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DOMINIC PLANT

**WHEN ONE CHILDHOOD MEETS ANOTHER – MATERNAL
CHILD MALTREATMENT AND OFFSPRING CHILD
PSYCHOPATHOLOGY**

**SECTION A: MATERNAL CHILD MALTREATMENT AND
OFFSPRING CHILD PSYCHOPATHOLOGY: A SYSTEMATIC
REVIEW**

7,972 (292) words

**SECTION B: MATERNAL CHILD MALTREATMENT AND
OFFSPRING CHILD PSYCHOPATHOLOGY: A LONGITUDINAL
STUDY**

8,000 (283) words

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Summary

Section A of this thesis synthesises existing empirical literature on the relationship between a mother's experience of maltreatment in her own childhood and her child's experience of psychopathology. Section B details an empirical investigation, using a longitudinal design, into the impact of a mother's child maltreatment history on her child's experience of preadolescent internalising and externalising difficulties.

Analysis focuses on discerning key mediating pathways between a mother's history of child maltreatment and her child's experience of psychopathology.

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**Section A: Maternal Child Maltreatment and
Offspring Child Psychopathology: A Systematic
Review**

7,972 (292) words

Abstract

Background: Child maltreatment can have a long-term impact on mental health. Less is known about the consequences of child maltreatment on the next generation's psychological wellbeing.

Objectives: This systematic review aimed to synthesise existing empirical literature on the association between a mother's history of maltreatment in her own childhood and her children's experience of psychopathology.

Method: Electronic database and hand searches yielded 12 studies, with a combined sample size of 45,723 mother-child dyads, which met criteria for inclusion in the review.

Results: Overall, there was evidence of positive association between a mother's history of child maltreatment and her child's experience of emotional and behavioural difficulties across childhood and adolescence. Maternal mental health difficulties and poorer parenting practices were found to be key mediating pathways of this association.

Conclusion: Children of mothers exposed to child maltreatment appear to be at an increased risk for psychopathology. Mothers with traumatic childhood experiences could be offered improved access to psychological therapies and parenting programmes to help mitigate the potential impact of child maltreatment on future generations.

Keywords: childhood abuse; trauma; child behaviour problems; adolescents; intergenerational

Note on Terminology

There is considerable debate around the most helpful way of referring to the emotional experiences described in the review. In keeping with Division of Clinical Psychology (DCP) guidance on the use of language in relation to functional diagnosis (DCP, 2015), a brief foreword is provided on the choice of language used. This review aims to speak to a wide audience, including clinicians, such as psychologists, psychiatrists and general practitioners, professionals from allied health disciplines, policymakers and academic researchers. It aims to refer to emotional distress in a way that can be understood by individuals from multiple disciplines, in order to foster increased understanding and utility of findings. The term “psychopathology” is therefore used throughout this review to refer to psychological distress as captured by a wide range of measures across individuals of varying ages.

Child maltreatment constitutes a major public health issue (World Health Organization, 2015). It is regarded as acts of commission or omission towards children (commonly defined as up to 18 years of age) that cause significant harm or the potential or threat of harm to children's development and health (Krug, Dahlberg, Mercy, Zwi, & Lozano, 2002). The most widely acknowledged forms of child maltreatment include (i) physical abuse, (ii) sexual abuse, (iii) emotional abuse (also referred to as psychological abuse) and (iv) neglect (Cicchetti & Toth, 2005; Gilbert et al., 2009; Norman et al., 2012). Exposure to domestic violence is also becoming an increasingly recognised form of maltreatment (Gilbert et al., 2009), which is reflected by the National Society for Prevention of Cruelty to Children (NSPCC) and the United Kingdom (UK) government identifying it as an adverse experience against which to safeguard children (Department for Education, 2015b; NSPCC, 2014).

It is estimated that up to 80% of acts of child maltreatment are perpetrated by parents and guardians, and multiple abuse types and neglect are often found to co-occur (Gilbert et al., 2009). Global prevalence rates for child maltreatment remain uncertain, with estimates varying between 2% and 62% (Norman et al., 2012). Likely reasons for these discrepancies include much child maltreatment remaining concealed and undisclosed due to stigma and fear, as well as varying levels of acknowledgement of child maltreatment experiences across different societies. In the UK over 49,000 children in England were subjects of a child protection plan as recorded in 2015: over 22,000 for being exposed to neglect, over 18,000 for being exposed to emotional abuse, over 3,000 for being exposed to physical abuse and over 2,000 for being exposed to sexual abuse (Department for Education, 2015a).

Consequences of Child Maltreatment

The impact of child maltreatment can vary widely; stark immediate consequences include physical injuries and death, due chiefly to gross neglect and abuse, and homicide (Krug et al., 2002; Pinheiro, 2006). Lower school performance and academic achievement has been reported in children who experienced maltreatment in comparison with their peers (Boden, Horwood, & Fergusson, 2007; Jonson-Reid, Drake, Kim, Porterfield, & Han, 2004). Several studies have demonstrated that child maltreatment, including the impact of exposure to domestic violence (Kitzmann, Gaylord, Holt, & Kenny, 2003; Moylan et al., 2010), predicts emotional and behavioural difficulties through childhood and adolescence, including externalising (disruptive behaviour, delinquency, violence, substance use) psychopathology, internalising (depression, anxiety, posttraumatic stress) psychopathology, low self-esteem, peer problems and risky sexual behaviour (Appleyard, Egeland, van Dulmen, & Sroufe, 2005; Herrenkohl & Herrenkohl, 2007; Kendall-Tackett, Williams, & Finkelhor, 1993; Lansford et al., 2002; Maas, Herrenkohl, & Sousa, 2008; Manly, Kim, Rogosch, & Cicchetti, 2001; McLaughlin et al., 2012; Simpson & Miller, 2002; Thornberry, Ireland, & Smith, 2001).

Affect processing and regulation has been identified as a key psychological mechanism linking exposure to maltreatment with vulnerability for psychopathology. Maltreated children have been shown to experience heightened fear and emotion dysregulation compared to their peers, which is associated with internalising and externalising difficulties (Maughan & Cicchetti, 2002). Furthermore, shame has been found to mediate the relationship between child maltreatment and anger and child externalising psychopathology (Bennett, Sullivan, & Lewis, 2005), as well as the relationship with depression (Stuewig & McCloskey, 2005). Shame-proneness also increases vulnerability for posttraumatic stress disorder (PTSD) symptomatology

(Pineles, Street, & Koenen, 2006). Child maltreatment appears to have implications for the development of secure attachment, with maltreated children showing elevated rates of insecure attachment in comparison with non-maltreated children (Cicchetti & Toth, 2005; Stronach et al., 2011). Insecure attachment is thought to negatively affect internal representations of relatedness with others and one's sense of self, which is regarded as initially developing in the context of the infant-caregiver relationship, with responsive, attuned and warm caregiving being viewed as central for the development of secure attachment (Bowlby, 1969, 1980). These internal representations are thought to be carried forwards in life, with the potential to influence emotion processing, regulation and behaviour, such that insecure attachment styles are associated with low self-esteem, interpersonal problems, and internalising and personality disorder symptomatology (Cicchetti & Toth, 2005; Lee & Hankin, 2009; Mikulincer & Shaver, 2012).

Contemporary research has investigated the long-term psychological sequelae of child maltreatment. An established link between child maltreatment and adult mental health problems has been documented in the literature. Study findings have indicated that child maltreatment is associated with adult occurrence of major depressive disorder (MDD), PTSD, substance use disorders, antisocial personality disorder, borderline personality disorder and suicide attempts (Bierer et al., 2003; Bifulco, Moran, Baines, Bunn, & Stanford, 2002; Collishaw, Pickles, et al., 2007; Dube et al., 2001; Green et al., 2010; Keyes et al., 2012; McCauley et al., 1997; Norman et al., 2012; Widom, DuMont, & Czaja, 2007). Child maltreatment appears to have persistent effects; a recent meta-analysis revealed that it is associated with an elevated risk for developing recurrent and chronic MDD through adulthood (Nanni, Uher, & Danese, 2012). It has also been shown to predict poorer adult functioning, further highlighting its long-term debilitating

potential (McLaughlin et al., 2010). Moreover, child maltreatment has been identified as a key risk factor for mood disorders at vulnerable life stages such as the perinatal period in women (Choi & Sikkema, 2015). This body of literature suggests that individuals who were exposed to maltreatment in childhood are at a heightened risk of experiencing keen psychological distress through their life course.

Impact of Child Maltreatment on the Next Generation

Studies have investigated the recurrence of maltreatment experiences across adjacent generations. Findings have been contentious, with some studies documenting evidence for the intergenerational cycle of child maltreatment (Berlin, Appleyard, & Dodge, 2011; Cort, Toth, Cerulli, & Rogosch, 2011; Dixon, Browne, & Hamilton-Giachritsis, 2005; Egeland, Jacobvitz, & Sroufe, 1988), and others finding minimal support (Sidebotham & Golding, 2001; Zuravin, Mcmillen, Depanfilis, & Risley-Curtiss, 1996). Wide methodological variation across studies, due particularly to the ethical inability to implement experimental designs, which is an inherent limitation of many cohort studies, likely accounts for these discrepant findings. Indeed, a recent systematic review reported mixed findings, warning that methodological weaknesses in most studies documenting an intergenerational effect means positive findings should be interpreted with caution (Thornberry, Knight, & Lovegrove, 2012). Notably, while findings of those studies reporting a positive association suggest that children of mothers who experienced maltreatment in their own childhood are at an increased risk of being exposed to maltreatment themselves, it does not mean that maltreated mothers will inevitably maltreat their own children. Safe, stable and nurturing relationships have been observed to buffer against the intergenerational transmission of maltreatment experiences (Jaffee et al., 2013).

Studies have also demonstrated that mothers who experienced maltreatment often experience greater difficulties in parenting. A history of child maltreatment is associated with increased intrusiveness towards their own children, decreased sensitivity, decreased responsiveness, lower rated confidence in parenting abilities and increased use of harsh discipline, including physical discipline (Bert, Guner, & Lanzi, 2009; Lomanowska, Boivin, Hertzman, & Fleming, 2015; Moehler, Biringen, & Poustka, 2007). Insensitive, hostile and punitive parenting styles are associated with increased child internalising and externalising difficulties (Enns, Cox, & Clara, 2002; Martin, Bergen, Roeger, & Allison, 2004; Stanger, Dumenci, Kamon, & Burstein, 2004; Stormshak, Bierman, McMahon, & Lengua, 2000; Tremblay et al., 2004; Wakschlag & Hans, 1999).

