis is restated, the relevant results summarised and interpretations considered. The findings are interpreted in relation to some of the methodological and conceptual issues relevant to developmental psychopathology presented in the background.

4.2.1 Hypothesis one.

Trajectories characterised by elevated postnatal maternal depression over time will be associated with higher child aggression at 2.5 years than trajectories of low postnatal depression.

Three maternal depression trajectories were identified; ‘high’, ‘low’ and ‘very low’. These were considered together with prenatal depression, potential confounding variables, and current depression.

4.2.1.1 Predictions from mothers’ postnatal depression to the broad construct of children’s aggression. Prenatal, postnatal, and current depression were each associated with CBCL child aggression in separate analyses, but only current depression made an independent contribution when they were examined jointly. Many of the associations were better accounted for by one of the confounder variables considered, psychological abuse between parents. Psychological abuse and mothers’ current depression each independently predicted children’s aggressive behaviour.

4.2.1.2 Predictions from mothers’ postnatal depression to physical aggression. Mothers’ depression was associated with children’s total physical aggression and aggression towards parents assessed in the Severe Aggression Measure interview. As with predictions to children’s aggressive behaviour, mothers’ prenatal, postnatal and current depression predicted these aggression outcomes when examined separately. Again, it was not clear that either pre or postnatal depression made a significant independent contribution to physical aggression. The results suggested that mothers’ reports of children’s physical

aggression may be less susceptible to the influence of current depression. Finally, levels of psychological abuse accounted for earlier associations with mothers' depression, and significantly predicted both children's total aggression across domains and aggression towards parents.

4.2.1.3 Interpretation of results relating to hypothesis one. As discussed in Section 1.4.1.2, it has been proposed that mothers' postnatal depression may be particularly risky for children (Field, 2010); however this has rarely been tested in relation to competing possibilities. In particular the possible contributions of prenatal depression which may affect outcomes via fetal programming, and of current depression, which may bias parental reports, have rarely been considered. In the study by Cents et al. (2012), the main study most relevant to the present thesis, both mothers' depression in pregnancy, and at the point of assessment, were included in the depression trajectory modelling. This is problematic when testing independent contributions. Examination of specificity would not have been possible with all indices of depression included in one trajectory model as the individual contribution could not be tested.

The results of the present study suggested that when considered jointly with depression during pregnancy, it could not be concluded that mothers' postnatal depression made an independent contribution. Moreover, when mothers' current depression was accounted for, it was this index of depression that made a significant independent contribution. Therefore hypothesis one was not supported. The findings posed methodological and theoretical questions, which are considered in the following sections.

4.2.1.3.1 Disentangling the influence of pre and postnatal depression. As presented in Table 3.1.2.1b, mothers' prenatal depression significantly predicted mothers' postnatal class membership, supporting previous findings in the literature (Hay et al., 2010). Such associations make it difficult to disentangle independent contributions. These problems were further underlined by the inconclusive results of the regression analyses with both pre and postnatal included. Whilst the small regression coefficients for membership of the high postnatal class approached significance, and the coefficients for prenatal depression dropped, the 95% confidence intervals for the high postnatal class contributions were wide. This can suggest that the results are an unreliable representation of the actual coefficient value (Field, 2009). Although these results did not convincingly support an independent contribution from mothers' postnatal depression to children's aggression, neither do they provide firm evidence that it is not contributing. The wide confidence intervals and results just short of significance could have been due to low power, which may have been the result of the relatively small high postnatal depression class. The variable representing postnatal depression class was categorical as compared to the continuous prenatal depression score. The use of groups can sacrifice power and weaken the contribution from the variable in question (Markon et al., 2011). But, on the other hand, the variable representing postnatal depression was made up of scores from a maximum of four assessment points as compared to a score from one assessment point in pregnancy. This could mean that the increased exposure to postnatal depression across time would disproportionately weaken the contribution of prenatal and make a significant contribution from postnatal depression more likely. Further, whilst statistical checks did not indicate problems of multicollinearity, there were clear associations between pre and postnatal depression. As prenatal depression predicted mothers' postnatal depression, the two

examined together could have been accounting for overlapping variance in the dependent variables.

4.2.1.3.2 Mothers' current depression. Mothers' current depression significantly predicted ratings of children's aggressive behaviour on the Child Behaviour Checklist. Mothers current depression was not however significantly associated with mothers' reports of their child's aggression on the physical aggression interview. Alternative interpretations of these results need to be considered. The cross-sectional association with CBCL aggression could reflect a causal link. In this case the lack of association of prenatal depression and postnatal depression trajectories with CBCL aggression, after accounting for current depression, could arise because current depression mediates the effects of previous depression. This would imply that earlier depression only has an effect on aggression where it persists up to the 30 months assessment. This interpretation however has to take account of the finding that current depression was not associated with physical aggression assessed in interview. One explanation could be that while current depression is associated with broadly defined child aggression, as assessed in the CBCL, it is not associated with physical aggression assessed in interview. Therefore, both effects of shared method variance and biasing of mothers' reports by depression symptoms may have been more likely for maternal-reported Child Behaviour Checklist items. In addition, the Severe Aggression Measure was investigator-based, involving interviewers eliciting information and objectively making ratings of behaviour. Therefore it was less likely to be subject to reporting bias from mothers.

4.2.1.3.3 Confounding variables. A further issue in relation to the study of postnatal depression, and limitation with previous studies has been the examination of the role of

multiple potential confounders. In the present study, a number of psychosocial confounders were included in analyses to address this limitation. Psychological abuse in particular was associated with maternal depression and accounted for associations between maternal depression and child aggression. This was not hypothesised but is worthy of further investigation given previous research reporting associations between marital conflict and children's behaviour problems (Hanington, Heron, Stein, & Ramchandani, 2012; Hipwell et al., 2005). The results suggest that psychological abuse in relationships may be an important candidate variable for further study. There was some indication that differences in the direction of psychological abuse (i.e. whether it was mother to partner or partner to mother perpetrated) had different influences in the pre or postnatal period, which could be further explored. This is further discussed in relation to the results from testing of hypothesis two, reported in the following section.

4.2.2 Hypothesis two.

Mothers' personality dysfunction as indexed by higher levels of DSM antisocial and borderline personality disorder symptoms will be associated with higher levels of aggression in children aged 2.5 years.

In line with previous literature discussed in Section 1.5, antisocial and borderline symptoms were significantly associated with each other, and both showed significant small to moderate associations with each potential confounder. Further, mothers' personality dysfunction was significantly associated with maternal depression at all time points.

4.2.2.1 Predictions from mothers' personality dysfunction to aggressive behaviour measured on the Child Behaviour Checklist. Mothers with higher levels of antisocial or borderline symptoms reported higher levels of aggressive behaviour for their children. Mothers' borderline personality dysfunction significantly predicted children's aggressive behaviour independently of antisocial personality dysfunction. When examined with mothers' borderline personality dysfunction, mothers' antisocial personality dysfunction did not predict children's aggressive behaviour. Moreover, the highly significant prediction from mothers' borderline personality dysfunction to children's aggressive behaviour remained when the potential confounders were accounted for, and none of the confounders made a significant contribution to children's aggressive behaviour.

4.2.2.2 Predictions from mothers' personality dysfunction to physical aggression measured on the Severe Aggression Measure. Mothers with higher levels of antisocial personality dysfunction reported higher overall levels of physical aggression and physical aggression expressed towards other adults and family children. Mothers with higher levels of borderline personality dysfunction reported higher physical aggression summed across domains, and higher levels of physical aggression towards parents, other adults and family children. When the joint contribution of mothers' antisocial and borderline personality dysfunction was examined, it appeared that mothers' borderline symptoms were significantly predicting overall physical aggression over mothers' antisocial personality dysfunction. However, a caveat to this should be noted: the contribution from mothers' borderline personality dysfunction approached significance whilst the contribution from antisocial dysfunction was just above the <.10 level. In relation to the remaining domains measured, the contribution of mothers' borderline personality dysfunction to children's physical aggression towards parents and family children approached significance, whilst

the contribution from antisocial personality dysfunction (examined for family children) did not. In the case of physical aggression towards other adults, neither aspect of mothers' personality dysfunction predicted levels of physical aggression in this domain. Given these results, the subsequent interpretations of results relating to predictions from mothers' personality dysfunction to physical aggression measured on the Severe Aggression Measure are tentative.

In contrast to the findings for children's aggressive behaviour measured on the Child Behaviour Checklist, mothers' borderline personality dysfunction did not predict any of the physical aggression interview outcomes when the potential confounders were accounted for. Instead, mothers' smoking status during pregnancy, levels of psychological abuse and mothers' cohabitation status reported in pregnancy showed associations with the physical aggression outcomes.

4.2.2.3 Interpretation of results relating to hypothesis two.

4.2.2.3.1 Mothers' borderline personality dysfunction and the broad construct of aggressive behaviour in children. As discussed in Section 1.5.4, no studies to date have examined the prediction from mothers' borderline personality dysfunction to young children's aggressive behaviour. Therefore, this was an important novel area covered by the study. As presented in the background (Section 1.5.4.2), there is indirect evidence, from clinical samples, adolescent samples, and studies investigating negative emotionality, to suggest it that the presence of borderline-type difficulties may confer a risk for the broad construct of children's aggressive behaviours and this was supported by the results of the present study; mothers' borderline personality dysfunction significantly predicted

children's aggressive behaviour. This suggests that an understanding of mothers' personality dysfunction may be critical when considering the role of other aspects of mothers' psychopathology. Both borderline personality disorder and children's aggressive behaviour are characterised by emotional dysregulation and aspects of negative emotionality such as proneness to anger (Morse et al., 2009). Given these similarities, these results may suggest that features of mothers' borderline personality dysfunction contribute directly to children's negative temperament, for example through transgenerational transmission (Stepp et al., 2012). However, it is also possible that children could be influenced indirectly through social-learning processes. These results are further discussed in Section 4.2.5, after the results relating to the other hypotheses are summarised.

4.2.2.3.2 Mothers' borderline personality dysfunction and children's physical aggression. Associations between mothers' personality dysfunction and children's physical aggression did not remain when examined jointly with the potential confounders. The difference from the prediction to broad construct of aggressive behaviour on the Child Behaviour Checklist may be instructive. This aggression scale includes angry, oppositional and defiant behaviours, while the Severe Aggression Measure only assessed physically aggressive behaviours. There may therefore be a specific link between the anger proneness of borderline symptoms (Morse et al., 2009) and the anger related symptoms assessed in the CBCL. However, there was some uncertainty in the regression results for the Severe Aggression Measure (as noted in Section 4.2.5.4.2) and given potential methodological limitations that may be relevant to a new measure of physical aggression no firm conclusions can be made. This is an important area for future work.

Along with potential methodological issues, it has been discussed in the literature that the presence of personality dysfunction can increase the likelihood of certain psychosocial risks, such as relationship difficulties, and this could apply to the results found in relation to the aggression interview. To investigate this question, further work into antecedents and temporal relationships between factors is needed, which would benefit from measurement before pregnancy.

4.2.2.3.3 Mothers' antisocial personality dysfunction. Interestingly, mothers' antisocial personality dysfunction did not significantly predict children's aggression when included in the same model as mothers' borderline personality dysfunction. Bivariate associations showed a moderate correlation between the two, so it could be the case that they accounted for overlapping variance in the aggression outcomes. This may be supported by the fact that the two disorders share certain key features (Alwin et al., 2006), such as impulsivity and dysregulation, so it could be these factors that are influencing aspects of children's aggression. As presented in the background, previous research has not compared the relative contribution of each aspect of personality disorder. The findings of the present study would imply that more attention should be paid to borderline-type difficulties in mothers of young children when examining mothers' functioning.

However, mothers' antisocial personality dysfunction is still likely to be important. For example, studies have demonstrated predictions from mothers' antisocial behaviour in combination with mothers' depression in samples older than those children in the present sample. Kim-Cohen et al. (2005) in a large, prospective study, found that children with the highest rates of antisocial behaviour problems were those with mothers who met DSM criteria for major depression and who had a history of antisocial personality disorder

symptoms as compared to controls and mothers with depression or antisocial symptoms only. These children were also more likely to have been exposed to a range of contextual risks such as maltreatment and mothers' substance abuse. Thus, mothers' antisocial symptoms could interact with more severe depression to create risk and therefore may be relevant in higher-risk samples where rates of depression are higher or meet clinical-diagnosis levels. This was not examined in the present study and would be further of future investigation.

4.2.3 Hypothesis three.

Mothers' personality dysfunction will predict levels of aggression in children aged 2.5 years independently of maternal depression.

The contribution of mothers' borderline personality dysfunction accounted for associations between both postnatal depression class and prenatal depression to aggressive behaviour as measured on the Child Behaviour Checklist. The inclusion of mothers' borderline personality dysfunction in analyses including mothers' current depression reduced the contribution from current depression and both jointly predicted children's aggressive behaviour. The same pattern was found for predictions to physical aggression as rated on the Severe Aggression Measure, although the effects of current depression upon mothers' reports of their children's physical aggression were not as strong.