Research on the intergenerational transmission of attachment security highlights the crucial role of a mother's ability to view her infant's behaviour in terms of mental states, reflective function (Fonagy & Target, 1997), and her ability to mentalise for the infant. Indeed, studies have demonstrated that mothers with poorer attachment status' exhibit poorer reflective function which directly predicts disorganisation in her child's attachment patterns (Slade et al., 2005.), thereby increasing vulnerability to experiencing later emotional distress (Cicchetti & Toth, 2005). Mothers who experienced traumatic events in childhood have been observed to have attachment disorganisation in adulthood (Lyons-Ruth, Yellin, Melnick & Atwood, 2003), suggesting this to be a potential psychological mechanism for the intergenerational transmission of traumatic experiences and their psychological sequelae.

Family systems theory posits that dominant beliefs and narratives are embedded within the family context and therefore become shared across generations (Byng-Hall, 1985). Past patterns of relating, thinking, feeling and being can be brought into the present in the form of beliefs and narratives for interpersonal relating and wider family

life (Byng-Hall, 1986; Vetere & Dallos, 2008). Hence, the second generation can become exposed to past adverse experiences of the first generation through their psychological sequelae. In the case of the impact of maternal child maltreatment, the summarised literature suggests that a mother's experience of maltreatment in her own childhood likely increases her vulnerability to experiencing later psychopathology, developing poorer models of interpersonal relating and affect regulation, experiencing difficulties in parenting and the increased likelihood of exposing her child to maltreatment. Indeed, maternal psychopathology per se has been identified as a risk factor for child psychopathology; children of depressed and anxious mothers have been shown to experience elevated rates of depression, anxiety, and antisocial behaviour across childhood, with research reporting maternal antenatal depression and recurrent depression to be particularly salient risks (Barker, 2012; Halligan, Murray, Martins, & Cooper, 2007; Hay, Pawlby, Waters, Perra, & Sharp, 2010; Mars et al., 2015; Pawlby, Hay, Sharp, Waters, & O'Keane, 2009; Pawlby, Sharp, Hay, & O'Keane, 2008; Sanger, Iles, Andrew, & Ramchandani, 2015; Sellers et al., 2013; Van den Bergh, Van Calster, Smits, Van Huffel, & Lagae, 2008). Collectively, these summarised lines of research can be viewed as providing sustenance for the hypothesis that children of mothers maltreated during childhood may be at an increased risk of experiencing emotional and behavioural psychopathology.

Review Aims

Despite the well-documented relationships between child maltreatment and later psychopathology outcomes, parenting and maltreatment experiences in the next generation, there has been no comprehensive review on the association between child maltreatment in the first generation and child psychopathology in the adjacent generation. The purpose of this systematic review is to synthesise existing empirical

literature on the relationship between a mother's history of maltreatment in her own childhood (henceforth referred to as "maternal child maltreatment") and her children's experience of psychopathology. The systematic review therefore sets out (i) to determine if there is a reliable association between maternal child maltreatment and offspring child psychopathology, and (ii) to characterise the mediating pathways that may underpin such an association. Given that theory posits multiple contributory familial factors to the emergence of child psychopathology, it is timely to assess whether these factors are indeed part of the trajectory between maternal child maltreatment and offspring child psychopathology. Findings from this review are expected to advance psychological theory on the developmental and transgenerational trajectories of child psychopathology and adversity, and to inform clinical psychology practice on preventative and intervention methods to reduce levels of child psychological distress.

Method

Literature Search Process

Electronic databases (MEDLINE, PubMed, PsycINFO, Embase, Cochrane Library) were searched for articles relating to maternal child maltreatment (search terms: maternal child* abuse OR maternal child* maltreatment OR maternal child* trauma OR maternal child* victimi* OR maternal child* neglect) and (AND) child psychopathology (depress* OR anxiety OR psychopathology OR conduct OR antisocial OR disruptive OR PTSD OR internali* OR externali* OR adjustment OR maladjustment OR behavio*). Citations from inception of the databases up to 28th October 2015 were included for review. Additional citations were identified through hand searches of key reference lists.

All abstracts and titles of retrieved citations were screened for eligibility. Articles were retrieved for full text review if they met the following inclusion criteria: (i) published in a peer-review journal in English, (ii) reported an empirical investigation, (iii)

included measurement of maternal maltreatment experiences in the childhood period (< 18 years), (iv) measured child psychopathology (emotional/behavioural problems) in the childhood period (< 18 years) and (v) tested for association between (iii) and (iv). When multiple articles reported on data derived from the same study sample, each article was evaluated individually and included in the review if different outcomes (child psychopathology) and/or exposures (maternal child maltreatment) were assessed. Individual articles are hereon referred to as “studies” to denote their investigation of distinct research questions. Figure 1 summarises the systematic literature search process.

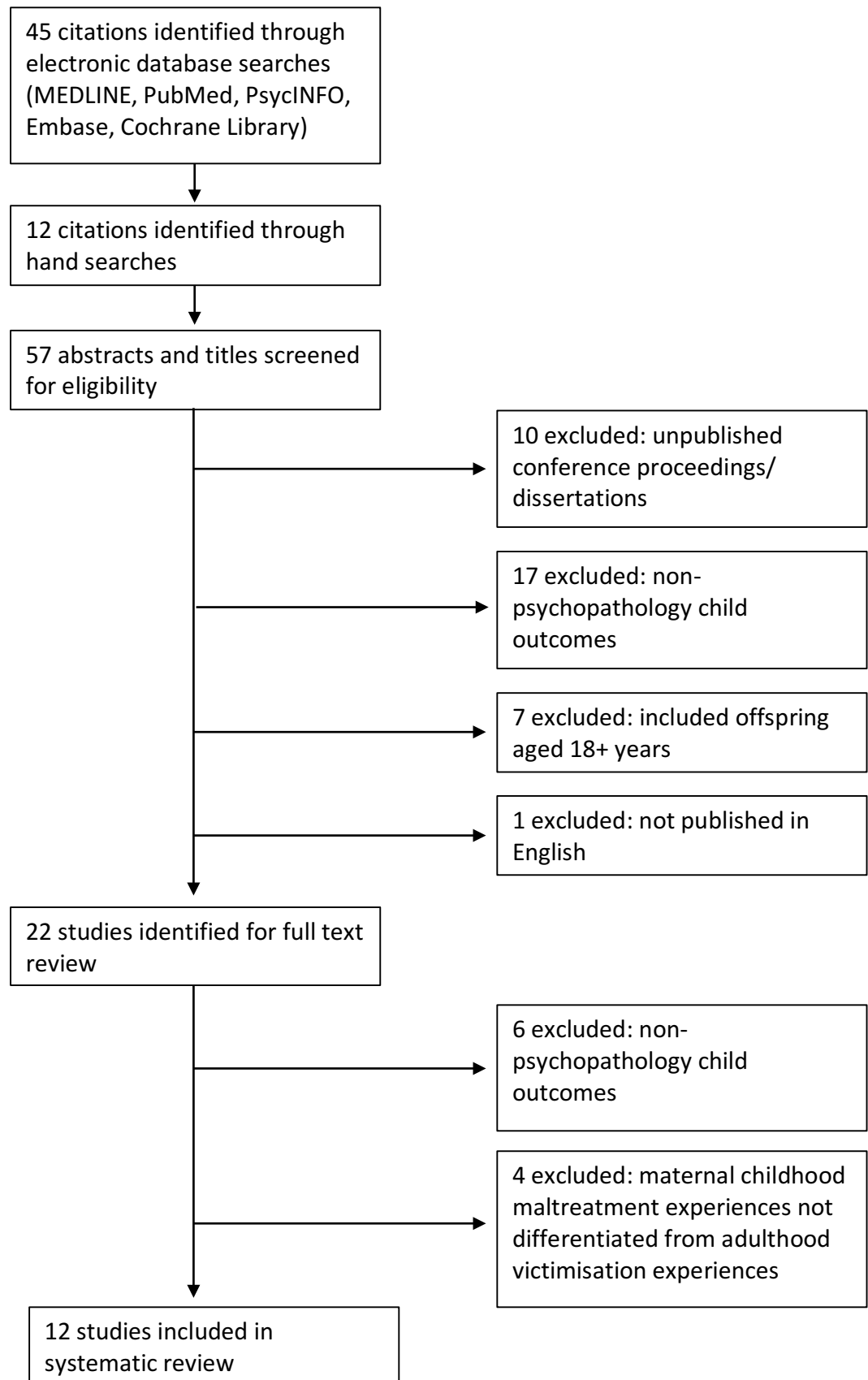


Figure 1. PRISMA flow diagram of literature search process

Data Extraction and Analysis

Relevant details on study design, sample characteristics, exposure and outcome variables, and key findings relating to the association between maternal child maltreatment and child psychopathology were summarised into a standardised extraction form for all studies which met the inclusion criteria. The methodological quality of studies was evaluated with reference to guidelines set forth by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement checklist (von Elm et al., 2007; see Appendix C). Yes/no ratings were given for each of the 22 checklist items, specific to study design, to yield an overall “methodological quality” index (0-22), whereby a higher score indicates greater methodological quality.

Descriptive analysis of types of maternal child maltreatment experiences (e.g. emotional/physical/sexual abuse/neglect), forms of child psychopathology (e.g. emotional problems, behavioural problems, clinical disorder etc.), assessment instruments (e.g. validated questionnaires, semi-structured interview, informant type) and statistical methods was undertaken. Study findings were categorised by form of psychopathology. Data on the association between maternal child maltreatment and child psychopathology analysed using multiple regression, analysis of variance (ANOVA) and structural equation modelling (SEM) were examined to identify covariates and mediators. Due to the heterogeneity of study designs, measurement and statistical methods, quantitative pooled analysis of effect sizes was not feasible.