4.2.2.3 Interpretation of results relating to hypothesis three. This hypothesis was partially supported. Mothers' borderline personality dysfunction accounted for the associations originally found between mothers' postnatal depression class and prenatal

depression with children's aggressive behaviour and physical aggression. Further, it made an independent contribution along with current depression to children's aggressive behaviour. Taken together with the results relating to hypothesis two, these findings add to the argument that mothers' borderline personality dysfunction may be an important influence to consider in the development of children's aggressive behaviour. Further, for the broad construct of children's aggressive behaviour, mothers' borderline personality dysfunction appeared to have additive effects with mothers' current depression. Potential interpretations of associations between mothers' current depression and children's aggression have been discussed in Section 4.2.1.3.2. The finding of a joint effect could suggest that mothers' current depression exacerbates already established levels of aggressive behaviour in children already at risk as a result of their mothers' borderline personality dysfunction. However, it could also be the case that the two aspects of mothers' functioning exert an influence upon children's aggression via different mechanisms. Another potential explanation relates to the possibility that borderline personality dysfunction may be a precursor for the onset of depression, and that mothers' current depression was an indicator for the presence of prolonged depression. Studies have reported new onsets of depression in women with higher levels of personality dysfunction when baseline levels of depression are controlled for (Daley et al., 2000). Further, personality dysfunction may begin to develop from a young age leading to an individual with higher levels of dysfunction being more susceptible to depression.

4.2.4 Hypothesis 4.

Links between mothers' personality dysfunction and children's aggression will be mediated via a mechanism of risky relationship establishment leading to presence of an antisocial partner.

As discussed in Section 1.6, hypothesis four was based on a proposed sequence whereby mothers' personality dysfunction increased the likelihood of either establishment of relationships without attention to the implications, or in spite of problems, which in turn made it more likely they would develop relationships with antisocial partners, which would be associated with child aggression. Mothers' borderline personality dysfunction was significantly associated with both risky relationship establishment and having an antisocial partner. However, neither aspect of risky relationship establishment or presence of an antisocial partner, accounted for the prediction from mothers' borderline personality dysfunction to aggressive behaviour measured on the Child Behaviour Checklist. Instead, the results suggested that risky relationship establishment and presence of an antisocial partner made significant independent contributions, along with that of mothers' borderline personality dysfunction.

4.2.4.1 Interpretation of results relating to hypothesis four. Hypothesis four was not supported. This may be a result of mothers' borderline personality dysfunction not exerting its effect through mothers' relationship processes and the presence of an antisocial partner when children are at this age. Particularly in this age group when mother-child interactions are likely to be very influential, other mechanisms for the transmission of risk from mothers' borderline difficulties might be more relevant, for example, aspects of

mothers' parenting skills that may influence children's emotion regulation. However, the presence of associations supports the importance of considering mothers' relating and antisocial partners, and they may have an additive effect with mothers' psychopathology. Detailed aspects of the processes underlying mothers' relationships are rarely considered and, considered with the associations found between levels of psychological abuse and children's physical aggression, the findings of the present study suggests that this is an important area for future work.

4.2.5 Overall discussion and interpretation of findings. In the following section the findings of the study are discussed in relation to the methodological and conceptual considerations discussed in Section 1.2.

4.2.5.1 Multiple influences and complex relationships. The findings highlight multiple influences that could influence the development of children's aggression. They also illustrate the difficulty in isolating independent contributions (Hill, 2002; Rutter, 2011). The predictions from mothers' current depression, borderline dysfunction and certain psychosocial variables suggest an important role for environmental factors, both proximal to mothers and more distal, psychosocial, risks. It has been noted that distal influences can predispose to proximal factors (Kumsta et al., 2010). However, it may also be the case that aspects of mothers' functioning, such as personality dysfunction, can make psychosocial risks more likely. For example, a woman with higher levels of personality dysfunction may have difficulties in interpersonal relationships that increase the likelihood of having problems gaining employment thus contributing to deprivation, or increase the risk of conflict and abuse in romantic relationships (Hill et al., 2011; Hill et al., 2008; Morse et al., 2009). The number of environmental factors examined in the study was by no

means exhaustive. Negative aspects of parenting, such as inconsistent discipline, physical abuse or maltreatment, or insensitive and hostile interactions may be important in the development of children's aggression (Jaffee et al., 2012; Patterson & Stouthamer-Loeber, 1984). For example, Rutter & Quinton (1984b) found that mothers' personality dysfunction and child outcomes were associated with levels of parental hostility. Mothers' psychopathology may affect mothers' perceptions of infant's signals and attributions of their child's behaviour, and this may in turn affect their parenting style (Talge et al., 2007).

A considerable body of evidence highlights the importance of genetic influences for children's development (Caspi et al., 2002; Caspi et al., 2010; Jaffee et al., 2012). The present study did not examine genetic factors. Therefore, it remains possible that the risk for children's aggression was directly genetically transmitted from parents to their children or resulted from gene by environment interactions. For example, there is evidence to suggest that borderline personality disorder is in part heritable (Stepp et al., 2012), and heritability could account for the associations found between mothers' borderline personality dysfunction and children's aggressive behaviour.

A further potential factor in the mother-child relationship is the influence of children upon their mothers. This was not tested in the present study. Child attributes such as children's temperament are likely to influence mothers' functioning and their relationship with their child (Belsky, 1984). For example, an infant with higher levels of negative temperament may lead to lower levels of maternal empathy which in turn may have consequences for aspects of their parenting, such as sensitivity that can influence the development of behaviour problems (Kochanska et al., 2004). The examination of bi-

directional effects requires a specific design with repeated measurement over time, which could be a potential goal for future research.

Overall, the findings of the study may be best interpreted from a multiple risk point of view, which places emphasises upon the joint occurrence of many individual and contextual risks (Sameroff, 1983; Seifer et al., 1996). From a clinical perspective this model posits that the identification of children at risk from a number of co-occurring risks is an important goal of developmental research. This could have been the case for a specific group of children in the present study, whose mothers may have reported elevated levels of personality dysfunction, higher levels of depression when their children were 30 months of age, and may have reported more sociodemographic risk during pregnancy.

4.2.5.2 Timing. The study was able to go some way in examining temporal relationships between factors, and the results are consistent with the argument that infant's early exposures are associated with, and show predictions to, developmental outcomes. This may provide evidence for causal mechanisms. However, there are caveats to this. The results did not conclusively locate timing effects relevant to whether there are different pathways of risk from prenatal or postnatal influences. From a foetal origins perspective, aspects of mothers' psychopathology that affect the foetus during pregnancy may lead to non-adaptive changes that may increase the risk of later difficulties for children, including externalising problems (Glover, 2011; Talge et al., 2007). Therefore, it would be expected that mothers' prenatal depression may have shown an independent contribution. However; an alternative explanation is that there is a continuum of influence (Harrington, 2001; Hay et al., 2003), which is more consistent with the present findings regarding mothers' depression. On the other hand, mothers' borderline personality dysfunction, which was

measured during pregnancy, did show independent predictions to children's aggressive behaviour. This could indicate a prenatal influence upon children, for example mothers' difficulties in emotion regulation could impact upon the foetus. Moreover, there may be influences from factors present in the preconception period (Talge et al., 2007), which this study did not address.

4.2.5.3 Confounding variables and mediation. The findings suggested that psychological abuse within relationships may be an important 'third variable' candidate for further research. Levels of psychological abuse (measured pre and postnatally) showed associations with children's aggression over mothers' pre and postnatal depression, and in addition to mothers' current depression. Whilst significant associations did not remain after the addition of mothers' borderline personality dysfunction for predictions to the broad construct of aggressive behaviour, prenatal psychological abuse was still associated with levels of physical aggression summed across the domains measured on the aggression interview. Discord in partner relationships has often been noted as an important area for research (Belsky & Pluess, 2009) as it makes up part of the wider context that children are raised in. Not only could discord have direct effects upon children, for example through them witnessing conflict or being at risk of maltreatment (Jaffee et al., 2003), higher levels of discord may make other factors more likely. For example, mothers may receive low levels of support, become socially isolated or experience relationship breakdown, which can all undermine parenting (Belsky, 1984; Cummings et al., 2004). In addition, relationship conflict can exacerbate mothers' own difficulties in psychopathology or coping (Hanington et al., 2012).

There were also contributions to children's physical aggression from two other potential confounders; mothers' smoking and cohabitation status during pregnancy. This is consistent with previous research that has documented associations between smoking and externalising difficulties in children (Roza et al., 2009) and adolescents (Fergusson et al., 1998), and evidence regarding associations between single mother status and children's conduct problems (Peterson & Zill, 1986). Further research would benefit from exploring these factors to investigate whether such risks are causal. Other confounders that may have influenced children's aggression were not examined in the study. For example, mothers' alcohol or substance use, or occurrence of stressful life events could act as third variables. In developmental psychopathology research, there is always the possibility of 'omitted variable bias' (Jaffee et al., 2012) as all potential confounders cannot be controlled for. This should be borne in mind when interpreting the findings.

In relation to mediation, the results did not provide evidence for the mediation sequence proposed in Section 1.6. There are a range of potential complete or partial mediators that could be relevant to the constructs measured in the thesis, and further research would benefit from testing other mediation possibilities. One such mediator could be mothers' expressed emotion, which has been identified as a potential risk factor for children's externalising problems (Caspi et al., 2004). The construct of expressed emotion refers to an aspect of family emotional climate, whereby higher levels of negative expressed emotion are said to indicate elevated levels of criticism, hostility and emotional over involvement (Barrowclough & Hooley, 2003). Higher levels of expressed emotion have been associated with poorer outcomes for a range of psychological difficulties (Butzlaff & Hooley, 1998). Furthermore, higher levels of mothers' expressed emotion have

been associated with their depression symptoms and found to mediate associations between those depression symptoms and children's behaviour problems (Bolton et al., 2003).

4.2.5.4 Measurement of psychopathology.

4.2.5.4.1 Measurement of maternal psychopathology. The study was based on a dimensional approach to measurement. As discussed in Section 1.2.4, there is debate over whether psychopathology is best conceptualised and measured with categorical or dimensional approaches (Markon et al., 2011; Rutter, 2011). There is evidence from meta-analyses of studies addressing psychopathology in a range of populations that suggests higher levels of reliability and validity in continuous measures of psychopathology (Markon et al., 2011). Moreover, studies involving dimensional measurement rather than categorical diagnoses are more likely to be generalisable to mothers in the community.

As presented in Section 1.4.1.2, a number of studies that have demonstrated associations between mothers' postnatal depression and children's behaviours used categorical approaches to identify mothers who met DSM criteria for major depression. These mothers may represent a group with particularly severe depression, whereas the present study identified a group with elevated but subthreshold symptoms. Whilst subthreshold symptoms are likely to cause impairment (Gotlib et al., 1995), it is acknowledged there may be important differences between those mothers in previous studies and the present sample. Specific aspects relevant to the use of Longitudinal Latent Class Analysis and the findings related to this are discussed in Section 4.4.

The study was novel in its investigator-based approach to examining associations between mothers' personality dysfunction and young children's aggression. Whilst the early study by Rutter & Quinton (1984b) also used a dimensional approach, this was not specifically based upon the validated DSM-traits and manualised criteria. The present study benefited from a thorough prospective measurement of mothers' personality dysfunction rather than reliance upon self-report scales or small numbers of those meeting DSM criteria. The face validity of this approach was supported with the documented associations between the personality dysfunction constructs and depression, as previously reported in the literature. Further, the measure demonstrated high inter-rater reliability. Moreover, the use of the Establishment Interview, developed from the validated Adult Personality Functioning Assessment (Hill et al., 1989) approach was novel. The construct validity of the measure gained some support from the associations found between risky establishment, mothers' borderline personality dysfunction and presence of an antisocial partner. In addition, the inter-rater reliability was high. However, it is acknowledged that it requires further validation and testing, ideally with a range of samples, to thoroughly test its utility.

4.2.5.4.2 Measurement of children's physical aggression. Relatively few studies have used investigator-based measures to examine children's developmental outcomes, despite the potential utility of the method as discussed in Section 1.2.4. Established measures of children's behaviours, such as the widely-used Child Behaviour Checklist, are based upon measurement of a number of aspects that make up a broad construct. The Severe Aggression Measure was developed based on the premise that children's aggression may be made up of different constructs and that physical aggression may be an important construct to examine in a more detailed manner. Drawing upon the argument that aggression in its relational context may be important (Dirks et al., 2012; Wakschlag et al.,

2010), and based upon previous investigator-based approaches, the measure was designed to assess physical aggression both across and between social domains. The results suggested that the approach had utility in assessing overall levels of physical aggression over a certain time period and may be sensitive to variability between domains. Further, the measure displayed good inter-rater reliability and validity. The descriptive statistics (presented in Appendix 5) showed some differentiation in levels and severity of aggression by domain, which provided some support for the conceptualisation of aggressive behaviour as heterogeneous. Whilst the majority of children were not highly aggressive, there were variations in levels of aggression by different domains. For example, rates of aggression were highest in the family context towards parents in particular, which could be expected in this age group as they have not yet started school. Further research will be essential in testing whether domain specificity is apparent when children are more active in multiple social domains. The measure has previously been used by the research group with a clinical sample of children whose parents and teachers were interviewed using the aggression interview, and the present study adds support to the practical use of the measure. Whilst the measure appears feasible and acceptable for use with mothers, it is acknowledged that it was more time consuming than the administration of a questionnaire, and involved trained assessors. Thus, not all studies would be able to employ the methodology. Potential limitations of the approach used to measure children's aggression in the study are discussed in Section 4.4.2.2.2.