Table 1. Summary of reviewed studies

First author, year	Country	Design, setting	Sample	Maternal child maltreatment	Child psychopathology	Relevant findings	STROBE index
Myhre, 2014	Norway	Cohort, community	25,452 pregnant women followed to child age 3 years	Emotional abuse (8%), physical abuse, sexual abuse (9% physical/ sexual, 18% any); questions based on the NorAQ	Externalising problems ($M = 5.8$, $SD = 3.1$) at 3 years; CBCL (parental reports)	(+) Maternal emotional abuse and physical/sexual abuse predicted externalising problems, adjusted for maternal age, education, marital status, adulthood abuse & child gender (emotional abuse: $B = 0.6$, 95% CI [0.4, 0.7]; physical/sexual abuse: $B = 0.4$, 95% CI [0.3, 0.6]). Effect partially mediated by maternal psychological distress	18
Rijlaarsdam, 2014	Netherlands	Cohort, community	4,438 pregnant women followed to child age 6 years	Physical abuse, emotional abuse, sexual abuse, emotional neglect, physical neglect (6% physical abuse/neglect, 8% emotional abuse/neglect, 6% sexual abuse); CTQ	Internalising (11%) & externalising (7%) problems at 6 years; CBCL (parental reports) & BPI (child reports)	(+) MCM associated with internalising problems and BPI externalising, & predicted CBCL internalising, adjusted for maternal age, ethnicity, marital status, education, parity, family income, child prior total	17

First author, year	Country	Design, setting	Sample	Maternal child maltreatment	Child psychopathology	Relevant findings	STROBE index
Min, 2013	USA	Cohort, community	231 mother-child dyads identified as high risk for pregnancy drug use followed from childbirth to age 9 years	Physical abuse, emotional abuse, sexual abuse, emotional neglect, physical neglect (50% any); CTQ	Total problems (internalising, externalising, attention) & DSM-IV disorder symptoms (internalising, externalising, attention; $M = 20.5$, $SD = 9.9$, INT; $M = 3.9$, $SD = 3.6$, EXT; $M = 6.6$, $SD = 4.3$, ATT) at 9 years; CBCL (parental reports, problems), DI (child reports, DSM-IV symptoms)	problems, age & gender ($\beta = 0.04$). Effect partially mediated by maternal psychological distress. Indirect effect of MCM on externalising problems (CBCL/BPI) through parental psychological distress & harsh discipline (+) MCM predicted maternal-rated problems (latent factor: INT, EXT, ATT), adjusted for maternal age, education & ethnicity ($\beta = 0.15$). Effect partially mediated by maternal psychological distress. Indirect effect of MCM on DSM-IV disorder symptoms (latent factor: INT, EXT, ATT) through maternal low social support	19

First author, year	Country	Design, setting	Sample	Maternal child maltreatment	Child psychopathology	Relevant findings	STROBE index
Miranda, 2013	Spain	Cross-sectional, clinic	327 outpatient adolescents (8-17 years) & their mothers	Sexual abuse, physical abuse, emotional abuse (14% any); structured interview	Internalising (36%) & externalising (33%) problems at 8-17 years; CBCL (parental reports)	(+) MCM associated with externalising problems ($r_b = 0.11$). Effect fully mediated by maternal psychological distress, adjusted for child age & gender	20
Plant, 2013	UK	Cohort, community	125 pregnant women followed to child age 16 years	Physical abuse, sexual abuse, emotional neglect, physical neglect (18% any 2+); semi-structured interview	DSM-IV DBDs ($M = 2.8, SD = 4.3, 11$ years; $M = 2.7, SD = 4.1, 16$ years) & depression ($M = 0.6, SD = 0.9, 11$ years; $M = 1.2, SD = 1.3, 16$ years) symptoms at 11 & 16 years; CAPA (combined parental & child reports)	(+) MCM associated with DBDs symptoms (latent factor: 11, 16 years; $r_b = 0.3$). Effect fully mediated by child maltreatment & moderated by maternal depression, adjusted for maternal age, education, child ethnicity & gender	17
Miranda, 2011	Spain	Cross-sectional, clinic	547 outpatient adolescents (8-17 years) & their parents	Emotional abuse, sexual abuse, physical abuse (12% any); structured interview	Internalising, externalising problems & DSM-IV disorder diagnoses (DBDs, mood, anxiety, eating, elimination disorders) at 8-17	(+) MCM associated with externalising problems, eating disorders & total DSM-IV diagnoses. MCM predicted DBDs diagnoses, adjusted for maternal and paternal	17

First author, year	Country	Design, setting	Sample	Maternal child maltreatment	Child psychopathology	Relevant findings	STROBE index
Lang, 2010	USA	Cohort, community	31 pregnant women followed to child age 1 year	Emotional abuse, physical abuse, sexual abuse; CTQ subscales	years; CBCL (parental reports, problems), DICA-IV (combined parental & child reports, DSM-IV diagnoses) Affect at 1 year; IBQ-R (parental reports)	DSM-IV diagnoses, partner violence, child age, gender, comorbid DSM-IV diagnoses & physical punishment (OR = 1.9, 95% CI [1.0, 3.6]) (#) Maternal physical abuse predicted negative affect ($\beta = 0.5$), but maternal emotional abuse negatively predicted negative affect ($\beta = -0.6$), adjusted for maternal postnatal depression & PTSD	15
Collishaw, 2007	UK	Cohort, community	5,619 pregnant women followed to child age 7 years	Sexual abuse (11%), physical abuse (3%), emotional abuse (8%; 17% any); questionnaire	Total problems (internalising, externalising) at 4 ($M = 8.8, SD = 4.5$) & 7 years ($M = 7.7, SD = 4.9$, parent; $M = 6.6, SD = 6.1$, teacher); SDQ (parental & teacher reports – 7 years	(+) MCM associated with total problems at 4 & 7 (parent & teacher reports) and predicted poorer adjustment trajectories 4-7 years (parent reports). Effect fully mediated by maternal psychological distress, parenting	19

First author, year	Country	Design, setting	Sample	Maternal child maltreatment	Child psychopathology	Relevant findings	STROBE index
Thompson, 2007	USA	Cohort, community	197 mother-child dyads identified as high-risk for child maltreatment followed from <2 years to 4 years	Physical abuse (26%); semi-structured interview	only) Total problems (internalising, externalising) at 4 years ($M = 51.1$, $SD = 9.3$, total problems); CBCL (parental reports)	hostility & life events (+) Maternal physical abuse predicted total problems, adjusted for family income, maternal education, age, marital status, depression, alcohol abuse, child temperament, gender & ethnicity ($\beta = 0.2$). Effect partially mediated by maternal parenting hostility	18
Roberts, 2004	UK	Cohort, community	8,292 pregnant women followed to child age 4 years	Sexual abuse (4%); questionnaire	Total problems (internalising, externalising) at 4 years; SDQ (parental reports)	(+) Maternal sexual abuse predicted total problems, adjusted for maternal psychological distress ($\beta = 0.4$) and childhood cruelty ($\beta = 0.4$). Effect partially mediated by maternal psychological distress & parenting confidence	17

First author, year	Country	Design, setting	Sample	Maternal child maltreatment	Child psychopathology	Relevant findings	STROBE index
Dubowitz, 2001	USA	Cohort, community	419 mother-child dyads identified as high-risk for child health problems and/or child maltreatment, followed from <2-5 years to 6-7 years	Physical abuse, sexual abuse; questionnaire	Internalising & externalising problems at 6-7 years; CBCL (parental reports)	(+) MCM associated with internalising problems, adjusted for maternal education, child age & recruitment site	14
Lyons-Ruth, 1996	USA	Cohort, community	45 low-income mother-child dyads followed from infancy to 9 years	Physical abuse, sexual abuse, neglect, witnessed violence (47% physical/sexual abuse); adapted AAI	Affect at 1.5 years; observation (researcher reports)	(+) MCM positively associated with negative affect ($r = 0.35$)	13

Note. AAI = Adult Attachment Interview; ATT = attention; B = unstandardised regression coefficient; β = standardised regression coefficient; BPI = Berkeley Puppet Interview; CAPA = Child and Adolescent Psychiatric Assessment; CBCL = Child Behavior Checklist; CI = confidence interval; CTQ = Childhood Trauma Questionnaire; DBDs = Attention-deficit and disruptive behaviour disorders; DI = Dominic Interactive; DICA-IV Diagnostic Interview for Children and Adolescents, Fourth Edition; DSM-IV = Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; EXT = externalising; IBQ-R = Infant Behavior Questionnaire-Revised; INT = internalising; M = mean; MCM = maternal child maltreatment; NorAQ = NorVold Abuse Questionnaire; PTSD = posttraumatic stress disorder; r = Pearson product-moment correlation coefficient; r_b = biserial correlation coefficient; SD = standard deviation; SDQ = Strengths and Difficulties Questionnaire; SES = socioeconomic status; UK = United Kingdom; USA = United States of America; (+) = significant positive association; (#) significant positive and negative associations

Results

Overview of Reviewed Studies

Of the 57 retrieved citations, 12 studies were included in the systematic review based on 10 distinct datasets. Table 1 provides a summary of reviewed studies. Two studies were based on the same UK longitudinal dataset (Avon Longitudinal Study of Parents and Children; Collishaw, Dunn, O'Connor, & Golding, 2007; Roberts, O'Connor, Dunn, & Golding, 2004) and two studies were based on a Spanish sample of outpatient adolescents and their mothers (Miranda, de la Osa, Granero, & Ezpeleta, 2011, 2013). Research on this topic has increased exponentially over the past three years, with five (42%) studies published from 2013 onwards. Studies were conducted across five countries, all high median income ones: USA ($n = 5$), UK ($n = 3$), Spain ($n = 2$), Norway ($n = 1$) and the Netherlands ($n = 1$).

Studies employed mostly longitudinal (83%) designs and drew mostly samples from community (83%) populations. Six (50%) studies recruited pregnant women and their expectant children (Collishaw, Dunn, et al., 2007; Lang, Gartstein, Rodgers, & Lebeck, 2010; Myhre, Dyb, Wentzel-Larsen, Groggaard, & Thoresen, 2014; Plant, Barker, Waters, Pawlby, & Pariante, 2013; Rijlaarsdam et al., 2014; Roberts et al., 2004), four (33%) studies recruited mother-child dyads in early childhood (Dubowitz et al., 2001; Lyons-Ruth & Block, 1996; Min, Singer, Minnes, Kim, & Short, 2013; Thompson, 2007) and two (17%) studies recruited outpatient adolescents and their mothers (Miranda et al., 2011, 2013). Four (40%) of the ten community sample studies drew their sample from high-risk community populations (child maltreatment risk, child physical health risk, maternal drug use, low-income families; Dubowitz et al., 2001; Lyons-Ruth & Block, 1996; Min et al., 2013; Thompson, 2007).

Measures of Maternal Child Maltreatment

Measures of maternal child maltreatment ranged from single maltreatment items (Roberts et al., 2004; Thompson, 2007) to five items (Lyons-Ruth & Block, 1996; Min et al., 2013; Rijlaarsdam et al., 2014). All studies assessed a combination of physical abuse, sexual abuse, emotional abuse or neglect (physical, emotional, undefined), apart from one study that also included witnessing violence as an additional type of maltreatment (Lyons-Ruth & Block, 1996). Two (17%) studies employed the full Childhood Trauma Questionnaire (CTQ; Bernstein et al., 2003) to assess maltreatment (Min et al., 2013; Rijlaarsdam et al., 2014), whilst the remaining studies used selected scales from the CTQ (Lang et al., 2010), structured and semi-structured interview questions (Miranda et al., 2011, 2013; Plant et al., 2013; Thompson, 2007), questionnaires designed for the studies (Collishaw, Dunn, et al., 2007; Dubowitz et al., 2001; Roberts et al., 2004) and adapted questionnaire (Myhre et al., 2014) and interview measures (Lyons-Ruth & Block, 1996). Physical (92%) and sexual abuse (92%) were the most frequently measured types of maltreatment, followed by emotional abuse (58%), neglect (physical/emotional; 33%) and witnessing violence (8%).

Two (17%) studies generated a continuous latent factor of maltreatment based on all measured items (Min et al., 2013; Rijlaarsdam et al., 2014), three (25%) studies defined maltreatment by the categorical presence of any single measured item (Dubowitz et al., 2001; Miranda et al., 2011, 2013), one (8%) study defined maltreatment by the categorical presence of two or more items (Plant et al., 2013), two (17%) studies separated maltreatment experiences into separate categorical types (Lang et al., 2010; Myhre et al., 2014), two (17%) studies generated continuous variables of maltreatment ordered by sum of types and severity of experiences (Collishaw, Dunn, et al., 2007; Lyons-Ruth & Block, 1996), and two (17%) studies measured only a single

categorical item of maltreatment (Roberts et al., 2004; Thompson, 2007). The prevalence of categorically defined maternal child maltreatment ranged from 4% to 50%. Rates were highest amongst high-risk community (26%-50%) samples compared to non-high-risk community (4%-18%) and clinical (12%-14%) samples.

Key methodological considerations include the reliance on retrospective self-reports, the limited use of psychometric measures, variation in operational definitions of maltreatment and the overrepresentation of physical and sexual abuse. Retrospective self-reporting of child maltreatment has been criticised as potentially being subject to unreliability and inaccuracy, particularly in regards to the influence of the natural process of forgetting of episodic memories, traumatic amnesia and current psychological distress on recall abilities (Feldman-Summers & Pope, 1994; Piolino, Desgranges, Benali, & Eustache, 2002; Wolkind & Coleman, 1983). However, a recent study reported good convergent validity between adult patients' self-reports of child maltreatment with clinical case notes and a second psychometric self-report measure, as well as non-association with severity of current psychological distress (Fisher et al., 2011). The limited use of psychometric measures of maltreatment amongst the majority of reviewed studies likely contributed to the wide variation in definitions of maltreatment. Indeed, a major methodological weakness of most studies was the lack of detailed assessment information regarding interview questions and criteria for categorical definitions. Furthermore, the degree of comorbidity between maltreatment types is not clear in most studies, and raises the issue as to whether findings are indicative of the impact of a particular form of maltreatment or of multi-type maltreatment experiences (Higgins & McCabe, 2001).

Measures of Child Psychopathology

The youngest age of child psychopathology assessment was one year, and the eldest age seventeen years. Three studies (25%) assessed children in toddlerhood (1-3 years; Lang et al., 2010; Lyons-Ruth & Block, 1996; Myhre et al., 2014), five (42%) studies in early childhood (4-7 years; Collishaw et al., 2007; Dubowitz et al., 2001; Rijlaarsdam et al., 2014; Roberts et al., 2004; Thompson, 2007), one (8%) study in middle childhood (8-12 years; Min et al., 2013) and three (25%) studies across middle childhood and adolescence (13-17 years; Miranda et al., 2011, 2013; Plant et al., 2013).

Psychopathology was most frequently characterised according to the traditional two-dimensional taxonomy of internalising versus externalising difficulties (Krueger, Caspi, Moffitt, & Silva, 1998; Krueger, 1999). The majority (83%) of studies assessed psychopathology at the level of problems and clinical disorder, whilst two studies (17%) assessed psychopathology in terms of infant expressed affect (Lang et al., 2010; Lyons-Ruth & Block, 1996).

Problems. Of those studies ($n = 9$) which included an assessment of child psychopathology at the level of problems, seven (78%) studies utilised the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2000, 2001; Dubowitz et al., 2001; Min et al., 2013; Miranda et al., 2011, 2013; Myhre et al., 2014; Rijlaarsdam et al., 2014; Thompson, 2007) and two (22%) studies employed the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997; Collishaw et al., 2007; Roberts et al., 2004). The CBCL and SDQ are both parent/teacher-rated instruments. The CBCL internalising scale comprises anxious/depressed, withdrawn, somatic complaints and emotionally reactive subscales for the preschool version ($n = 2$ studies; Myhre et al., 2014; Rijlaarsdam et al., 2014), whilst in the school-age version ($n = 5$ studies; Dubowitz et al., 2001; Min et al., 2013; Miranda et al., 2011, 2013; Thompson, 2007) it comprises anxious/depressed,

withdrawn/depressed and somatic complaints subscales. The SDQ internalising scale comprises emotional problems and peer problems subscales (all versions). In the CBCL preschool version, the externalising scale includes aggressive behaviour and attention problems subscales, whilst in the school-age version it comprises aggressive behaviour and rule-breaking behaviour. The SDQ externalising scale comprises conduct problems and hyperactivity subscales (all versions). Thus, there is discrepancy between studies as to whether attention problems were included in adult-rated measures of externalising problems (44%), and whether peer problems were included in measures of adult-rated internalising problems (25%).

Parental reports were provided predominantly by mothers; one study (Collishaw, Dunn, et al., 2007) collected both maternal and teacher reports (analysed separately). One study (Rijlaarsdam et al., 2014) included a measure of child-rated problems, assessed using the Berkeley Puppet Interview (Ablow et al., 1999), in addition to a parent-rated CBCL (analysed separately). All nine studies assessed both internalising and externalising problems, apart from one, which assessed only externalising problems (Myhre et al., 2014). Four studies presented analyses for only total problems as the sum of internalising and externalising scales (Collishaw, Dunn, et al., 2007; Min et al., 2013; Roberts et al., 2004; Thompson, 2007), and in the case of Min et al. (2013), with the addition of attention problems in a total problems factor score.

Whilst an overall strength of studies is the use of the SDQ and CBCL, both of which have been shown to demonstrate good psychometric properties particularly in regards to multiple testing, wide childhood age ranges, several sample population norms and convergence with other clinical and non-clinical instruments (Achenbach & Rescorla, 2000, 2001; R. Goodman & Scott, 1999; S. Goodman & Gotlib, 1999), the use of single informants in the majority of studies is a noteworthy limitation, particularly for the

assessment of externalising difficulties (Jensen et al., 1999). Furthermore, studies differed in their analysis of construct total scores versus scale scores, as well as the generation of factor scores. This discrepancy presents ambiguity as to whether observed associations may be specific to particular types of problems (e.g. aggressive behaviour) or reflective of generalised psychopathology.

Clinical disorder. Psychopathology rated at the level of clinical disorders was assessed in three (25%) studies (Min et al., 2013; Miranda et al., 2011; Plant et al., 2013). Of these three studies, all assessed clinical disorder according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV; American Psychiatric Association, 1994). Miranda et al. (2011) and Plant et al. (2013) used the combined parental and/or child reports of disorder symptoms, assessed via the Diagnostic Interview for Children and Adolescents-IV (Miranda et al., 2011; Reich, Leacock, & Shanfeld, 1997) and the Child and Adolescent Psychiatric Assessment (Angold & Costello, 2000; Plant et al., 2013), whilst Min et al. (2013) used only child reports, assessed via the Dominic Interactive (Valla, 2000). Miranda et al. (2011) and Plant et al. (2013) applied the categorisation of attention-deficit and disruptive behaviour disorders (DBDs), which under DSM-IV taxonomy includes conduct disorder (CD), opposition defiant disorder (ODD) and attention-deficit/hyperactivity disorder (ADHD), which are considered externalising disorders (American Psychiatric Association, 1994).

Min et al. (2013) constructed a latent factor of total DSM-IV disorder symptoms (CD, ODD, ADHD, generalised anxiety disorder, major depressive disorder (MDD), dysthymia, separation anxiety disorder, specific phobias), Plant et al. (2013) assessed DSM-IV disorder symptom levels (DBDs, depression [MDD, dysthymia, depression not otherwise specified]) whilst Miranda et al. (2011) assessed DSM-IV disorder diagnoses (DBDs, affective disorders, eating disorders, elimination disorders), in addition to parent

rated problems. Whilst the use of psychiatric classifications of psychopathology is useful from the research perspective of measurement standardisation allowing for facilitated comparison of findings across studies, it is questionable whether such measurement methods are most appropriate for community populations such as in the case of Plant et al. (2013). Furthermore, the generation of latent factors and use of composite diagnostic category variables limits the opportunity to assess associations with specific clinical disorders.

Infant temperament. Lang et al. (2010) assessed temperament using the Infant Behavior Questionnaire-Revised (Gartstein & Rothbart, 2003), a maternal-rated scale of infant affect and behaviour, whilst Lyons-Ruth & Block (1996) conducted researcher-rated video recorded home observation sessions (40 minutes) of expressed affect. Negative affectivity is a widely identified construct of temperament that has been observed amongst children and adults (Goldsmith & Campos, 1990; Rothbart, Ahadi, & Evans, 2000). Thus, whilst its assessment in these two studies provides an index of infant differences in patterns of negative emotional experiences, the lack of assessment using a psychometric measure in Lyons-Ruth and colleagues' (1996) study is a substantial limitation. Without norm-rated assessment, the validity, reliability and severity of measured negative affect in this study remains unclear.

Statistical Methods

Studies applied correlational analyses (Lyons-Ruth & Block, 1996; Miranda et al., 2011, 2013; Plant et al., 2013; Rijlaarsdam et al., 2014), ANOVAs (Dubowitz et al., 2001; Myhre et al., 2014), multiple regression models (Collishaw, Dunn, et al., 2007; Lang et al., 2010; Miranda et al., 2011; Myhre et al., 2014; Roberts et al., 2004; Thompson, 2007) and SEM (Min et al., 2013; Rijlaarsdam et al., 2014) to test for the direct association

between maternal child maltreatment and child psychopathology. Nine (75%) studies employed a variety of analytic methods to test for mediation.