4.3 Strengths of the Study

The study extended previous work concerning the influence of mothers' psychopathology upon children's aggression by examining specific characteristics of

mothers' depression, along with mothers' personality dysfunction and the contribution of mechanisms relevant to relationship establishment. Therefore, the study has made some contribution to unpacking which aspects of mothers' functioning may be relevant to their children's aggression. Novel aspects included the examination of the influence of mothers' borderline personality dysfunction upon young children's aggression, the measurement of aspects of relationship formation likely to increase risk of deviant partners, and the use of a newly developed measure of young children's physical aggression across domains. The study also addressed a number of characteristics of mothers' depression, rather than combining measures across time or focusing upon depression at only a single perinatal time point.

The study was embedded within a large, longitudinal study, which allowed for prospective measurement from a community-based sample drawn from a well-defined geographical area of the UK. As discussed in Section 1.2, prospective designs offer advantages over cross-sectional designs by providing more information about possible temporal sequences and specificity in timing (Rutter, 2011). Moreover, the sampling strategy of the wider study may have reduced potential biases associated with high-risk, clinical or volunteer samples, increasing the representativeness and generalisability of the results. The design of the wider WCHADS study was specifically developed to investigate early risk for children, thus the present study was able to take advantage of this, and examine early prospective and concurrent predictors to children's aggression in pregnancy and during infancy, which has been identified as a key developmental time (Shaw et al., 2012).

To the researcher's knowledge, no studies to date have compared contributions from mothers' depression, antisocial, and borderline symptoms to children's aggression. The examination of multiple influences, that included wider psychosocial risks, was aided by the use of a range of measures that included both self-report and investigator-based approaches. Further, the design allowed for predictions to both a broadband measure of aggressive behaviour and physical aggression in particular, to be examined that enabled the researcher to consider whether there was specificity in associations.

4.4 Limitations of the Study

The findings of the present study should be considered in light of some limitations, and these are discussed below.

4.4.1 Statistical and methodological issues. Some of the results from the regression models in the study suggested a degree of uncertainty, in that the confidence intervals were wide or overall models were significant but with non-significant regression coefficients. This can indicate inconclusive results (Tabachnick & Fidell, 2012). Where this was the case, the issue has been noted, and results have not been interpreted as conclusive. Rather these results suggest a need for further exploration. This was particularly relevant to analyses using the physical aggression interview and postnatal trajectory membership variables. Although the power analyses (Section 2.4.1) indicated that the sample size was adequate, power for some analyses may have been reduced either due to associations between predictors, small groups (e.g. in the case of the categorical trajectory membership variable), or problematic distributions (e.g. in the case of physical aggression outcomes). As discussed in Section 2.4.2, the alpha value $<.05$ was not adjusted due to the risk of Type

2 errors, the possibility of rejecting potentially significant and important results (Tabachnick & Fidell, 2012). Additionally, significance values $<.10$ were noted. This may have increased the possibility of Type 1 errors, which can occur when multiple testing increases the likelihood of finding significant results that have occurred due to chance (Tabachnick & Fidell, 2012).

The study made use of Longitudinal Latent Class Analysis to model mothers' postnatal depression symptoms, and fit indices suggested that at least one of the models was a good fit to the data. However, the method also suffers from limitations. The results of latent class modelling are dependent on the data used for analyses (Pickles & Angold, 2003). As discussed in Section 2.4.3.2.2, due to the skew of the data, ordinal categories of mothers' depression scores were created based upon the distributions in the sample, with a score of 10 or over on the Edinburgh Postnatal Depression Scale as the highest cut point. Although this is a recommended step to deal with non-normal data (Feldman et al., 2009), it may have resulted in the high symptoms class comprising of an additional smaller group of mothers who had much higher, clinically significant, symptoms. However, the data did not permit the use of a higher cut point as overall levels of depression symptoms were low.

Confounders such as mothers' age, deprivation and cohabitation status that may have been expected to show associations with the high postnatal class based on previous research (Campbell et al., 2009; Cents et al., 2012) were not significantly associated. This lack of differentiation can suggest that a model is not meaningfully distinguishing groups (Nagin, 2009). Significant associations were found between mothers' depression during pregnancy and the confounders, which in turn predicted mothers' postnatal class membership. This sequence may have accounted for the lack of associations between the

confounders and postnatal depression classes. In addition, previous studies with latent class models have used very large samples, which make it more likely that they will find significant associations.

It is also important to remember that the classes identified represent an approximation to the underlying ‘reality’ of complex distributions and the ‘mothers’ postnatal class’ variable was based upon their most likely class membership (Nagin & Tremblay, 2001; Nagin & Odgers, 2010). Therefore, there is a possibility that the modelling used may not have reflected the actual patterns of mothers’ postnatal depressive symptoms. This should be addressed, ideally in replication of the design, in future research.

4.4.2 Measurement.

4.4.2.1 Maternal report. All measures used in the study were based on maternal report. This relies on mothers’ interpretations of their own functioning and their child’s behaviours, which may be susceptible to attribution biases or mothers’ wishing to present a positive image. Other informants such as fathers would have been extremely valuable. In addition, mothers reported on their partner’s antisocial behaviour, which could be problematic. Even though this method is often used, mothers might under-report levels of antisocial behaviour for a variety of reasons (Jaffee et al., 2003) that may have influenced the validity of reports in the present study.

4.4.2.2 Individual measures. It is possible that the individual measures employed in the study may have suffered from limitations.

4.4.2.2.1 Mothers' depression. In the case of mothers' depression symptoms, there has been some discussion over whether the Edinburgh Postnatal Depression Scale includes items that capture symptoms of anxiety rather than depression. For example, in the items "I have been anxious and worried for no reason", and "I have felt scared and panicky for no very good reason" (Jomeen & Martin, 2005). Depression and anxiety are often comorbid and therefore confounded when examined together, but it is possible that anxiety and depression exert effects through different mechanisms (Glover, 2011). Therefore, measurement in the study could have captured aspects of mothers' anxiety as well as depression symptoms. Future work could address this limitation by removing certain items from the scale or using a different scale to measure mothers' depression.

4.4.2.2.2 Children's aggression. Two outcome measures were employed in the study to characterise both the broadband construct of aggressive behaviour in children (The Child Behaviour Checklist) along with children's physical aggression (The Severe Aggression Measure). There is heterogeneity within the aggressive behaviour scale of the Child Behaviour Checklist, which is comprised of 19 items that cover oppositional, disruptive, and physically aggressive behaviours. This is a potential limitation as the behaviours measured using this scale only provide a broad index of externalising difficulties, which make it difficult to make conclusions about specific behaviours and their antecedents.

The Severe Aggression Measure is a new interview-based measure used to assess both frequency of children's physical aggression and potential contextual variations in the present sample. However, the measure may have suffered from certain limitations that should be borne in mind in interpreting the results. The Severe Aggression Measure is

based upon investigator-based interviewing that requires mothers to provide examples of their child's aggression across a number of interpersonal domains. However, in very young children as used in the present study this may be problematic as children are likely to be somewhat limited in the domains that they are active in. For example, all participants in the present study were first-time mothers and so the children may not have had siblings. Further, at age 27-33 months children may not spend periods of time with other adults or children outside of the family (for example at nursery). This may have limited the utility of the Severe Aggression Measure with the present sample. As shown in Appendix 5, rates of physical aggression towards parents were clearly much higher than physical aggression expressed in the other three domains, which may have been a function of the children having limited opportunity to interact within the other social domains.

There is some evidence from naturalistic observations and maternal-report that in the developmental course of aggression, instrumental acts such as snatching, pushing or shoving emerge in the early years before interpersonal physical aggression such as hitting (Hay, 2011). The Severe Aggression Measure does not include specific questions to capture these instrumental acts. This may account for the relatively low frequency of aggressive acts reported for the sample in the interpersonal domains and acts that were not measured may have been important precursors to physical aggression that would have been valuable to assess. This issue could be used to inform future development of the Severe Aggression Measure, and in other samples of young children it would be beneficial to measure early instances of instrumental aggression along with interpersonal physical aggression. In regard to the present results, this limitation should be borne in mind when considering the generalisability of the results to children aged 27-33 months.

4.4.3 Sampling and missing data. The sample for the study was drawn from all mother-child dyads, in the intensive sample, who had completed the assessment when the children were 30 months old providing data on the Child Behaviour Checklist (n=246). 244 of these mothers had completed the Severe Aggression Measure at the maternal interview. As presented in Section 2.1.3, there was some attrition from the initial point of consent. Comparison of those who completed the 30 month assessment to those who initially consented, found that those who did not complete the 30 month assessment were significantly younger but were not more deprived. This may give a less stable basis to generalisation of the findings, and caution should be applied in relation to generalising the results to younger mothers. Furthermore, the sample was not ethnically diverse, which presents an additional limit upon the representativeness of the sample. In addition, weighted back analyses (described below) were not employed in the present study. Therefore, the main thesis sample may not have been as representative of the general population as the original extensive sample. This should be borne in mind when interpreting the results i.e. effect size estimates, as these may not be applicable in the general population.

As discussed in Section 2.1.3, the WCAHDS design involved selecting all of those mothers reporting above threshold levels of psychological abuse into the intensive sample, along with a random sample of those that scored below threshold. This was done to identify a subsample at higher risk for conduct problems, as the psychological abuse stratification variable was chosen for its associations with a variety of risk factors for early child development. However, mothers' depression symptom levels and rates of children's behaviour problems in the present study suggested that the sample was low risk. For example, in relation to depression scores, Cox et al. (1993) report a mean EPDS score of 7.6 for mothers who completed assessments at 6 months postpartum who were part of a

general population sample recruited from a community hospital. In comparison, the mean EPDS score for mothers in the present sample at 6 months postpartum was somewhat lower (5.4). Further, Achenbach & Rescorla (2000) report mean scores of 18.4 on the CBCL aggression scale for clinically referred children aged between 1.5 to 5 years, and mean scores of 7.0 for a non-referred sample. In comparison, the mean score on the CBCL aggression scale for the present sample was 8.0, illustrating that the sample were more similar to a general population sample rather than a high risk sample.

Missing data is a common problem in prospective studies and there were missing data in some of the analyses performed. Whilst overall rates of missing data were low (as discussed in Section 2.4), missing data can be a source of non-random missingness, which increases the likelihood of bias (Tabachnick & Fidell, 2012). If mothers with missing data on one measure had been excluded from all other analyses this would have reduced the overall sample considerably or introduced bias. It is not known whether women who had missing data may have had poorer functioning. For example, a mother who did not complete the depression scale at 30 months may have been experiencing high levels of symptoms. Therefore, selective sample loss and potential bias cannot be ruled out, and the study sample may have differed from the sample originally recruited. This should be borne in mind when generalising the results of the study.

4.5 Clinical and Practical Implications of the Results

The area of study is very relevant to clinical practice and practical approaches. Given the importance of infant's early functioning to their later development, preventive and supportive strategies that can be implemented during early childhood, pregnancy, and

in some cases, pre- conception are an important area for practitioners and policy to address (Hay et al., 2003; Tremblay, 2010) .

The findings regarding the potential role of mothers' borderline personality dysfunction suggest that it may be beneficial for practitioners to consider whether borderline traits are present for mothers. For example, health professionals such as GPs, midwives and health visitors could assess the presence of such traits using relatively short self-report questionnaires. These traits are often quite obvious, and therefore can be easy to identify (Stepp et al., 2012). There are a number of interventions that have been developed and used with clinical populations of women with borderline personality disorder. Such approaches often involve helping women to develop practical skills to apply to resolving conflicts, managing emotions and addressing impulsivity. These skills may also help women address the potential risks from other difficulties such as psychological abuse within relationships, and could be used with mothers to aid parenting, as well as managing borderline traits and associated interpersonal difficulties (Herr et al., 2008). Although personality has traditionally been considered relatively stable and therefore difficult to change, it is increasingly recognised that many traits can be addressed, and the targeting of specific behaviours and or cognitions has been shown to improve functioning (Duggan, 2004).

Given the associations between mothers' current depression and children's aggression, and the possibility that this may either be a marker for chronicity or be influencing children's aggression cross-sectionally, the results highlight the continued importance of assessing mothers' depressive symptoms. This widely recognised in child and family services, and health professionals commonly assess for depression symptoms. If

associations with current depression and children's aggression are a result of continued influence, it would suggest that assessment of mothers' history of depression in addition to current symptoms is also important.

Further, aspects of mothers' relationship establishment and the presence of an antisocial partner were found to predict children's aggressive behaviour and physical aggression. Whilst all factors that predict are not necessarily causal (Serbin & Karp, 2004), these results suggest that further work to examine the role of these correlates of mothers' functioning is important. Interventions adopting a systemic approach where the wider context, including relationship processes, of mothers and their children is considered may be valuable. For example, professionals working with mothers could explore aspects of mothers' relationships sensitively in more detail, possibly informed by the investigator-based approach. This implication is also relevant to the results that suggested levels of psychological abuse predicted children's physical aggression. Often, physical violence is a focus of assessment and intervention with mothers, despite the fact that psychological abuse tends to be more common and may have as many, or more, detrimental effects (Ludermir, Lewis, Valongueiro, de Araujo, & Araya, 2010; Moffitt et al., 1997; Woolhouse, Gartland, Hegarty, Donath, & Brown, 2012).

4.6 Future Directions for Research

Future work could build on the findings of this study in a number of ways. Firstly, it is important to establish whether the findings can be replicated. This would add strength to the findings and offer further opportunity to validate the investigator-based measures. In particular, such studies could address the potential methodological issues of the present

study. Replications would benefit from the measurement of other potential confounders and mediators, such as aspects of parenting that may contribute to continuity or discontinuity in children's aggression. If possible, future studies including biological measurement would allow for investigation of potential genetic mechanisms. As boys are often reported to show higher rates of externalising behaviours (Baillargeon et al., 2007; Hay et al., 2011) studies might find it useful to examine sex differences.

Secondly, follow up study of the present sample is required to examine the developmental pathways for the children included in this sample. Not all children are affected by stressors in the same way (Glover, 2011) and it would be useful to examine whether the children in the sample showed evidence of differential susceptibility. Moreover, children's ability to regulate their emotions and behaviour increases over time (Côté et al., 2007) and it will be important to consider what subsequent factors and individual differences may play a role in later development. It would be advantageous if this included reports about the children's behaviour from other informants, such as fathers and teachers, in order to address possible biasing effects of only using maternal report. Other methods of assessing aggression such as observational measures that are administered in various social domains would be of great value to assess overall levels of aggression and further address the issue of whether there are contextual differences in children's aggression. The children in the WCHADS are currently starting school, which provides an excellent opportunity for gaining teachers' reports of behaviour and observing children's interactions with a wider range of peers and other adults.

Thirdly, given the results relating to mothers' borderline personality dysfunction this seems like a critical area for future research. It would be interesting to examine whether

there are any changes in children's aggressive behaviours if their mothers receive interventions that target borderline traits. This may be most applicable to clinical samples. Future studies with community samples would benefit from assessing whether borderline personality dysfunction is present and if so, whether there are specific predictions from mothers' borderline personality dysfunction to a range of child outcomes. Some studies have examined children's borderline-type traits, for example impulsivity or self harm, in order to examine potential precursors of adult personality dysfunction (Crowell, Beauchaine, & Linehan, 2009). Whilst caution should be applied in regard to the risks involved in labelling behaviours as indicators of adult difficulties, the concept could be applied to explore whether mothers' borderline traits predict similar traits in their children. Another interesting aspect of mothers' borderline personality dysfunction is whether the symptoms themselves, or the impairments they can cause, fluctuate over time, and whether these variations could affect children. Therefore, further research could test these predictions.

4.7 Conclusion

The findings of the present study underline the importance of testing competing explanations for associations between mothers' psychopathology and children's outcomes. Postnatal depression provides a striking example because it is associated with prenatal depression, chronic depression, and depression at the moment of reporting, along with mothers' personality dysfunction. Rutter et al. (2001) discuss the distinction between necessary and component causes of behaviour, whereby the concept of component causes is based on the suggestion that there are multiple pathways to each outcome that involves several causal components. The study aimed to examine some of these components in

relation to young children's aggression. Taken together, the results suggest that aspects of mothers' functioning, namely current depression symptoms and borderline personality dysfunction, along with mothers' relationship functioning and antisocial partners, may be a marker of risk for children's development of aggression. However, it is not clear *how* these aspects may lead to children's aggression, and this is an important area for future work. The present study has a number of implications for applied practice, although the limitations and areas in need of future work should be borne in mind.

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Appendices

Appendix 1 Ethical Approval Letter

Cheshire North & West Research Ethics Committee

Cheshire West PCT
1829 Building
Countess of Chester Health Park
Liverpool Road
Chester
CH2 1HJ

Telephone: 01244 650 334
Facsimile: 01244 650 333

27 June 2006

Professor Jonathan Hill
Professor of Child and Developmental Psychiatry
University of Liverpool, Alder Hey Hospital
Mulberry House, Alder Hey Hospital
Eaton Road
L12 2AP

Dear Professor Hill

Full title of study: The Wirral Child Health and Development Study
REC reference number: 05/Q1506/107

Thank you for your letter of 19 May 2006, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Vice-Chairman.

Confirmation of ethical opinion

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

Conditions of approval

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

Approved documents

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

| <i>Document</i> | <i>Version</i> | <i>Date</i> |
|---|----------------|-----------------|
| Application | | 09 January 2006 |
| Investigator CV | | |
| Protocol | 1 | 09 January 2006 |
| Covering Letter | | 09 January 2006 |
| Summary/Synopsis | 1 | 09 January 2006 |
| Response to Request for Further Information | | 19 May 2006 |
| Father Information Sheet, Study 1500 - Phases 1, 3, 5 & 7 | 2 | 01 May 2006 |
| Study 300 Parent Information Sheet, one year - Phase 8 | 2 | 01 May 2006 |
| Study 300 Parent Information Sheet, 6 months - Phase 6 | 2 | 01 May 2006 |

| | | |
|---|---|------------------|
| Study 300 Parent Information Sheet, Antenatal Phases 2 & 4 | 2 | 01 May 2006 |
| Mother Information Sheet, Study 1500 - Phases 1, 3, 5, & 7 | 2 | 01 May 2006 |
| Letter confirming funding - MRC | | 09 March 2005 |
| Supporting letter from Mr Doyle, Wirral Hospitals NHS Trust | | 09 December 2005 |
| Supporting letter from Ms Sheila Hillhouse, Birkenhead & Wallasey PCT | | 09 December 2005 |
| Phase 8: Study 300 12 month mother and baby postnatal assessments | 1 | 09 January 2006 |
| GP Letter Study 1500 | 1 | 01 January 2006 |
| GP Letter Study 300 | | 01 January 2006 |
| Parent Consent, Study 1500 - Phases 1, 3, 5 & 7 | 1 | 09 January 2006 |
| Consent to contact a relative - Study 1500 | 1 | 09 January 2006 |
| Parent Consent, Fathers, - Study 1500 - Phases 1, 3, 5 & 7 | 1 | 09 January 2006 |
| Parent Consent - Study 300 Antenatal, perinatal - (Phases 2 & 4) | 1 | 09 January 2006 |
| Study 300 Parent Information Sheet 6 months (Phase 6) | 1 | 09 January 2006 |
| Parent Consent - Study 300, first birthday (Phase 8) | 1 | 09 January 2006 |
| Parent Consent - Study 300, DNA First Birthday (Phase 8) | 1 | 09 January 2006 |
| Phase 1: Study 1500 mother antenatal screen | 1 | 09 January 2006 |
| Phase 1: Study 1500 father antenatal screen | 1 | 09 January 2006 |
| Phase 2: Study 300 mother antenatal interview | 1 | 09 January 2006 |
| Phase 3: Study 1500 pregnancy/obstetric/birth outcomes | 1 | 09 January 2006 |
| Phase 4: Study 300 perinatal baby assessment | 1 | 09 January 2006 |
| Phase 5: Study 1500 6-8 week questionnaire mother | 1 | 09 January 2006 |
| Phase 6: Study 300 6 month postnatal assessments mother and baby | 1 | 09 January 2006 |
| Phase 7: Study 1500 8 month questionnaire and routine health visitor developmental check (mother) | 1 | 09 January 2006 |
| Phase 7: Study 1500 8 month questionnaire (father) | 1 | 09 January 2006 |

Research governance approval

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

Statement of compliance

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

| |
|---|
| 05/Q1506/107 Please quote this number on all correspondence |
|---|

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

Yours sincerely

Mr Peter Ward
Vice-Chairman

Email: julia.thomas@cwpcct.nhs.uk

Enclosures:

Standard approval conditions

Appendix 2 Information Sheet and Consent Form given at 12 Weeks Gestation

The University
of Manchester

MANCHESTER
1824

Wirral University Teaching Hospital 
NHS Foundation Trust



Study Base:
The Lauries Centre, 142 Claughton Road,
Birkenhead, Wirral, CH41 6EY
Freephone: 0800 051 7597

Parent Information Sheet (Mother)– Study 1500

Title of study: The Wirral Child Health and Development Study

Investigators: Jonathan Hill, Helen Sharp, Andrew Pickles, Gill Lancaster

Research Staff: Karen Lunt, Carol Bedwell, Belinda Thompson, Julie Carlisle, Kate Marks, Kate Marshall, Liz Green, Florin Tibu, Jo Roberts, Jenny Lee, Nichaela Broyden, Carol Sadler, Jeanette Appleton

You are being invited to take part in a research study. Before you decide whether you want to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether you wish to take part. Thank you for reading this.

What is the study about?

We would like to invite you to participate in a new study of children's early development from birth to their first birthdays. This study is based at the Universities of Liverpool and Manchester. It is part of a programme of research into how children learn how to behave with other people, and why some children have difficulties controlling their behaviours. In order to fully understand this we need to measure the early development of children in many different ways. The aim of the study is to find out about the effects of many different forms of stress on parents and babies during the antenatal period and in the first months after birth. We know that for some parents and children the effects are quite long lasting,

and others find ways of coping. We want to understand these processes better so that services to support families experiencing stress can be improved.

Who is being invited to take part?

We are approaching all first time mothers and their partners who are booked into the antenatal clinic at Arrowe Park Hospital over a two year period. It is important that we have participants in the study with low, medium and high levels of stress. If you have agreed to take this letter home a research midwife will contact you at your 20 week appointment or slightly after, to tell you more about the study, answer any questions you have and to invite you to take part.

Do I have to take part?

It will be up to you to decide whether or not you would like to take part. If you agree, and change your mind later, you can withdraw from the study. This will not affect the care you receive.

How often will I be contacted?

We will contact you again six weeks after the birth of your baby, and when your baby is 8 months old.

We would also like to contact some mothers more often up to the first birthdays of their children, so that we can ask them more about their lives, and understand better their ways of coping, and assess their babies' health and development in more detail. If you decide to take part, the computer will tell us who to invite for the additional contacts after we have entered the information you provide now. If

your name does come up we hope very much that you will be able to help us, but at this stage we are only asking you to participate now and at 6 weeks and eight months.

What will I be asked to do at each time point?

During your pregnancy we will interview you and ask you to complete some questionnaires about your current health and relationships, and about your expectations of the baby and being a mother. This can be done here at the antenatal clinic or at another clinic on the Wirral or at the study base in the Lauries Centre. It should take about 25 minutes.

We will also ask you for consent for us to have access to your medical records for the pregnancy, the birth, and your new born infant following the birth.

When your baby is 6 weeks old we will send you some short questionnaires about your health, your relationships, and about your baby by post, and ask you to 'Freepost' them back to us.

When your baby is 8 months old we will send you more questionnaires about your health and about your baby, and ask you to return them 'Freepost' to us or return them to your health visitor when you attend for your baby's routine 8 month developmental check-up.

We will also ask your health visitor for the results of their 9-12 month assessment of your baby's development.

If you give written consent to take part in this study and you are selected by the computer to be invited for additional contacts, one of the research team named on the front of this information sheet will contact you at home, using the contact details you give to the research midwife. They will only contact you if you agree to it.

How will this information be used?

All information that we receive from you will be treated as strictly confidential, under the guidelines of the Universities of Liverpool and Manchester, the UK Medical Research Council, and the Data Protection Act. Information that we enter on the computer will be identified only by a number. We will report general findings about parents and children, but you or your child will never be identified. The only reason we might have to share information from the study with other people is if there are concerns about you or a child being at risk of serious harm. If that happens we will talk with you first to decide on the best way forward. Concerns like this would be addressed by seeking appropriate forms of help for you and/or following Trust Child Protection Guidelines.

Who is organising and funding the research study?

The study is being run by Professor Jonathan Hill of the University of Manchester and Dr Helen Sharp of the University of Liverpool. The research is funded by the Medical Research Council.

Are there any benefits in taking part in this study?

There are no benefits to you or your child's health in taking part in this study. However we hope that you will feel you are contributing to medical research in a way that will help children and families in the future.

What if something goes wrong?

If you feel you or your child have been harmed by taking part in this research and that the researchers have been negligent or at fault, then you may be able to make a legal claim for compensation to their employer. You might have to pay the legal costs of doing this. However, if you are harmed and the researchers are not at fault, there is no facility for you to make a claim. If you wish to complain or have any concerns about any aspect of the way you have been approached or treated during the course of this study, normal University or National Health Service complaints procedures should be available to you.

Are there any risks to myself or my child taking part in this study?

No, there are no known or likely risks.

Who has reviewed and approved the study?

A team of international experts on child development has reviewed this study for the Medical Research Council. The study has been reviewed and approved by the Research & Development committees of Wirral Hospitals NHS Trust, Wirral PCT and the Cheshire Local Research Ethics Committee.

Can I ask further questions?

When the research midwife meets you, at or after your 20 week scan appointment, she will be very happy to answer any questions you might have. In the meantime, if you would like any more information, please do not hesitate to contact Professor Jonathan Hill, Dr Helen Sharp, or Liz Green on the freephone number shown on the front page.



Study Base:
The Lauries Centre, 142 Claughton Road,
Birkenhead, Wirral, CH41 6EY
Freephone: 0800 051 7597
(from a mobile) 800 051 7597
Text: 07956 297412

RESEARCH CONSENT FORM

Title of study: Wirral Child Health and Development Study

Names of researchers: Jonathan Hill, Helen Sharp, Andrew Pickles, Gill Lancaster

1. I confirm that I have read and understand the information sheet dated March 2007 for the above study. I have had an opportunity to consider the information, ask questions and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my care or legal rights being affected.
3. I agree for the research team to have access to my medical records to obtain information about my pregnancy, delivery and my baby's birth record
4. I agree to my health visitor releasing a copy of my baby's 9-12 month routine development assessment in paper form and in the red book recorded in the Child Development Centre
5. I agree to my GP being notified that I am taking part in this study
6. I understand that any concerns about a child being in potential danger, will be addressed in line with the Trust Child Protection Guidelines.
7. I agree to take part in the above study.