Techniques included (i) Baron and Kenny's (1986) method of inferred mediation (Collishaw, Dunn, et al., 2007; Thompson, 2007), including the use of Sobel's (1982) test (Miranda et al., 2011; Myhre et al., 2014; Thompson, 2007), (ii) generation of path analytic models (Plant et al., 2013) and (iii) quantification of the indirect effect by applying a product of coefficients approach (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; Min et al., 2013; Miranda et al., 2013; Preacher & Hayes, 2008; Rijlaarsdam et al., 2014; Roberts et al., 2004).

The product of coefficients approach has been hailed as one of the most accurate methods to test for mediation, boasting precise Type 1 error rates, especially in comparison to Baron and Kenny's (1986) method which is susceptible to increased Type 1 error, largely due to the fact that there is no formal quantification of the magnitude of the indirect effect (MacKinnon et al., 2002; Preacher & Hayes, 2008). Furthermore, as Baron and Kenny's (1986) method relies on an initial significant association between X and Y before testing for mediation, whereas a product of coefficients approach does not, this is a key factor contributing to Baron and Kenny's (1986) method also being more susceptible to elevated rates of Type 2 error. Findings from studies employing Baron and Kenny's (1986) method of mediation should therefore be interpreted with greater caution.

STROBE Index

STROBE methodology scores ranged from 13 to 20. Studies scored highest in the domains of provision of a rationale and background to study objectives, as well as integration of findings into existing literature and weighing up strengths and limitations of observed results. Studies scored more poorly on the provision of detailed information

on measurement methods, statistical methods, descriptive results and statistical results. Given that testing for association between maternal child maltreatment and child psychopathology was not the sole hypothesis of some studies, this meant there was often limited detailed information about prevalence rates and characteristics of subgroups. Whilst the STROBE criteria are not exhaustive, they do provide insight into a study's methodological areas of strengths and weakness. Lower scores in the domains of detailed information on measurement and statistical methods and results is somewhat limiting when attempting to collate findings across multiple studies taking into account measurement, design and analytic procedure differences.

Maternal Child Maltreatment and Child Psychopathology

Child problems. At least one significant positive association between maternal child maltreatment and child problems was reported in all nine studies that measured child problems (Collishaw, Dunn, et al., 2007; Dubowitz et al., 2001; Min et al., 2013; Miranda et al., 2011, 2013; Myhre et al., 2014; Rijlaarsdam et al., 2014; Roberts et al., 2004; Thompson, 2007). Four studies reported a significant positive association for externalising problems (Miranda et al., 2011, 2013; Myhre et al., 2014; Rijlaarsdam et al., 2014), two studies reported a significant positive association for internalising problems (Dubowitz et al., 2001; Rijlaarsdam et al., 2014), and four studies reported a significant positive association for total problems (Collishaw, Dunn, et al., 2007; Min et al., 2013; Roberts et al., 2004; Thompson, 2007). Notably, Dubowitz and colleagues (2001) assessed the relative impact of maternal child maltreatment in contrast to adulthood violence, with no analysis of the independent association of maternal child maltreatment only; an effect of exposure to life-course maltreatment (childhood and adulthood) was observed for externalising problems. In the cases of studies which included multi-informant ratings (Collishaw, Dunn, et al., 2007; Rijlaarsdam et al., 2014),

associations were observed for parent, teacher and child ratings. Positive associations were observed amongst children aged 3 years to 17 years, including poorer total problem trajectories between 4 to 7 years (Collishaw, Dunn, et al., 2007). The range of maltreatment types assessed in these nine studies included physical abuse, sexual abuse, emotional abuse, physical neglect and emotional neglect.

Adjusted analyses demonstrated that associations were significant in all studies except one (Miranda et al., 2011), when controlling for the following covariates: (i) maternal factors (age, ethnicity, education, parity, adulthood violence, psychological distress, alcohol abuse, childhood cruelty); (ii) family factors (income, parental marital status); (iii) child factors (gender, age, temperament, prior total problems). In the study conducted by Miranda et al. (2011), maternal child maltreatment did not remain a significant predictor of child externalising problems in analyses adjusted for maternal and paternal DSM-IV diagnoses, partner violence, child age, child gender and child physical punishment (maltreatment); maternal DSM-IV diagnoses and child maltreatment significantly predicted child total problems, however. It is worth noting that this was the only study of the nine which assessed maternal psychological distress at the level of psychiatric disorder (as opposed to symptomatology), as well as including offspring child maltreatment as a covariate in adjusted analyses.

Child clinical disorder. Of the three studies that assessed children's clinical disorders, two studies (67%) reported significant positive direct associations between maternal child maltreatment experiences and child DSM-IV disorders (Miranda et al., 2011; Plant et al., 2013), whilst the third reported a null result (Min et al., 2013). Maternal child maltreatment predicted DBDs but not affective disorders; although Miranda et al. (2011) observed an association between maternal child maltreatment and total number of child diagnoses. Notably, rates of DBDs were higher compared to rates

of mood disorders in both these studies. In Miranda et al.'s (2011) study, the association between maternal child maltreatment and child DBDs remained significant when controlling for offspring child maltreatment (physical abuse; in addition to controlling for parental DSM-IV disorders, partner violence, child age, child comorbid DSM-IV diagnoses and child gender); however, in Plant et al.'s (2013) study the association was no longer significant when controlling for child maltreatment experiences which included measures of physical abuse (in addition to sexual abuse and harsh discipline).

In Min and colleagues (2013) study, only child reports of DSM-IV symptoms were collected, whilst the other two studies employed combined parent and child reports, in addition to the generation of latent factors of total DSM-IV symptoms with no analysis of individual disorders. These methodological differences could account for the discrepant findings such that single-informant measures yielded less power than multi-informant measures in conjunction with non-specificity of disorder types making for less sensitive assessment. Furthermore, key methodological differences between Miranda et al.'s (2011) and Plant et al.'s (2013) studies include (i) sample type (clinical versus community), (ii) types of maternal maltreatment (sexual abuse, physical abuse, emotional abuse versus sexual abuse, physical abuse, emotional neglect, physical neglect), and (iii) ages of children (8-17 years versus 11 and 16 years). These data suggest that the association between maternal child maltreatment and child clinical disorders is less robust than the association with child problems. The strongest association was observed for child DBDs; however, this association did not appear to be fully independent of pertinent risk factors such as offspring child maltreatment experiences.

Infant temperament. Lyons-Ruth et al. (1996) observed infant negative affect to be positively associated with summative maternal maltreatment experiences, whilst

Lang et al. (2010) observed both positive and negative associations between infant negative affect and maternal maltreatment depending on the type of maltreatment experience: maternal physical abuse positively predicted negative affect but maternal emotional abuse negatively predicted negative affect (adjusted for maternal psychological distress), whilst no significant association with maternal sexual abuse was observed. Given that Lyons-Ruth et al. (1996) did not measure maternal emotional abuse, in conjunction with the fact that both studies employed small sample sizes, it remains challenging to draw conclusions about the counterintuitive finding that maternal emotional abuse predicted improved infant temperament. Lang and colleagues (2010) do note, however, that in their sample maternal emotional abuse was associated with lower maternal postnatal psychological distress, which is also contrary to the overall extant literature, suggesting that this finding may be idiosyncratic to aspects of this sample (high annual mean income [$> \$50\,000$], $> 50\%$ at least university level education), and highlights the need for further investigation before drawing firm conclusions.

Mediating Pathways

Psychological distress. Eight studies tested the mediating effect of maternal psychological distress, with seven studies reporting that maternal psychological distress (antenatal period through to child adolescence) mediated significantly the effect of maternal child maltreatment on child psychopathology (Collishaw, Dunn, et al., 2007; Min et al., 2013; Miranda et al., 2013; Myhre et al., 2014; Rijlaarsdam et al., 2014; Roberts et al., 2004; Thompson, 2007), and one study finding a null result (Miranda et al., 2011). Two studies observed mediation of externalising problems (Miranda et al., 2013; Myhre et al., 2014), one study observed mediation of internalising problems (Rijlaarsdam et al., 2014) and four studies observed mediation of total problems

(Collishaw, Dunn, et al., 2007; Min et al., 2013; Roberts et al., 2004; Thompson, 2007). Five studies reported a partially mediated effect (Min et al., 2013; Myhre et al., 2014; Rijlaarsdam et al., 2014; Roberts et al., 2004; Thompson, 2007), whilst two studies reported a fully mediated effect (Collishaw, Dunn, et al., 2007; Miranda et al., 2013).

Forms of maternal psychological distress found to be significant mediators were anger (Miranda et al., 2013; Rijlaarsdam et al., 2014), depression (Miranda et al., 2013; Thompson, 2007), anxiety (Roberts et al., 2004), affective (depression, anxiety; Collishaw et al., 2007; Rijlaarsdam et al., 2014) and generalised (Min et al., 2013; Myhre et al., 2014) symptomatology. In Miranda and colleagues' (2011) study which reported a null mediated effect, this was the only study which assessed maternal psychological distress at the level of DSM-IV disorders, as well as including maternal adulthood violence as a co-predictor in SEM models. These two factors may have contributed to the null findings in comparison to other studies, such that studies which employed measurement of maternal psychological distress at the level of symptomatology and included maternal child maltreatment as the sole predictor variable may have benefited from increased power. Furthermore, Rijlaarsdam and colleagues (2014) also assessed the mediating effect of paternal psychological distress. Maternal child maltreatment was found to be indirectly associated with parent and child-rated externalising problems through paternal and maternal anger and harsh discipline practices; maternal child maltreatment predicted parental anger, which predicted parental harsh discipline, which predicted child externalising problems (i.e. a serial mediation pathway).

Parenting. Of the four studies that tested mediation by parenting practices, all reported that poorer parenting mediated significantly the association between maternal child maltreatment and child psychopathology (Collishaw, Dunn, et al., 2007; Rijlaarsdam et al., 2014; Roberts et al., 2004; Thompson, 2007). Two studies found that

maternal child-directed aggression and hostility partially mediated the pathway between maternal child maltreatment and child total problems (Collishaw, Dunn, et al., 2007; Thompson, 2007), whilst one study found that low maternal parenting confidence partially mediated this association (Roberts et al., 2004). One study reported that independently maternal and paternal harsh discipline fully mediated the effect of maternal child maltreatment on child externalising problems via maternal/paternal anger, but not child internalising problems (Rijlaarsdam et al., 2014).