8. I agree that one of the research team named on the front of the information sheet can contact me

Name of Participant Date Signature

Name of person taking consent
(if different from researcher) Date Signature

Researcher Date Signature

Appendix 3 Information Sheet and Consent Form given for Intensive Sample

The University
of Manchester

MANCHESTER
1824

Wirral Hospital 
NHS Trust



Study Base:
The Lauries Centre, 142 Claughton Road
Birkenhead, Wirral, CH41 6EY
Freephone: 0800 051 7597
(from a mobile) 800 051 7597
Text: 07956 297412

Parent Information Sheet – Study 300

Title of study: The Wirral Child Health and Development Study

Investigators: Jonathan Hill, Helen Sharp, Andrew Pickles, Gill Lancaster

Research Staff: Karen Lunt, Carol Bedwell, Belinda Thompson, Julie Carlisle, Kate Marks, Liz Green, Florin Tibu, Carol Sadler, Joanne Roberts, Jenny Lee, Nichaela Broyden

A few weeks ago you kindly agreed to help with a study that we are conducting designed to understand better how stress affects mothers to be, their partners and their babies, and how good experiences and support can make a difference. We are following 1500 women up to the first birthday of their babies mainly using questionnaires. In addition, we are asking 300 to be interviewed in more detail and to agree to us filming their baby's development during the first year of their life. We would like to invite you to be one of the 300. Before you decide whether you want to take part, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask us if there is anything that is not clear or if you would like more information. Take time to decide whether you wish to take part. Thank you for reading this.

What is the study about?

The aim of the study is to find out about the effects of different forms of stress on mothers and babies during the antenatal period and in the first months after birth. We plan to measure each baby's development and how they interact with their mother in some detail. We believe that for some parents and children the effects of some stresses are quite long lasting, and others find ways of coping. We want to understand these processes better so that services to support families experiencing stress can be improved. We are focussing on

mothers for this detailed part of the study because most babies spend most time with their mother.

Who is being invited to take part?

The computer chooses the names of women who we approach based on the information they have given about how much stress they are facing. Because we particularly want to understand about stress in pregnancy the computer will pick more women who are experiencing stress. Your name has been chosen either because you have indicated that you may be dealing with quite a lot of stress or because you have said you are not facing a lot.

Do I have to take part?

It will be up to you to decide whether or not you would like to take part. If you agree, and change your mind later, you can withdraw from the study. This will not affect the care you receive.

How often will I be contacted?

We would like to meet with you four times in all. We would like to

- § Talk with you before your baby is born.
- § Invite you and your baby to come to our study centre or visit you with your baby soon after he or she is born.
- § Invite you and your baby to come to our study centre for about half a day when your baby is 6 months old.
- § Invite you and your baby to come to our study centre for about half a day when your baby is one year old.

We will provide all the transport for all the visits, which can be arranged at a time to suit you and your family.

What will I have to do at each time point?

- During your pregnancy we will ask you to complete some more questionnaires and we will interview you about yourself, about your relationships, your physical and mental health over the past years, and your feelings about the pregnancy. We will ask you about aspects of your life now that you feel are a source of support and what you see as sources of stress. We will ask about your expectations of motherhood and your future baby. Also, we'll ask you to watch some video clips of babies and answer some questions about them. At any point, if you are not happy with a question you will be able to let the interviewer know and she will move on to the next topic.
- The whole session will take between two to four hours depending on how much there is to talk about. It can be done in one sitting (with comfort breaks) or can be divided up if that is more convenient. It can be done at any time that is convenient for you and wherever is most convenient for you. We have private interview rooms at our base on the Wirral, or we can come to your home.

- During your pregnancy we also want to see how much your body produces the kinds of hormones that help people to deal with challenging or stressful situations. To do this, all we have to do is ask you to wipe some cotton swabs in your mouth each time. This is completely safe. It will allow us to collect a sample of your saliva, which can then be analysed to measure the hormones. We would like to ask you to do this eight times, six times yourself during two days at home, and twice with the researcher before and after viewing short video clips of different babies.
- During the first two to four weeks after your baby is born we would like you and your baby to visit our study base at a time that is convenient to you. A trained child researcher will assess your baby's different reactions and watch and video him/her carefully for about 30 minutes, to find out about his or her 'personality'. For example, does your baby seem happier when left to be quiet or does he or she like to hear sounds or look at things? They will also put two patches on your baby's chest that will record your baby's heart rate. We will measure how much your baby's heart rate changes. This may help us to understand more about each baby's emotional responses to everyday events as well as to stress. **You will of course be with your baby at all times.**
- When your baby is 6 months old and again at the time of his/her first birthday we will ask you to come with your baby to the study centre. We will talk with you about your feelings and experiences since the last visit, ask you about your baby's usual behaviour, watch you playing with the baby and observe how your baby responds to everyday events such as having to sit in a car seat. We will record your baby's development. When your baby is one year old we will also ask for your agreement to take a sample of his/her saliva for DNA analysis. This would only be to help us understand babies' behavioural development in more detail. We will give you more detailed information about the 6 month and one year visits nearer the time. We will also ask for your written consent for those visits separately and for the DNA sample.

How will this information be used?

- We would like to make an audio recording of the interview so that the interviewer can go over what you have said in detail afterwards. We will also video you and your child together at times. The audio and video recordings will be identified only by a number, so that information on it cannot be traced to you. The recording will be kept secure at the university base for up to ten years.
- All information that we receive from you will be treated as strictly confidential, under the guidelines of the Universities of Liverpool and Manchester, the UK Medical Research Council, and the Data Protection Act.
- All the information from the assessments will be stored on computer but will only be identified by a number. A list of names and addresses of participants and their case numbers will be kept separately and securely at the university base.
- We will report general findings about parents and children, and you or your child will never be identified. Reports will only be based on the ratings that we make from the interview and none of what you say will be reported.

- The only reason we might have to share information from the study with other people is if there are concerns about you or a child being at risk of serious harm. If that happens we will talk with you first to decide on the best way forward. Concerns like this would be addressed by seeking appropriate forms of help for you and following Trust Child Protection Guidelines.

Who is organising and funding the research study?

The study is being run by Professor Jonathan Hill of the University of Manchester and Dr Helen Sharp of the University of Liverpool. The research is funded by the Medical Research Council.

Are there any benefits in taking part in this study?

There are no benefits to you or your child's health in taking part in this study. However we hope that you will feel you are contributing to medical research in a way that will help children and families in the future.

Will my expenses be paid?

We will be pleased to organise transport to the interview, or to pay for your transport. We are able to pay up to £30 in gift vouchers to compensate you for time taken from home or from work or any other expenses incurred from taking part in the study.

What if something goes wrong?

If you feel you or your child have been harmed by taking part in this research and that the researchers have been negligent or at fault, then you may be able to make a legal claim for compensation to their employer. You might have to pay the legal costs of doing this. However, if you are harmed and the researchers are not at fault, there is no facility for you to make a claim. If you wish to complain or have any concerns about any aspect of the way you have been approached or treated during the course of this study, normal University or National Health Service complaints procedures should be available to you.

Are there any risks to myself or my child taking part in this study?

No, there are no known or likely risks.

Who has reviewed and approved the study?

A team of international experts on child development has reviewed this study for the Medical Research Council. The study has been reviewed and approved by the Research & Development committees of Wirral Hospitals NHS Trust, Wirral Primary Care Trust and the Cheshire Local Research Ethics Committee.

Can I ask further questions?

When the researcher meets you they will be very happy to answer any questions you might have. In the meantime, if you would like any more information, please do not hesitate to contact Professor Jonathan Hill, Dr Helen Sharp or Liz Green on the freephone number shown on the front page.



**RESEARCH
CONSENT FORM**

Title of study: Wirral Child Health and Development Study

Names of researchers: Jonathan Hill, Helen Sharp, Andrew Pickles, Gill Lancaster

1. I confirm that I have read and understand the information sheet dated for the above study. I have had an opportunity to consider the information, ask questions and have had these answered satisfactorily.
2. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my care or legal rights being affected.
3. I agree to my GP being notified that I am taking part in this study.
4. I agree to an audio recording of the antenatal interview being made
5. I agree to being contacted so my baby can be observed and filmed at the study base shortly after birth
6. I understand that any concerns about a child being in potential danger, will be addressed in line with the Trust Child Protection Guidelines.
7. I agree to take part in the above study.

| | | |
|-------------------------------|------|-----------|
| Name of Participant | Date | Signature |
| Name of person taking consent | Date | Signature |
| Researcher | Date | Signature |

Appendix 4 Measures Used in the Study (non-copyrighted only)

1. 20 Weeks Demographic Questionnaire:

Wirral Child Health and Development Study



We are very grateful to you for helping us with our research. We hope to learn a great deal from your experiences and those of other women having their first baby. The questions we ask are not a test, so there are no right or wrong answers. We just want to learn as much as we can about how different experiences of pregnancy and life during pregnancy and early motherhood influence children's early development over time, starting now!

First, some background information about you.....

1. How many weeks pregnant are you? [][] months
2. How old are you? [][] years [][] months
3. What is your date of birth? [][]/[][]/[][][] (day / month / year)
4. How would you describe your ethnic origin?

| | |
|--|------------------------------------|
| <input type="checkbox"/> Bangladeshi | <input type="checkbox"/> Indian |
| <input type="checkbox"/> Black African | <input type="checkbox"/> Pakistani |
| <input type="checkbox"/> Black Caribbean | <input type="checkbox"/> Turkish |
| <input type="checkbox"/> Chinese | <input type="checkbox"/> White |
| <input type="checkbox"/> Greek/Greek Cypriot | <input type="checkbox"/> Other |

5. Are you currently?

| | |
|------------------------------------|---|
| <input type="checkbox"/> Married | <input type="checkbox"/> Cohabiting |
| <input type="checkbox"/> Single | <input type="checkbox"/> Partner living elsewhere |
| <input type="checkbox"/> Widowed | <input type="checkbox"/> Other..... |
| <input type="checkbox"/> Divorced | |
| <input type="checkbox"/> Separated | |

6. What is your postcode? [][][][][][][][][][]

7. How many bedrooms do you have? [][]

8. What type of housing do you live in?

| | |
|---|--|
| <input type="checkbox"/> House | <input type="checkbox"/> Caravan |
| <input type="checkbox"/> Flat | <input type="checkbox"/> Hostel |
| <input type="checkbox"/> Bedsit | <input type="checkbox"/> Student accommodation |
| <input type="checkbox"/> Maisonette | <input type="checkbox"/> Other |
| <input type="checkbox"/> Work related accommodation | |

9. How old were you when you finished full time education? [][]

10. What was your employment status when you became pregnant?

| | |
|--|---|
| <input type="checkbox"/> Full time paid employed | <input type="checkbox"/> Full time education |
| <input type="checkbox"/> Part time paid employment | <input type="checkbox"/> Part time education |
| <input type="checkbox"/> Self-employed | <input type="checkbox"/> Voluntary |
| <input type="checkbox"/> Unemployed | <input type="checkbox"/> Full time education and part time work |
| <input type="checkbox"/> On sick leave or disability | <input type="checkbox"/> Other |

2. Smoking Status Questions:

| | | | | |
|---|---|----------------------|-------------------|--------------|
| 1 | <u>During your pregnancy, have you smoked cigarettes?</u> | Yes No | | |
| 2 | <u>If you answered yes, during your pregnancy, on average how many cigarettes have you been smoking per day?</u> (Please indicate number of cigarettes for each stage of your pregnancy) | Less than 10 per day | Between 10 and 20 | More than 20 |
| | | | | |

3. Severe Aggression Measure Interview Schedule:

SAM AGGRESSION.

**Now I am going to ask you about's behaviours in a bit more detail.
REFERRING TO THE PAST 3 MONTHS**

Does he/she have 'temper tantrums'?

What happens?

Can you give me recent example?

How long did that go on? Are they ever longer? What is the longest?

How often does s/he have tantrums like these?

What about breaking things or damaging things deliberately?

What happens?

Can you think of something that happened recently?

RATING: Temper Tantrums

Severity of worst time

0 = None

1 = Brief annoyance

2 = Angry for several seconds, up to around a minute

3 = Angry for 1-5 minutes

4 = Behaves angrily for 5-20 minutes

5 = For 20 minutes- 1 hour

6= 1 hour plus (After this each hour counts as a tantrum)

Freq.of any incident '2' or above

0 = None

1 = Up to once per week or 4 times per month

2 = Regular, two to seven times per week

3 = Several times/day up to around 5 - frequent

4 = More than 5 times/day – very frequent

Overall Rating

0 = None

1 = Fr 1 Sev 2

2 = Fr 1 Sev 3 **OR** Fr 2 Sev 2

3 = Fr 1 Sev 4, **OR** Fr 2 Sev 3, **OR** Fr 3 Sev 2

4 = Fr 1 Sev 5, **OR** Fr 2 Sev 4, **OR** Fr 3 Sev 3, **OR** Fr 4 Sev 2

5 = Fr 1 Sev 6 **OR** Fr 2 Sev 5 **OR** Fr 3 Sev 4, **OR** Fr 4 Sev 3, **OR** Fr 5 Sev 2

6= Fr 2 Sev 6 **OR** Fr 3 Sev 5, **OR** Fr 4 Sev 4, **OR** Fr 5 Sev 3, **OR** Fr 6 Sev 2

7 = Fr 3 Sev 6, **OR** Fr 4 Sev 5, **OR** Fr 5 Sev 4, **OR** Fr 6 Sev 3 or higher

RATING: Breaking/Damaging Things

This has to be clearly deliberate and damaging through the use of force. N.B. for 2-3 year olds we do not rate ripping book pages.