Child maltreatment. Of the three studies which included measures of offspring child maltreatment (Miranda et al., 2011; Plant et al., 2013; Thompson, 2007), only one study reported that child maltreatment (sexual abuse, physical abuse and harsh discipline) significantly mediated the association between maternal child maltreatment and child psychopathology (DSM-IV DBDs; Plant et al., 2013). Maternal antenatal depression was found to moderate this mediation effect, such that a significant mediated effect was observed only amongst mothers depressed in pregnancy. Miranda and colleagues (2011) observed a null result for tests of mediation of maternal child maltreatment on child externalising problems by child physical abuse. Notably, this study tested for mediation in a model in which maternal child maltreatment and adulthood violence were entered simultaneously as predictor variables, thereby likely reducing power for the potential effects of each predictor independently.

Similarly, Thompson and colleagues (2007) did not find evidence that offspring child maltreatment (physical abuse, neglect, sexual abuse) mediated the association between maternal child maltreatment and child total problems. In this study, maternal adulthood violence was also entered as a co-predictor variable in multiple regression analyses. Plant and colleagues' (2013) sample was the only one to include mothers depressed during pregnancy, which has been identified as a risk factor for offspring child

maltreatment (Lereya & Wolke, 2013; Pawlby, Hay, Sharp, Waters, & Pariante, 2011), therefore likely accounting for the significant mediated effect in this subgroup which could be expected to yield greater power, in conjunction with likely reduced power in Thompson et al.'s (2007) and Miranda et al.'s (2011) studies.

Life events. Stressful child and family life events partially mediated the association between maternal child maltreatment and child total problems in the one study that tested for this (Collishaw, Dunn, et al., 2007).

Social support. One study tested and reported that maternal child maltreatment indirectly predicted child total DSM-IV disorder symptoms through low maternal social support (Min et al., 2013).

Discussion

The systematic review examined the relationship between a mother's history of child maltreatment and her children's experience of psychopathology. The review synthesised findings across twelve studies with a combined sample size totalling 45,723 mother-child dyads. Across studies, between 4% and 50% of mothers reported a history of child maltreatment, with prevalence rates highest amongst high-risk community samples, which is consistent with existent literature (Choi & Sikkema, 2015). The most frequently assessed forms of child psychopathology were internalising and externalising problems, followed by clinical disorder and infant negative temperament. Age of child problems and clinical disorder assessments ranged from between three and seventeen years, and between one and one and a half years for assessments of infant temperament.

Maternal Child Maltreatment and Child Psychopathology

Overall, the review documented evidence of positive association between maternal child maltreatment and child problems and clinical disorder psychopathology.

Findings regarding the relationship between maternal child maltreatment and infant negative temperament were less consistent. A robust relationship was documented for child total problems, with all studies that tested this relationship reporting a positive association. Eighty percent of studies that assessed externalising problems separately reported a positive association, whilst fifty percent of studies that assessed internalising problems separately reported a positive association. Sixty-seven percent of studies reported a positive association between maternal child maltreatment and child clinical disorder; specifically, DBDs. Of the two studies which assessed infant temperament, one reported a positive association between maternal child maltreatment and infant negative affect, whilst the other reported both positive and negative associations which varied by type of maternal child maltreatment experience.

Overall, these findings suggest that a high proportion of children of mothers who experienced child maltreatment tend to experience generalised and externalising difficulties through early childhood into adolescence, with a more tenuous association documented for specifically internalising difficulties. Findings remain when controlling for multiple maternal, family and child factors. Documented associations reflect difficulties reported predominantly by parents, as well as child reports in the case of severe difficulties, comprising maternal multi-type maltreatment experiences.

One possible explanation for the more evidenced association for externalising difficulties in contrast to internalising difficulties could be increased power, given that some epidemiological research suggests that prevalence in internalising difficulties tends to start at a lower rate and increase through the life-course, whilst the opposite is true for externalising difficulties (Hipwell et al., 2011). Prevalence rates in the reviewed studies followed this trend for psychopathology at the level of clinical disorder but not for psychopathology at the level of symptomatology; externalising and internalising

problems were of similar prevalence in most reviewed studies that reported separate rates. Thus, the robust association between maternal child maltreatment and total problems could indeed reflect a risk for generalised psychopathology. However, it is also plausible that discrepancies in types of problems classed as internalising versus externalising in the CBCL, SDQ and various versions of these, contributed to differences between study findings. Furthermore, it is also possible that these associations are driven by a unique vulnerability for children of mothers maltreated in childhood to develop externalising difficulties. Without further separate analyses and disparities in prevalence rates it remains difficult to draw conclusions about the specificity of this risk.

A Conceptual Framework: Mediating Pathways

Several pathways were documented in reviewed studies that statistically mediated the association between mothers' child maltreatment and her children's experience of psychopathology.

Maternal psychological factors. Numerous studies evidenced maternal psychological distress to mediate the association between maternal child maltreatment and child psychopathology. Studies documented partial and full mediation of externalising, internalising and generalised child problems, by various types of maternal psychological distress, particularly affective, occurring through the antenatal period to child adolescence. These data complement the literature linking child maltreatment experiences to vulnerability for adulthood mental health difficulties (Bifulco et al., 2002; Keyes et al., 2012; Nanni et al., 2012), as well as the impact of such on child psychopathology (O'Donnell, Glover, Barker, & O'Connor, 2014; Sanger et al., 2015; Sellers et al., 2013). Maternal psychopathology at key developmental stages, such as the perinatal period, and recurrence through childhood and adolescence, is thought to influence children's development through a variety of ways such as foetal programming

of sensitised stress and inflammatory systems, disruption of secure attachment, poorer educational attainment and compromised prosocial development, all of which can increase vulnerability for emotional and behavioural maladjustment (Hay, Pawlby, Angold, Harold, & Sharp, 2003; Hay & Pawlby, 2003; Lee & Hankin, 2009; Murray & Cooper, 1997; Nemeroff & Vale, 2005; Sharp et al., 1995; Toth, Rogosch, Sturge-Apple, & Cicchetti, 2009; Van den Bergh et al., 2008). These data thereby support the idea of maternal psychological distress being considered a key pathway for the intergenerational transmission of such adversity.

Parenting practices. Studies documented that punitive and hostile parenting styles accounted for a large proportion of poor parenting practices that were found to statistically mediate maternal child maltreatment and child problem psychopathology. There was also evidence indicating that low parenting confidence was a significant mediator. Indeed, mothers reporting traumatic childhoods have been documented to exhibit increased punitive parenting in conjunction with lower levels of sensitivity, warmth and confidence in their parenting practices with their own children, which in turn have been associated with increased psychopathology, particularly disruptive behaviour problems (Lomanowska et al., 2015; Stormshak et al., 2000). Punitive and insensitive parenting likely influences children's behaviour through a variety of ways including social modelling and compromising emotion regulation and security (Cummings & Cummings, 2002; Davies & Cummings, 1994; Simons, Whitbeck, Conger, & Conger, 1991). It is likely that maternal and family beliefs and scripts around interpersonal relating (Byng-hall, 1986; Vetere & Dallos, 2008), including parent-child relating, manifest predominantly through parenting practices.

Environmental factors. A couple of the reviewed studies found evidence for the mediating influences of low maternal social support and family life events on total child

problems and disorder symptoms. Research suggests that early adversity such as child maltreatment often aggregates with the experience of environmental adversity factors such as low social economic status, family disorganisation and social isolation (Appleyard et al., 2005; Coohy, 1996; Coulton, Korbin, & Su, 1999; Fergusson, Boden, & Horwood, 2008; McLaughlin et al., 2010). Such factors have been shown to yield a cumulative risk for the onset of child psychopathology, independently of other factors such as maternal mental health (Barker, Copeland, Maughan, Jaffee, & Uher, 2012). Mothers maltreated in childhood may be at increased risk of experiencing continued environmental adversity in adulthood, which could contribute to their children's vulnerability to experiencing psychopathology. However, more studies are required to examine the persistence of social and environmental adversity amongst mothers with a history of maltreatment. It is also plausible that environmental factors moderate documented associations (Mersky & Reynolds, 2007).

Child factors. There was minimal support for the hypothesis that offspring child maltreatment mediates the pathway between mothers' child maltreatment and child psychopathology. Whilst child maltreatment has been documented to predict later psychopathology in childhood and adolescence (Herrenkohl & Herrenkohl, 2007; McLaughlin et al., 2012; Thornberry et al., 2001), research documents the link between maternal child maltreatment and offspring maltreatment to be more tenuous (Thornberry et al., 2012). Indeed, only one of the three reviewed studies testing the association between maternal child maltreatment and offspring child maltreatment reported a significant association. These data would suggest that whilst offspring child maltreatment may be associated with factors observed amongst mothers with a child maltreatment history, it does not appear to be a key mediational pathway. Rather, other

child factors may be more relevant to investigate such as affect regulation and processing capacities, and social cognition.

Limitations of Review

Whilst the systematic review has several strengths, including investigation of mediation pathways to help answer questions around how and why a relationship between a mother's maltreatment history and her children's' psychopathology may exist, and drawing on samples from ranging population types and demographics, there are methodological issues about the review that warrant consideration. The review included only peer-reviewed empirical papers and did not include grey literature such as book chapters or dissertations. As the focus of the study was the impact of maternal trauma in childhood on offspring childhood psychopathology, several studies were excluded as (i) they did not differentiate maternal adulthood traumatic experiences from childhood ones or (ii) they also included offspring aged over eighteen years, suggesting a potentially larger literature base.

There was considerable heterogeneity amongst reviewed studies, particularly around definitions of maternal multi-type maltreatment, definitions and inclusion of confounder and child variables, timing of assessments and statistical procedures, all of which limited how well findings across a smaller pool of studies could be aggregated and extrapolated. Furthermore, all measures of maternal child maltreatment were attained retrospectively, thereby potentially introducing increased levels of reporting error in contrast to prospectively collected data. Several studies recruited mothers currently experiencing psychological distress and there was no evidence of assessing potential confounding of such in relation to either maternal self-reports of maltreatment or maternal-rated reports of child psychopathology.

Clinical Implications and Directions for Future Research

The reviewed data indicates a need to identify and support mothers with traumatic childhoods as a means to protecting their own and their children's psychological wellbeing. Mothers with gross child maltreatment histories may benefit from improved access to psychological interventions aimed at reducing psychological distress and promoting high-quality social support, as well as parenting programmes aimed at promoting sensitive and warm caregiving practices that instil a sense of confidence. Interventions focused around developing a robust attachment relationship with their child may be particularly useful (Cicchetti, Rogosch, & Toth, 2006). Such interventions could include parent-infant psychotherapy, which has been found to improve infant attachment, parent-child sensitivity and parental mental health (Barlow et al., 2015).

Future research would benefit from assessing the impact of particular maternal maltreatment types on child psychopathology, as well as investigating trajectories of difficulties. Whilst maternal psychological distress, poorer parenting and environmental adversity were identified as relevant mediators, there was little analysis on the specificity of timing for when these factors may exert the most detrimental influences. Research identifying key developmental periods of sensitivity, such as the perinatal period (when many women are already in contact with clinical services), would allow for more targeted interventions and allow for enhanced preventative treatments. There was little investigation into the role of genetic factors as well as the impact of fathers; future research would benefit from exploring these factors, as well as investigating key facets of affect regulation and processing in vulnerable children, to inform potential child-based intervention programmes.

Conclusion

A mother's history of child maltreatment appears to be associated with children's emotional and behavioural difficulties across childhood and adolescence. Identified mediating pathways include mothers' adulthood mental health difficulties, poorer parenting practices and environmental adversity. Historically maltreated mothers could be offered improved access to psychological therapies and parenting programmes to help mitigate the potential consequences of child maltreatment on future generations.

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**Section B: Maternal Child Maltreatment and
Offspring Child Psychopathology: A Longitudinal
Study**

8,000 (283) words

Abstract

Background: Studies have shown that a mother's history of child maltreatment is associated with her child's experience of internalising and externalising difficulties.

Aims: To characterise the mediating pathways that may underpin this association.

Method: Data on a mother's history of child maltreatment, depression during pregnancy, depression after birth, maladaptive parenting practices and her child's experience of maltreatment and preadolescent internalising and externalising difficulties were analysed in a sample of 9,397 mother-child dyads followed prospectively from pregnancy to child age 13.

Results: Maternal history of child maltreatment was significantly associated with child internalising and externalising difficulties in preadolescence. Maternal antenatal depression, post-birth depression, maladaptive parenting and child maltreatment were observed to significantly mediate this association.

Conclusions: Psychological and psychosocial interventions focused around treating maternal depression, particularly during pregnancy, and improving parenting skills, could be offered to mothers with traumatic childhood experiences to help protect against psychopathology in the next generation.

Keywords: childhood abuse; trauma; internalising; externalising; intergenerational

Note on Terminology

There is considerable debate around the most helpful way of referring to the emotional experiences described in this study. In keeping with Division of Clinical Psychology (DCP) guidance on the use of language in relation to functional diagnosis (DCP, 2015), a brief foreword is provided on the choice of language used. This study aims to speak to a wide audience, including clinicians, such as psychologists, psychiatrists and general practitioners, professionals from allied health disciplines, policymakers and academic researchers. It aims to refer to emotional distress in a way that can be understood by individuals from multiple disciplines, in order to foster increased understanding and utility of findings. The term “psychopathology” is therefore used throughout this study to refer to psychological distress as captured by a wide range of measures across individuals of varying ages.

It is widely recognised that many factors that influence child wellbeing do not occur in isolation, but are often influenced by other factors, many of which commonly go unmeasured (Thapar & Rutter, 2009). Much research has demonstrated a link between maternal mental health problems and child emotional and behavioural difficulties. In particular, research indicates that children of depressed and anxious mothers show elevated rates of depression, anxiety and disruptive behaviour disorders across childhood and adolescence (Barker, Copeland, Maughan, Jaffee, & Uher, 2012; Hay, Pawlby, Waters, Perra, & Sharp, 2010; Pawlby, Hay, Sharp, Waters, & O’Keane, 2009; Sanger, Iles, Andrew, & Ramchandani, 2015; Sellers et al., 2013) Contemporary research suggests that the timing of maternal mental health difficulties is of relevance, such that maternal affective symptomatology during pregnancy has been observed to increase risk for child psychopathology that is independent to risk conferred by later maternal affective problems, such as during the postnatal period and child’s later developmental years (O’Donnell, Glover, Barker, & O’Connor, 2014; Pawlby, Hay, Sharp, Waters, & Pariante, 2011; Van den Bergh & Marcoen, 2004). Given the high degree of concordance between depression during pregnancy and both postnatal depression and depression during the child’s early years (Leigh & Milgrom, 2008; Pawlby et al., 2011), these findings speak to the pertinence of maternal antenatal depression as an idiosyncratic risk factor for child psychopathology.

Child maltreatment is another factor that adversely affects psychological development and wellbeing. Children who have experienced maltreatment, such as physical abuse, sexual abuse, emotional abuse and neglect, have been observed to experience greater emotional and behavioural difficulties, including depression, posttraumatic stress, disruptive behaviour problems, low self-esteem and peer problems (Appleyard, Egeland, van Dulmen, & Sroufe, 2005; Herrenkohl & Herrenkohl, 2007;

Maas, Herrenkohl, & Sousa, 2008; Thornberry, Ireland, & Smith, 2001). Contemporary research has turned to investigate the intergenerational consequences of child maltreatment, including (i) the recurrence of maltreatment across adjacent generations, and (ii) the impact on child psychopathology in the next generation. Findings from studies examining cycles of maltreatment are mixed, with some studies documenting evidence for the intergenerational cycle of child maltreatment and others finding minimal support (Berlin, Appleyard, & Dodge, 2011; Sidebotham & Golding, 2001). In a recent systematic review, Thornberry, Knight, & Lovegrove (2012) concluded that wide methodological variation amongst studies likely accounts for much of the varied findings. Thus, further research is needed that makes use of more rigorous research methods, such as the prospective assessment of maternal child maltreatment, to better characterise these potential cycles.

Studies investigating whether a mother's experiences of maltreatment in her own childhood (henceforth referred to as "maternal child maltreatment") are linked with her child's experience of emotional and behavioural problems are few and far between. As reviewed by Plant (under review), findings from studies that have investigated this association suggest that maternal child maltreatment is associated with elevated rates of their children's emotional and behavioural difficulties across childhood and adolescence (Collishaw, Dunn, O'Connor, & Golding, 2007; Dubowitz et al., 2001; Min, Singer, Minnes, Kim, & Short, 2013; Miranda, de la Osa, Granero, & Ezpeleta, 2011, 2013; Myhre, Dyb, Wentzel-Larsen, Groggaard, & Thoresen, 2014; Plant, Barker, Waters, Pawlby, & Pariante, 2013; Rijlaarsdam et al., 2014; Roberts, O'Connor, Dunn, & Golding, 2004; Thompson, 2007). Most of these studies assessed child psychopathology in terms of generalised problems (Collishaw et al., 2007; Min et al., 2013; Roberts et al., 2004; Thompson, 2007), whilst others analysed internalising and externalising difficulties

separately (Myhre et al., 2014; Rijlaarsdam et al., 2014), including measurement of difficulties at the level of clinical disorder (Miranda et al., 2011, 2013; Plant et al., 2013). Furthermore, some of these studies tested for mediating effects, with maternal mental health difficulties and maladaptive parenting practices most frequently observed to be significant mediators of the association between maternal child maltreatment and child emotional and behavioural difficulties (Collishaw et al., 2007; Min et al., 2013; Miranda et al., 2013; Myhre et al., 2014; Roberts et al., 2004; Thompson, 2007). The mediating effect of child maltreatment has also been tested in a couple of studies, with mixed findings reported (Miranda et al., 2011; Plant et al., 2013; Thompson, 2007).

The finding that maternal mental health difficulties mediates the association between maternal child maltreatment and child internalising and externalising problems is consistent with not only the body of research detailing the adverse impact of poor maternal mental health on child psychopathology, but also with the literature documenting a strong predictive association between child maltreatment and later life psychopathology, particularly affective disorders (Keyes et al., 2012; Nanni, Uher, & Danese, 2012; Widom, DuMont, & Czaja, 2007). Interestingly, a recent review highlighted a robust association between a history of child maltreatment and maternal experience of mood disorders in the perinatal period (Choi & Sikkema, 2015), a time when maternal affective problems have been observed to be intimately linked to child psychopathology (Hay et al., 2010; Murray, 1992; Pawlby et al., 2009). Moreover, maternal child maltreatment is associated with poorer parenting practices, including increased intrusiveness towards their own children, decreased sensitivity, decreased responsiveness, and increased use of harsh discipline (Bert, Guner, & Lanzi, 2009; Lomanowska, Boivin, Hertzman, & Fleming, 2015). Insensitive, hostile and punitive parenting styles are associated with increased child internalising and externalising

difficulties (Martin, Bergen, Roeger, & Allison, 2004; Stanger, Dumenci, Kamon, & Burstein, 2004). Maternal depression is also associated with poorer parenting practices (Lovejoy, Graczyk, O'Hare, & Neuman, 2000), as well as increased risk of child maltreatment (Conron, Beardslee, Koenen, Buka, & Gortmaker, 2009; Lereya & Wolke, 2013; Pawlby et al., 2011).

Two useful psychological theories that help contextualise these findings are that of attachment and family systems theory. Family systems theory asserts that dominant beliefs and narratives are embedded within the family context, and thus, can become shared across generations (Byng-Hall, 1985). Past patterns of relating, thinking, feeling and being can be brought into the present in the form of beliefs and narratives for interpersonal relating and wider family life (Byng-Hall, 1986; Vetere & Dallos, 2008). Attachment theory posits that internal models for relating with others, as well as representations of one's sense of self, have their origins of development in the context of the infant-caregiver relationship (Bowlby, 1969, 1980). Responsive, attuned and warm caregiver behaviour has been identified as central to the development of secure attachment, whilst hostile, inconsistent, absent and cold caregiving is linked to insecure attachment. Internal representations are thought to be carried forwards, with the potential to influence later emotion processing and regulation, interpersonal relating and identity formation. Indeed, insecure attachment styles are associated with low self-esteem, interpersonal problems, anger and internalising and personality disorder symptomatology (Cicchetti & Toth, 2005; Lee & Hankin, 2009; Mikulincer & Shaver, 2012).

Child maltreatment is believed to influence the development of secure attachment, with maltreated children showing elevated rates of insecure attachment in comparison with non-maltreated children (Cicchetti & Toth, 2005; Stronach et al., 2011).