Severity of Worst

- 0 = None
- 1 = Throws, bangs etc, no damage
- 2 = Toys
- 3 = Household objects

Frequency Rated '2' or Higher

- 0 = None
- 1 = Up to 3 times over 3 months
- 2 = Occasional, up to once per week or 4 times a month
- 3 = Regular- two to seven times
- 4 = Most or all days - frequent

Overall Rating

- 0 = None, Fr 1 Sev 1
- 1 = Fr 1 Sev 2
- 2 = Fr 1 Sev 3 **OR** Fr 2 Sev 2
- 3 = Fr 2 Sev 3, **OR** Fr 3 Sev 2
- 4 = Fr 3 Sev 3, **OR** Fr 4 Sev 2
- 5 = Fr 4 Sev 3

AGGRESSION TOWARDS PARENTS

I'd like to ask you some more detailed questions about his behaviour, over the past three months

Has ever hit you? Or his dad/your partner?

IF DESCRIBED AS PLAYFIGHTING, STILL GET A DESCRIPTION.

Or try to harm you in any other ways?

Can you tell me about that? What happened? Can you give me an example?
How long does that go on for? How often? When was the last time?

What has been the worst thing he has done?

IF NOT CLEAR:

Has he ever used anything to hit you or his dad (or partner)? Like a stick? Or any other object?

Or hit you in the face, or your private parts, or other sensitive areas?

Or bitten you? Whereabouts?

Can you give me an example? How often does that happen? When was the last time?

What was happening before he did that?

THEN ESTABLISH WHETHER THE OPPOSITE (REACTIVE/PROACTIVE) IS EVER TRUE

Has it ever just come out of the blue? OR Has he ever done it in reaction to something?

AGGRESSION TOWARDS OTHER ADULTS

And what about other adults?

For instance other relatives?

Or parents of other children?

GO THROUGH THE SAME QUESTIONS REGARDING OTHER ADULTS

RATING: Physical aggression towards parents

| | |
|--------------------------------------|--|
| <u>Severity of Worst</u> | 0 = None or verbal 1 = Physical, no risk 2 = Physical risk (includes any in the face) 3 = Physical high risk |
| <u>Frequency Rated '1' or Higher</u> | 0 = Never 1 = Up to once per month/3 x over 3 months 2 = Up to once per week or 4 times per month 3 = 2 – 7 incidences per week 4 = Several times/day, up to around 10/day 5 = More than 10/day |
| <u>Overall Rating</u> | 0 = None 1 = Fr 1 Sev 1 |
| <u>Reactive/Proactive</u> | 2 = Fr 1 Sev 2 OR Fr 2 Sev 1 |
| 0= None | 3 = Fr 1 Sev 3, OR Fr 2 Sev 2, OR Fr 3 Sev 1 |
| 1= Reactive | 4= .Fr 2 Sev 3, OR Fr 3 Sev 2, OR Fr 4 Sev 1 |
| 2 = Proactive | 5 = Fr 3 Sev 3, OR Fr 4 Sev 2 OR Fr 5 Sev 1 |
| 3 = Mixed | 6 = Fr 4 or 5 Sev 3, |

RATING: Physical aggression towards other adults

| | |
|--------------------------------------|--|
| <u>Severity of Worst</u> | 0 = None or verbal 1 = Physical, no risk 2 = Physical risk (includes any in the face) 3 = Physical high risk |
| <u>Frequency Rated '1' or Higher</u> | 0 = Never 1 = Up to once per month/3 x over 3 months 2 = More than monthly, less than weekly 3 = 2 – 7 per week 4 = Several times/day, up to around 10/day 5 = More than 10/day |
| <u>Overall Rating</u> | 0 = None 1 = Fr 1 Sev 1 |
| <u>Reactive/Proactive</u> | 2 = Fr 1 Sev 2 OR Fr 2 Sev 1 |
| 0= None | 3 = Fr 1 Sev 3, OR Fr 2 Sev 2, OR Fr 3 Sev 1 |
| 1= Reactive | 4= .Fr 2 Sev 3, OR Fr 3 Sev 2, OR Fr 4 Sev 1 |
| 2 = Proactive | 5 = Fr 3 Sev 3, OR Fr 4 Sev 2 OR Fr 5 Sev 1 |
| 3 = Mixed | 6 = Fr 4 or 5 Sev 3, |

Physical Aggression The aim of rating physical aggression is to rate analogues of violence in adults. As violence by children rarely leads to injury, the focus is on the type of acts. Aggressive behaviours with risk include:

- a) Risk of or actual harm, e.g. biting
- b) Attacks on sensitive areas such as the face, breasts or genitals
- c) Attack whilst the adult is vulnerable, for instance lying down
- d) Use of an implement

Serious risk often will include a combination of these. However it cannot be rated mechanically, and the rater should refer to examples.

PHYSICAL AGGRESSION TOWARDS SIBLINGS AND OTHER CHILDREN IN THE FAMILY

Thinking now about his brothers and sisters (refer to their names) or any other children in your family.

ASK ALSO ABOUT OTHER CHILDREN IN THE FAMILY

**Has hit any of them?
And what about (name of another sibling)?**

IF NOT MENTIONED CHECK ALL SIBLINGS

Or try to harm them in any other ways?

Can you tell me about that? Can you give me an example?
How long does that go on for? How often? When was the last time?
What has been the worst thing he has done?

IF NOT CLEAR:

Has he ever used anything to hit any of them?

Like a toy? Or a stick? Or any other object?

**Or bitten them, or hit them in the face, the eye, or the private parts,
or tried to strangle them?**

Or pushed any of them down the stairs, or into the road? Or put them at risk in any other way?

Can you give me an example? How often does that happen?

What was happening before that?

THEN ESTABLISH WHETHER THE OPPOSITE (REACTIVE/PROACTIVE) IS EVER TRUE

Has it ever just come out of the blue? OR Has he ever done it in reaction to something?

PHYSICAL AGGRESSION TOWARDS CHILDREN OUTSIDE OF THE FAMILY

ASK THE SAME QUESTIONS REGARDING CHILDREN OUTSIDE OF THE FAMILY

PHYSICAL AGGRESSION TOWARDS ANIMALS

Thinking about the past year

Has he been cruel to animals? What has he done?

When was that?

RATING: Physical aggression towards other children in the family

| | |
|--------------------------------------|--|
| <u>Severity of Worst</u> | 0 = None or verbal 1 = Physical, no risk 2 = Physical risk (includes any in the face) 3 = Physical high risk |
| <u>Frequency Rated '1' or Higher</u> | 0 = Never 1 = Up to once per month/3 x over 3 months 2 = Up to once per week or 4 times per month 3 = 2 – 7 incidences per week 4 = Several times/day, up to around 10/day 5 = More than 10/day |
| <u>Overall Rating</u> | 0 = None 1 = Fr 1 Sev 1 |
| <u>Reactive/Proactive</u> | 2 = Fr 1 Sev 2 OR Fr 2 Sev 1 |
| 0= None | 3 = Fr 1 Sev 3, OR Fr 2 Sev 2, OR Fr 3 Sev 1 |
| 1= Reactive | 4= .Fr 2 Sev 3, OR Fr 3 Sev 2, OR Fr 4 Sev 1 |
| 2 = Proactive | 5 = Fr 3 Sev 3, OR Fr 4 Sev 2 OR Fr 5 Sev 1 |
| 3 = Mixed | 6 = Fr 4 or 5 Sev 3, |

RATING: Physical aggression towards other children outside of the family

| | |
|--------------------------------------|--|
| <u>Severity of Worst</u> | 0 = None or verbal 1 = Physical, no risk 2 = Physical risk (includes any in the face) 3 = Physical high risk |
| <u>Frequency Rated '1' or Higher</u> | 0 = Never 1 = Up to once per month/3 x over 3 months 2 = Up to once per week or 4 times per month 3 = 2 – 7 incidences per week 4 = Several times/day, up to around 10/day 5 = More than 10/day |
| <u>Overall Rating</u> | 0 = None 1 = Fr 1 Sev 1 |
| <u>Reactive/Proactive</u> | 2 = Fr 1 Sev 2 OR Fr 2 Sev 1 |
| 0= None | 3 = Fr 1 Sev 3, OR Fr 2 Sev 2, OR Fr 3 Sev 1 |
| 1= Reactive | 4= .Fr 2 Sev 3, OR Fr 3 Sev 2, OR Fr 4 Sev 1 |
| 2 = Proactive | 5 = Fr 3 Sev 3, OR Fr 4 Sev 2 OR Fr 5 Sev 1 |
| 3 = Mixed | 6 = Fr 4 or 5 Sev 3. |

Physical Aggression The aim of rating physical aggression is to rate analogues of violence in adults. As violence by children rarely leads to injury, the focus is on the type of acts. Aggressive behaviours with risk include:

- a) Risk of or actual harm, e.g. biting
- b) Attacks on sensitive areas such as the face, breasts or genitals
- c) Attack whilst the adult is vulnerable, for instance lying down
- d) Attack on much younger, or in other way weaker child
- e) Use of an implement

Serious risk often will include a combination of these. However it cannot be rated mechanically, and the rater should refer to examples.

RATING: CRUELTY TO ANIMALS PAST YEAR

0 = None

1 = Rough handling

2 = Definite suffering - once

3 = Definite suffering – more than once

4. Establishment Interview:

ROMANTIC RELATIONSHIPS CONCEPTION ONWARDS

NB Partner 1 is the person the mother was with when she conceived and partners are numbered from there.

| | Partner 1 | Partner 2 | Partner 3 | Partner 4 |
|---|----------------------|----------------------|----------------------|----------------------|
| Is there a partner? (No = 0, Yes = 1) | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Age at start of relationship (years, decimals) | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Age at end of relationship (years, decimals) | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Age at marriage/cohabitation (years, decimals) | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Age of spouse/cohabitee at start (years) | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Time going out prior to cohabitation (months) | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Decision prior to cohabitation (months) | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Duration of marriage/cohabitation (months) | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Duration of relationship (months) | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |
| Has partner deviance and psychiatric history been entered into the LHC? | <input type="text"/> | <input type="text"/> | <input type="text"/> | <input type="text"/> |

A. ESTABLISHMENT OF RELATIONSHIP

RELATE YOUR QUESTIONING TO INFORMATION GAINED EARLIER:

Thinking about your relationship with

How did the relationship start?

How old were you then? How old was s/he?

How did you meet?

Had you known each other before you started dating/going out?

**What did you do together at the beginning?
(Thinking of the first days and weeks).**

GET ENOUGH INFORMATION TO COMPLETE THE 'TIME FROM START OF DATING TO :-' TABLE

Can you tell me a bit more about your feelings at the start of the relationship.

How did you feel at the beginning? And him?

How could you tell?

How often did you get together?

How much time did you spend together?

Did that affect the time you spent on other things?
Such as being with friends, or family, or work?

How much did you talk about yourself? Your life? Your feelings? Were there things you didn't talk about?

And him? Can you tell me about that?

How soon did it become a sexual relationship?

Was that something you wanted? And him?

Were there any sexual difficulties at the beginning?

*Did you get to the point where you or he/she gave up some independence
for the other, in order to be together?*

I mean for example by moving into the other's house?
Or finding a place together?
Or relying on the other for money? What happened?
How long had you been together then?

| | | | | |
|--|--------------------|-----------------|-----------------|---------------|
| Time from start of dating to:- (weeks) | Moving in together | Getting engaged | Getting married | Having a baby |
| | | | | |

Rapid Tempo Checklist

READ OUT THE QUESTIONS ON THIS LIST OR PROVIDE CHECKLIST TO COMPLETE

| | Months | Weeks | Days | Never felt like this |
|--|--------|-------|------|----------------------|
| How long after start of relationship did you feel he was the most important person in your life? | | | | |
| How long after the start of the relationship was he the person you wanted to be near to as much as possible? | | | | |
| How long after the start of the relationship did you tell him your most private feelings and thoughts? | | | | |
| How long after the start of the relationship was he the first person you turned to when upset or feeling down, or worried? | | | | |
| How long after the relationship started was he the person you missed most when he wasn't there? | | | | |
| How long after the relationship started did you feel you could always count on him? | | | | |
| How long after the start of the relationship was he the person you trusted most? | | | | |

CHECKLIST - rapid tempo with intensity

| | NO | YES |
|--|----|-----|
| Strong passionate feelings in the first days of the relationship? | | |
| Thoughts like 'we are perfect for each other', 'we are soulmates'? | | |
| Did the interviewee express or in some other way show these feelings or thoughts? | | |
| Did the other person express or in some way show these feelings or thoughts? | | |
| Did one or both partners confide very personal information very early on? | | |
| Did they spend most or all of their available time together? | | |
| Was that at the expense of other relationships, activities or study/work? | | |
| Did they take steps with long- term implications, such as to move in together, in the first weeks? | | |

IF INTERVIEWEE HAS NOT EXPLAINED THE TRANSITION TO ENGAGEMENT, COHABITING OR HAVING A BABY:

How long had you been going out with him before you started living together, got engaged, got married, had a baby?

ASK FOLLOWING QUESTIONS FOR EACH RELATIONSHIP EVENT:

How old were you then? And your partner?

How did you make the decision? How did you end up living together, getting engaged, getting married, having a baby?

Did you talk about living together, getting engaged, getting married, having a baby before you did it?

LET HER ELABORATE FIRST, THEN

For instance.....

.... Whether it was for life?

.... What getting married, etc etc meant to you?

.... Whether you would have children?

.... Where you would live?

.... How you would manage financially?

PROBE FOR: MUTUAL DECISION

EXTERNAL CIRCUMSTANCES E.G. FINANCIAL NEED TO LIVE TOGETHER

UNPLANNED PREGNANCY – ask re contraception

ONE PUTS PRESSURE ON THE OTHER

NO CLEAR DECISION MAKING

LACK OF ACKNOWLEDGEMENT THAT THEY ARE TAKING A RELATIONSHIP STEP

Before you moved in together, got engaged, got married, had a baby were there any difficulties?

For example, that one of you was possessive or jealous?

or that one of you had strong views about the way the other should behave? or about your or his/her friends?

Or that one of you still had other relationships? (Or were married).

Did s/he have children?

Or that one of you had your own problems?

E.g.with drugs or alcohol?or other psychiatric problems?

.....or with being aggressive?or trouble with the police?

Or that there were arguments? Or any violence? Tell me about that ...

IF YES:

Did that make any difference to the relationship?
In what ways?

CHECKLIST – increased involvement without attention to the implications

| | NO | YES |
|---|----|-----|
| Did they take steps because one partner had nowhere to live? | | |
| Did they take steps without talking about it? | | |
| Did they take steps without a joint decision (e.g. one moved in and didn't leave)? | | |
| Did they take steps without a background of clear emotional involvement? | | |
| Did they take steps without talking about their future plans? | | |
| Was the relationship started without attention to implications for other close relationships? | | |

| Steps taken in the absence of plans/emotional involvement, or for convenience? | Move in together | Get engaged | Get married | Have a baby |
|--|------------------|-------------|-------------|-------------|
| | YES/NO | YES/NO | YES/NO | YES/NO |

CHECKLIST - increased involvement in spite of problems.

| Problems in the relationship before : | | | Moving in together | | Getting engaged | | Getting married | | Having a baby | | |
|---------------------------------------|----|-----|--------------------|-----|-----------------|-------|-----------------|-----|---------------|-----|-----|
| - | | | NO | YES | NO | YES | NO | YES | NO | YES | |
| Discord | NO | YES | Violence | NO | YES | Drugs | NO | YES | Alcohol | NO | YES |
| Risk to children | | | NO | YES | Other..... | | | | | NO | YES |

FOR EACH RELATIONSHIP EVENT WE WANT TO KNOW WHETHER THEY CONSIDERED AND DISCUSSED THE STEP PROPERLY, SAW IT AS AN INCREASE IN INTIMACY AND PLANNED FOR IT. BEFORE EACH RELATIONSHIP EVENT WE WANT TO KNOW ABOUT THE QUALITY OF THE RELATIONSHIP – HAD THEIR RELATIONSHIP BEEN PROBLEMATIC BEFORE THEY INCREASED THEIR INTIMACY?

5. Establishment Rating Sheet:

Establishment Rating

Increased involvement in spite of problems

1.

| | | Yes | No |
|--|-----------------------|-----|----|
| Increased Involvement | Moving in together... | | |
| In spite of problems | Discord | | |
| | Violence | | |
| | Alcohol | | |
| | Risk | | |
| Overall rating based on RAPFA manual guidance | | | |

2.

| | | Yes | No |
|--|--------------------|-----|----|
| Increased Involvement | Getting engaged... | | |
| In spite of problems | Discord | | |
| | Violence | | |
| | Alcohol | | |
| | Risk | | |
| Overall rating based on RAPFA manual guidance | | | |

3.

| | | Yes | No |
|--|--------------------|-----|----|
| Increased Involvement | Getting married... | | |
| In spite of problems | Discord | | |
| | Violence | | |
| | Alcohol | | |
| | Risk | | |
| Overall rating based on RAPFA manual guidance | | | |

4.

| | | Yes | No |
|--|------------------|-----|----|
| Increased Involvement | Having a baby... | | |
| In spite of problems | Discord | | |
| | Violence | | |
| | Alcohol | | |
| | Risk | | |
| Overall rating based on RAPFA manual guidance | | | |

Increased involvement without attention to the implications

1.

| | | Yes | No |
|--|--|-----|----|
| Increased Involvement | Moving in together... | | |
| Without attention to the implications | Because one partner had nowhere to live? | | |
| | Without talking about it? | | |
| | Without a joint decision? | | |
| | Without a background of clear emotional involvement? | | |
| | Without future plans? | | |
| | Without consideration for other close relationships? | | |
| Overall rating based on RAPFA manual guidance | | | |

2.

| | | Yes | No |
|--|--|-----|----|
| Increased Involvement | Getting engaged... | | |
| Without attention to the implications | Because one partner had nowhere to live? | | |
| | Without talking about it? | | |
| | Without a joint decision? | | |
| | Without a background of clear emotional involvement? | | |
| | Without future plans? | | |
| | Without consideration for other close relationships? | | |
| Overall rating based on RAPFA manual guidance | | | |

3.

| | | Yes | No |
|--|--|-----|----|
| Increased Involvement | Getting married... | | |
| Without attention to the implications | Because one partner had nowhere to live? | | |
| | Without talking about it? | | |
| | Without a joint decision? | | |
| | Without a background of clear emotional involvement? | | |
| | Without future plans? | | |
| | Without consideration for other close relationships? | | |
| Overall rating based on RAPFA manual guidance | | | |

4.

| | | Yes | No |
|--|--|-----|----|
| Increased Involvement | Having a baby... | | |
| Without attention to the implications | Because one partner had nowhere to live? | | |
| | Without talking about it? | | |
| | Without a joint decision? | | |
| | Without a background of clear emotional involvement? | | |
| | Without future plans? | | |
| | Without consideration for other close relationships? | | |
| Overall rating based on RAPFA manual guidance | | | |

6. Partner Antisocial Behaviour Checklist:

Now we are going to end the interview by asking some more questions about your partner. Firstly, we're asking all mums whether their partners since conception have had any of the following difficulties in the past....

1. Has he ever been in trouble with the police for any non-violent behaviour/s? For example, stealing, fraud, or selling drugs, or any driving offences?

(Ask if they have been arrested, charged, convicted or gone to prison).

Have you ever been involved in any non-violent activities that are against the law even if you weren't caught?

2. Has he ever been in trouble with the police for any violent behaviour/s? For example, fighting, using a weapon, physically threatening anyone else?

(Ask if they have been arrested, charged, convicted or gone to prison).

Have you ever been involved in any non-violent activities that are against the law even if you weren't caught?

Partner Antisocial Behaviours (Ever)

| | Prison | Convicted | Charged | Arrested | Undetected |
|---------------|--------|-----------|---------|----------|------------|
| Non – Violent | | | | | |
| Violent | | | | | |

Appendix 5 Descriptive Statistics

Maternal Predictor Variables:

Table 5.1

Edinburgh Postnatal Depression Scale Summary Statistics (Both Samples)

| Variable | n | Mean | SD | Range | Skew z score |
|----------|-----|------|------|-------|--------------|
| Ph2 EPDS | 245 | 8.18 | 6.61 | 0-26 | 3.80 |
| Ph4 EPDS | 281 | 5.82 | 4.22 | 0-19 | 5.22 |
| Ph5 EPDS | 866 | 5.66 | 4.74 | 0-26 | 14.53 |
| Ph6 EPDS | 274 | 5.35 | 4.69 | 0-24 | 9.23 |
| Ph8 EPDS | 799 | 5.15 | 4.47 | 0-27 | 14.45 |
| Ph9 EPDS | 243 | 5.21 | 4.97 | 0-24 | 8.40 |

Note. Ph2 = 32-36 weeks gestation; Phase 4= 5 weeks postnatal; Phase 5= 6-8 weeks postnatal; Phase 6= 6 months postnatal; Phase 8 = 12-14 months postnatal; Phase 9 = 27-30 months postnatal

Table 5.2

Correlations between Edinburgh Postnatal Depression Scale Scores at Each Assessment Point (Trajectory Analysis Sample)

| Variable | 1. | 2. | 3. | 4 |
|-------------|------|-------|-------|-------|
| 1. Ph4 EPDS | 1.00 | .75 | .50 | .51 |
| p= | | <.001 | <.001 | <.001 |
| n= | | 250 | 263 | 245 |
| 2. Ph5 EPDS | | 1.00 | .64 | .52 |
| p= | | | <.001 | <.001 |
| n= | | | 243 | 682 |
| 3. Ph6 EPDS | | | 1.00 | .64 |
| p= | | | | <.001 |
| n= | | | | 245 |
| 4. Ph8 EPDS | | | | 1.00 |
| p= | | | | |
| n= | | | | |

Note. Spearman's correlations used for all.

Table 5.3

Edinburgh Postnatal Depression Scale Summary Statistics (Main Thesis Sample)

| Variable | n | Mean | SD | Range | Skew z score |
|----------|-----|------|------|-------|--------------|
| Ph2 EPDS | 245 | 8.19 | 4.61 | 0-26 | 3.80 |
| Ph4 EPDS | 236 | 5.76 | 4.27 | 0-19 | 5.04 |
| Ph5 EPDS | 219 | 5.38 | 4.58 | 0-25 | 6.78 |
| Ph6 EPDS | 235 | 5.37 | 4.61 | 0-24 | 8.47 |
| Ph8 EPDS | 229 | 5.51 | 4.94 | 0-26 | 7.63 |
| Ph9 EPDS | 243 | 5.20 | 4.97 | 0-24 | 8.40 |

Table 5.4 *Correlations between Edinburgh Postnatal Depression Scale Scores at Each Assessment Point (Main Thesis Sample)*

| Variable | 1. | 2. | 3. | 4 | 5. | 6. |
|-------------|------|-------|-------|-------|-------|-------|
| 1. Ph2 EPDS | 1.00 | .43 | .49 | .52 | .49 | .37 |
| p= | | <.001 | <.001 | <.001 | <.001 | <.001 |
| n= | | 235 | 218 | 234 | 228 | 242 |
| 2. Ph4 EPDS | | 1.00 | .76 | .50 | .51 | .37 |
| p= | | | <.001 | <.001 | <.001 | <.001 |
| n= | | | 216 | 226 | 220 | 233 |
| 3. Ph5 EPDS | | | 1.00 | .62 | .51 | .41 |
| p= | | | | <.001 | <.001 | <.001 |
| n= | | | | 212 | 208 | 216 |
| 4. Ph6 EPDS | | | | 1.00 | .63 | .54 |
| p= | | | | | <.001 | <.001 |
| n= | | | | | 221 | 233 |
| 5. Ph8 EPDS | | | | | 1.00 | .60 |
| p= | | | | | | <.001 |
| n= | | | | | | 227 |
| 6. Ph9 EPDS | | | | | | 1.00 |
| p= | | | | | | |
| n= | | | | | | |

Table 5.5

The Structured Clinical Interview for DSM-IV Axis II Disorders Summary Statistics for Antisocial and Borderline Personality Dysfunction

| Variable | n | Mean | SD | Range | Skew z score |
|------------|-----|------|------|-------|--------------|
| Antisocial | 243 | 8.82 | 4.35 | 0-35 | 27.81 |
| Borderline | 245 | 3.07 | 3.97 | 0-19 | 12.31 |

Potential Confounding Variables:

Table 5.6

Confounding Variables Summary Statistics for Continuous Variables

| Variables: | n | Mean | SD | Range | Skew z score |
|-----------------------------------|-----|-------|------|-------|--------------|
| Age | 245 | 27.87 | 6.15 | 18-51 | 3.03 |
| Deprivation | 246 | 2.27 | 1.27 | 1-5 | 4.43 |
| Education | 246 | 18.44 | 5.42 | 16.37 | 10.23 |
| Prenatal mother to partner abuse | 246 | 1.58 | 2.37 | 0-11 | 11.48 |
| Prenatal partner to mother abuse | 246 | 2.55 | 2.55 | 0-14 | 7.89 |
| Postnatal mother to partner abuse | 229 | 1.69 | 1.92 | 0-12 | 10.23 |
| Postnatal mother to partner abuse | 229 | 1.44 | 2.30 | 0-14 | 14.39 |

Note. Age= mothers' age at 20 weeks gestation (point of consent); Deprivation= Index of Multiple Deprivation score at 20 weeks gestation, quintiles ranging from 1 'most deprived' and 5 'least deprived used to aid interpretation; Education = mothers' age at leaving full time education; Mother to partner abuse = mother to partner psychological abuse score; Partner to mother abuse= partner to mother psychological abuse score (postnatal calculated by taking mean of scores from birth to child aged 12-14 months).

Table 5.7

Confounding Variables Frequency Statistics for Binary Variables

| | 0 | % | 1 | % |
|---------------------------------------|-----|------|----|------|
| Smoking in pregnancy (<i>n</i> =242) | 203 | 83.9 | 39 | 16.1 |
| Cohabitation status (<i>n</i> =245) | 217 | 11.4 | 28 | 88.6 |

Note. 0 = no smoking or single; 1= smoked during pregnancy or in a relationship.

Table 5.8

Associations between Confounding Variables

| Variables: | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. |
|--|------|---------------|---------------|---------------|---------------|--------------|--------------|--------------|---------------|
| Age <i>n</i> = | 1.00 | -.37** 245 | -.25** 241 | .26** 244 | .33** 245 | -.15* 245 | -.19* 245 | -.16* 228 | -.24* 228 |
| Deprivation <i>n</i> = | | 1.00 | .32** 242 | -.20** 245 | -.26** 246 | .16* 246 | .10 246 | .07 229 | .22* 229 |
| Smoking <i>n</i> = | | | 1.00 | -.09** 242 | -.31** 242 | .31** 242 | .25** 242 | .26** 226 | .27** 226 |
| Cohabitation <i>n</i> = | | | | 1.00 | .22** 245 | -.04 245 | .01 245 | -.09 229 | -.18** 229 |
| Education <i>n</i> = | | | | | 1.00 | -.02 246 | -.08 246 | -.02 229 | -.01 229 |
| Prenatal mother to partner abuse <i>n</i> = | | | | | | 1.00 | .51** 246 | .41** 229 | .50** 229 |
| Prenatal partner to mother abuse <i>n</i> = | | | | | | | 1.00 | .61** 229 | .46** 229 |
| Postnatal mother to partner abuse <i>n</i> = | | | | | | | | 1.00 | .65** 229 |
| Postnatal partner to mother abuse <i>n</i> = | | | | | | | | | 1.00 |

Note. ** $p < .001$; * $p < .05$; Spearman's correlations used for all; Age= mothers' age at 20 weeks gestation (point of consent); Deprivation= Index of Multiple Deprivation score at 20 weeks gestation, quintiles ranging from 1 'most deprived' and 5 'least deprived used to aid interpretation; Smoking = binary variable representing smoking status during pregnancy; Cohabitation = binary variable indicating cohabitation status at 32-36 weeks gestation; Education = mothers' age at leaving full time education; Mother to partner abuse = mother to partner psychological abuse score; Partner to mother abuse= partner to mother psychological abuse score (postnatal calculated by taking mean of scores from birth to child aged 12-14 months).

Child Outcome Measures:

Table 5.9

Child Behaviour Checklist Aggression Scale Raw Score Summary Statistics

| | n | Mean | SD | Range | Skew z score |
|-----------------|-----|------|------|-------|--------------|
| CBCL aggression | 246 | 8.01 | 5.32 | 0-34 | 6.58 |

Table 5.10

Severe Aggression Measure: Total Physical Aggression Score across Domains (n=244)

| | n | Mean | SD | Range | Skew z score |
|-------------|-----|------|------|-------|--------------|
| Total score | 244 | 3.55 | 2.99 | 0-15 | 5.17 |

Note. Total score= Total physical aggression score across domains on aggression interview.

Table 5.11

Severe Aggression Measure: Physical Aggression to Parents Overall Rating (n=244)

| Overall score | n | % |
|---------------|----|------|
| 0 | 74 | 30.3 |
| 1 | 34 | 13.9 |
| 2 | 45 | 18.4 |
| 3 | 45 | 18.4 |
| 4 | 39 | 16.0 |
| 5 | 5 | 2.0 |
| 6 | 2 | 0.8 |

Table 5.12

Severe Aggression Measure: Physical Aggression to Other Adults Overall Rating (n=244)

| Overall score | n | % |
|---------------|-----|------|
| 0 | 197 | 80.7 |
| 1 | 18 | 7.4 |
| 2 | 21 | 8.6 |
| 3 | 3 | 1.2 |
| 4 | 5 | 2.1 |
| 5 | 0 | - |

Table 5.13

Severe Aggression Measure: Physical Aggression to Family Children Overall Rating (n=244)

| Overall score | n | % |
|---------------|-----|------|
| 0 | 164 | 67.2 |
| 1 | 23 | 9.4 |
| 2 | 22 | 9.0 |
| 3 | 16 | 6.6 |
| 4 | 12 | 4.9 |
| 5 | 7 | 2.9 |

Table 5.14

Severe Aggression Measure: Physical Aggression to Other Children Overall Rating (n=244)

| Overall score | n | % |
|---------------|-----|------|
| 0 | 175 | 71.7 |
| 1 | 32 | 13.1 |
| 2 | 25 | 10.2 |
| 3 | 12 | 4.9 |
| 4 | 0 | - |
| 5 | 0 | - |

Table 5.15

Peer Physical Aggression Frequency Statistics (n=223)

| | n | % |
|-----------|-----|------|
| None | 159 | 71.3 |
| Sometimes | 44 | 19.7 |
| Often | 20 | 9.0 |

Potential Mediating Variables:

Table 5.16

Establishment Interview Frequency Statistics (n=227)

| | 0 | % | 1 | % |
|---|-----|------|----|------|
| Increased involvement in spite of problems | 194 | 85.5 | 33 | 14.5 |
| Increased involvement without attention to implications | 146 | 64.3 | 81 | 35.7 |

Note. 0= Rated as not present; 1= Rated as present.

Table 5.17

Partner Antisocial Behaviour Frequency Statistics (n=227)

| | 0 | % | 1 | % |
|-----------------------------------|-----|------|----|------|
| Presence of an antisocial partner | 172 | 75.8 | 55 | 24.2 |

Appendix 6 Frequency Distributions for Edinburgh Postnatal Depression Scale Scores for the Trajectory Analysis Sample

Table 6.1

Phase 4 (5 weeks) Scores

| P4 EPDS total score | | | | | |
|---------------------|-----------|---------|---------------|--------------------|-------|
| | Frequency | Percent | Valid Percent | Cumulative Percent | |
| | .00 | 25 | 2.5 | 8.9 | 8.9 |
| | 1.00 | 19 | 1.9 | 6.8 | 15.7 |
| | 2.00 | 25 | 2.5 | 8.9 | 24.6 |
| | 3.00 | 27 | 2.7 | 9.6 | 34.2 |
| | 4.00 | 23 | 2.3 | 8.2 | 42.3 |
| | 5.00 | 26 | 2.6 | 9.3 | 51.6 |
| | 6.00 | 29 | 2.9 | 10.3 | 61.9 |
| | 7.00 | 23 | 2.3 | 8.2 | 70.1 |
| | 8.00 | 19 | 1.9 | 6.8 | 76.9 |
| | 9.00 | 10 | 1.0 | 3.6 | 80.4 |
| Valid | 10.00 | 17 | 1.7 | 6.0 | 86.5 |
| | 11.00 | 7 | .7 | 2.5 | 89.0 |
| | 12.00 | 10 | 1.0 | 3.6 | 92.5 |
| | 13.00 | 7 | .7 | 2.5 | 95.0 |
| | 14.00 | 3 | .3 | 1.1 | 96.1 |
| | 15.00 | 2 | .2 | .7 | 96.8 |
| | 16.00 | 2 | .2 | .7 | 97.5 |
| | 17.00 | 4 | .4 | 1.4 | 98.9 |
| | 18.00 | 1 | .1 | .4 | 99.3 |
| | 19.00 | 2 | .2 | .7 | 100.0 |
| | Total | 281 | 28.2 | 100.0 | |
| Missing | System | 716 | 71.8 | | |
| Total | | 997 | 100.0 | | |

Phase 5 (6-8 weeks) Scores

P5 EPDS total score

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|----------------|-----------|---------|---------------|--------------------|
| .00 | 93 | 9.3 | 10.7 | 10.7 |
| 1.00 | 87 | 8.7 | 10.0 | 20.8 |
| 2.00 | 82 | 8.2 | 9.5 | 30.3 |
| 3.00 | 75 | 7.5 | 8.7 | 38.9 |
| 4.00 | 80 | 8.0 | 9.2 | 48.2 |
| 5.00 | 72 | 7.2 | 8.3 | 56.5 |
| 6.00 | 65 | 6.5 | 7.5 | 64.0 |
| 7.00 | 52 | 5.2 | 6.0 | 70.0 |
| 8.00 | 52 | 5.2 | 6.0 | 76.0 |
| 9.00 | 46 | 4.6 | 5.3 | 81.3 |
| 10.00 | 38 | 3.8 | 4.4 | 85.7 |
| 11.00 | 35 | 3.5 | 4.0 | 89.7 |
| Valid 12.00 | 17 | 1.7 | 2.0 | 91.7 |
| 13.00 | 17 | 1.7 | 2.0 | 93.6 |
| 14.00 | 11 | 1.1 | 1.3 | 94.9 |
| 15.00 | 7 | .7 | .8 | 95.7 |
| 16.00 | 8 | .8 | .9 | 96.7 |
| 17.00 | 7 | .7 | .8 | 97.5 |
| 18.00 | 5 | .5 | .6 | 98.0 |
| 19.00 | 7 | .7 | .8 | 98.8 |
| 20.00 | 2 | .2 | .2 | 99.1 |
| 23.00 | 2 | .2 | .2 | 99.3 |
| 25.00 | 3 | .3 | .3 | 99.7 |
| 26.00 | 3 | .3 | .3 | 100.0 |
| Total | 866 | 86.9 | 100.0 | |
| Missing System | 131 | 13.1 | | |
| Total | 997 | 100.0 | | |

Phase 6 (6 months) Scores

P6 EPDS total score

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|----------------|-----------|---------|---------------|--------------------|
| .00 | 32 | 3.2 | 11.7 | 11.7 |
| 1.00 | 30 | 3.0 | 10.9 | 22.6 |
| 2.00 | 30 | 3.0 | 10.9 | 33.6 |
| 3.00 | 20 | 2.0 | 7.3 | 40.9 |
| 4.00 | 29 | 2.9 | 10.6 | 51.5 |
| 5.00 | 16 | 1.6 | 5.8 | 57.3 |
| 6.00 | 27 | 2.7 | 9.9 | 67.2 |
| 7.00 | 16 | 1.6 | 5.8 | 73.0 |
| 8.00 | 22 | 2.2 | 8.0 | 81.0 |
| 9.00 | 9 | .9 | 3.3 | 84.3 |
| 10.00 | 12 | 1.2 | 4.4 | 88.7 |
| Valid 11.00 | 5 | .5 | 1.8 | 90.5 |
| 12.00 | 6 | .6 | 2.2 | 92.7 |
| 13.00 | 2 | .2 | .7 | 93.4 |
| 14.00 | 4 | .4 | 1.5 | 94.9 |
| 15.00 | 1 | .1 | .4 | 95.3 |
| 16.00 | 6 | .6 | 2.2 | 97.4 |
| 17.00 | 1 | .1 | .4 | 97.8 |
| 18.00 | 1 | .1 | .4 | 98.2 |
| 21.00 | 1 | .1 | .4 | 98.5 |
| 23.00 | 3 | .3 | 1.1 | 99.6 |
| 24.00 | 1 | .1 | .4 | 100.0 |
| Total | 274 | 27.5 | 100.0 | |
| Missing System | 723 | 72.5 | | |
| Total | 997 | 100.0 | | |

Phase 8 (12-14 months) Scores

P8 EPDS total score

| | Frequency | Percent | Valid Percent | Cumulative Percent |
|----------------|-----------|---------|---------------|--------------------|
| .00 | 108 | 10.8 | 13.5 | 13.5 |
| 1.00 | 69 | 6.9 | 8.6 | 22.2 |
| 2.00 | 84 | 8.4 | 10.5 | 32.7 |
| 3.00 | 92 | 9.2 | 11.5 | 44.2 |
| 4.00 | 71 | 7.1 | 8.9 | 53.1 |
| 5.00 | 55 | 5.5 | 6.9 | 59.9 |
| 6.00 | 66 | 6.6 | 8.3 | 68.2 |
| 7.00 | 51 | 5.1 | 6.4 | 74.6 |
| 8.00 | 49 | 4.9 | 6.1 | 80.7 |
| 9.00 | 30 | 3.0 | 3.8 | 84.5 |
| 10.00 | 33 | 3.3 | 4.1 | 88.6 |
| 11.00 | 22 | 2.2 | 2.8 | 91.4 |
| 12.00 | 14 | 1.4 | 1.8 | 93.1 |
| Valid 13.00 | 14 | 1.4 | 1.8 | 94.9 |
| 14.00 | 7 | .7 | .9 | 95.7 |
| 15.00 | 8 | .8 | 1.0 | 96.7 |
| 16.00 | 5 | .5 | .6 | 97.4 |
| 17.00 | 5 | .5 | .6 | 98.0 |
| 18.00 | 7 | .7 | .9 | 98.9 |
| 19.00 | 2 | .2 | .3 | 99.1 |
| 20.00 | 2 | .2 | .3 | 99.4 |
| 21.00 | 1 | .1 | .1 | 99.5 |
| 22.00 | 1 | .1 | .1 | 99.6 |
| 24.00 | 1 | .1 | .1 | 99.7 |
| 26.00 | 1 | .1 | .1 | 99.9 |
| 27.00 | 1 | .1 | .1 | 100.0 |
| Total | 799 | 80.1 | 100.0 | |
| Missing System | 198 | 19.9 | | |
| Total | 997 | 100.0 | | |

Appendix 7 Graphical Plots from Longitudinal Latent Class Analysis