Furthermore, mothers who experienced traumatic events in childhood have been observed to have attachment disorganisation that persists into adulthood (Lyons-Ruth, Yellin, Melnick & Atwood, 2003). Research has also identified that mothers with poorer attachment status exhibit poorer reflective function which directly predicts disorganisation in her child's attachment patterns (Slade et al., 2005.). Hence, in regards to trying to understand why children of mothers with a history of child maltreatment appear more vulnerable to experiencing emotional and behavioural difficulties, it is plausible that mothers maltreated in childhood would have been more likely to develop maladaptive attachment styles, have a lower capacity to mentalise her child's needs, and have poorer models for interpersonal relating, processing and regulating affect. These factors could explain the vulnerability of mothers maltreated in childhood to experience affective problems in later life, particularly unique periods such as the perinatal period, which have been observed to trigger greater reflective engagement with their own childhood experiences as they prepare for motherhood themselves (Klaus, 2010). Furthermore, models for relating and managing affect may become embedded in a mother's narrative around family and childhood life, further increasing vulnerability to potentially experiencing difficulties in expressing attuned caregiving and mentalisation, thereby giving rise to the increased chance of experiencing difficulties in parenting and developing a secure parent-infant attachment relationship, as well as the increased likelihood of exposing her child to maltreatment, both of which would have negative implications for her child's own development of attachment security (Bifulco, Moran, Jacobs, & Bunn, 2009; Slade et al., 2005). Maternal depression during her own child's early years is also likely to negatively affect her own' child attachment security, through compromising engaged and sensitive caregiving (Toth, Rogosch, Sturge-Apple, &

Cicchetti, 2009), thereby further increasing child vulnerability to experiencing psychopathology.

Bringing together the reviewed bodies of research, in conjunction with theoretical premises, there is indication that maternal depression, maladaptive parenting and child maltreatment are key mediating factors linking maternal child maltreatment to child psychopathology. What is less clear, is how these mediating pathways may operate in combination with one another. Indeed, no study has simultaneously examined all three of these mediating pathways. Furthermore, no study has assessed the possible differential mediating effects of timing of maternal depression. The present study therefore set out to establish whether maternal antenatal depression, maternal depression during a child's early life, maternal maladaptive parenting and child maltreatment operate as independent mediators of the association between maternal child maltreatment and child internalising and externalising difficulties in preadolescence, as well as to characterise serial mediation pathways. It was anticipated that investigation of these developmental trajectories would inform clinical psychology practice on targeted preventative and intervention strategies to reduce levels of child psychological distress, as well as advance psychological theory on the transgenerational trajectories of child psychopathology and adversity. Moreover, the study aims were in keeping with NHS values, particularly in regards to (i) providing a comprehensive service available to all based on clinical need, (ii) providing best value for taxpayers' money and the most effective, fair and sustainable use of finite resources.

Based on the reviewed literature and psychological theories, the following predictions were therefore made: (i) maternal child maltreatment will predict both internalising and externalising difficulties; (ii) maternal antenatal depression, maternal

depression during a child's early life, maternal maladaptive parenting and child maltreatment will operate as independent mediators (i.e. parallel mediation); (iii) there will be an indirect effect of maternal antenatal depression through subsequent maternal depression after birth, maladaptive parenting and child maltreatment separately (i.e. double serial mediation); (iv) there will be an indirect effect of maternal depression after birth through maladaptive parenting and child maltreatment separately (i.e. multiple serial mediation).

Method

Sample

The present study made use of archival data from the Avon Longitudinal Study of Parents and Children (ALSPAC), an ongoing longitudinal birth cohort study of 14,541 mother-child dyads followed from pregnancy into the children's young adulthood, that was setup by a team of researchers at the University of Bristol in 1990 (Fraser et al., 2013). Pregnant women living in the former Avon county with an expected delivery date of between April 1991 and December 1992 were invited to take part in the study through opportunist recruitment; advertisements for participation were made across GP and antenatal clinics, local shops and public centres, and national coverage in the media. No exclusion criteria were applied. Of the 14,541 women recruited, 13,988 had infants alive at 1 year. From the 1st trimester of pregnancy onwards, mothers completed postal questionnaires about themselves and their child's health and development, and from 7 years onwards children were also sent post self-report questionnaires.

For the purpose of the present study, mother-child dyads were included if (i) the child was alive at 1 year, and (ii) full data on the mother's history of childhood maltreatment was available. This resulted in a sample of 9,397 mother-child dyads. Basic sociodemographic characteristics of this sample are presented in Table 2. The majority

of mothers were partnered (at 8 months postnatal) and had completed secondary school education. The majority of children were of white British origin, with similar numbers of girls and boys.

Table 2. Sociodemographic characteristics of the sample

Characteristic	%
Maternal level of education	
O levels	51.4
Vocational qualification	9.2
A levels	24.7
Bachelor degree	14.7
Maternal partnering status	
Partner	96.3
Single	3.7
Child gender	
Male	51.5
Female	48.5
Child ethnicity	
White	96.7
Black	0.2
Asian	0.2
Mixed race	2.7
Other ethnicity	0.1

Design

A longitudinal design was employed. Maternal and child based data was retrieved primarily from maternal-rated postal questionnaires sent at various time points between pregnancy and child age 13 years, as well as from child-rated questionnaires completed at age 8. Mothers reported retrospectively on their childhood experiences of maltreatment, collected during pregnancy and at child age 2 years 9 months. All further data on maternal and child experiences were rated relevant to the concurrent time point when questionnaires were sent (i.e. between pregnancy and child age 13).

Measures

Maternal child maltreatment. Maternal experience of physical abuse, sexual abuse, emotional abuse and neglect during childhood (< 18 years) was rated from maternal self-report questionnaire data collected at 12 and 32 weeks' gestation and 2 years 9 months. At 12 weeks' gestation mothers were asked if they had been sexually assaulted as a child (yes/no). At 32 weeks' gestation mothers were asked if they'd been sexually abused as a child (yes/no), if they'd experienced childhood physical cruelty (yes/no) or childhood emotional cruelty (yes/no). At 2 years 9 months, mothers were asked if they'd been emotionally or physically neglected as a child (yes/no) as well as if they'd been physically abused as a child (yes/no). Binary variables of each type of historical abuse and neglect as rated at either of the two time points of assessment were generated. These were used to generate a binary variable of maternal child maltreatment: mothers who answered "yes" to any form of abuse or neglect were rated as having experienced child maltreatment (1), whilst mothers who reported no instances of abuse or neglect were rated as non-maltreated (0). A continuous variable was also generated which summed the number or types of maltreatment reported (0-4).

Maternal antenatal depression. Expectant mothers completed the Edinburgh Postnatal Depression Scale (EPDS; Cox, Holden, & Sagovsky, 1987) at 18 and 32 weeks of pregnancy. The EPDS is a 10-item self-report questionnaire focused around identifying low mood over the preceding week. Two variables were generated. One which took a mean score from both time points, and a second that rated expectant mothers as depressed (1) versus non-depressed (0) using the advised cut-off of ≥ 13 to identify likely depressed women, based on the highest score from the two time points.

Maternal post-birth depression. Mothers completed the EPDS at 8 weeks postnatal, 8 months postnatal, 1 year 9 months and 2 years 9 months. A continuous

variable was generated of the mean score across all 4 time points. Mothers were also rated as depressed (1) versus non-depressed (0) based on a score of > 13 at any one time point.

Maternal maladaptive parenting. At 3 years 11 months mothers reported on their parenting practices. Mothers reported on their use of shouting and slapping and feelings of hostility towards their child. Shouting and slapping behaviour was rated separately and coded as present if mothers reported daily use of each of these behaviours (e.g. how often to you shout at/slap your child?). Mothers answered yes or no to questions about often getting irritated with their child and having a battle of wills with them. Previous research conducted factor analysis into these questions finding that slapping/shouting mapped onto one dimension and irritation and (Waylen, Stallard, & Stewart-Brown, 2008). Thus these four questions were used in the presented study to signify maladaptive parenting. A binary variable of maladaptive parenting (present [1] versus absent [0]) was generated in which maladaptive parenting was rated as presented if mothers were rated as expressing any of these types of behaviours/attitudes. A continuous variable was also generated which summed the number or reports of maladaptive parenting indices (0-4).

Child maltreatment. Mothers reported on their child's experience of physical (e.g. child was physically hurt by someone? [yes/no]), and sexual abuse (e.g. child was sexually abused by someone? [yes/no]) at 1 year 6 months, 2 years 6 months, 3 years 6 months, 4 years 9 months, 5 years 9 months, 6 years 9 months and 8 years 7 months. At 1 year 6 months mothers were asked about their child's physical and sexual abuse experiences since the child was 6 months old, whilst at all further time points mothers rated abuse experienced for the time interval between the current and preceding assessment. At 8 months postnatal, 1 year 9 months, 2 years 9 months, 3 years 11

months and 6 years 11 months, mothers rated their child's experience of emotional abuse (e.g. mum or partner has been emotionally cruel to child? [yes/no]). The first rating was based on experiences since birth, with all subsequent rating based on the interval between successive assessment time points. Separate binary variables of physical abuse, sexual abuse and emotional abuse were generated based on "yes" ratings for each abuse type at any time interval.

At 8 years 6 months children self-reported on their experiences of peer victimisation using the Bullying and Friendship Interview Schedule (Wolke, Woods, Bloomfield, & Karstadt, 2000). The scale generates two dimensions of victimisation, overt and relational victimisation, based on high frequency reports of at least one victimisation type (overt: personal belongings taken, threatened or blackmailed, hit or beaten up, tricked in a nasty way, called bad/nasty names; relational: exclusion to upset the child, coercive pressure to do things they did not want to, lies/nasty things said about them, games spoilt). A child was classed as having experienced peer victimisation if they were rated as having experienced at least one type of peer victimisation. Finally, a binary variable (maltreated [1] versus non-maltreated [0]) was generated indicating a child to have been maltreated based on positive ratings of at least any one type of abuse (sexual, physical, emotional) or victimisation experience. A summed variable was also generated based on the number of counts of abuse and victimisation experienced by a child (0-4).

Child preadolescent emotional and behavioural difficulties. At 10 years 8 months, and 13 years 10 months, mothers completed the Development and Well-being Assessment (DAWBA; Goodman, Ford, Richards, Gatward, & Meltzer, 2000), and at 11 years 8 months they completed the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). The DAWBA is a questionnaire and semi-structured interview measure

which assesses a range of psychological symptoms with an aim of making DSM-IV (American Psychiatric Association, 1994) clinical disorder diagnoses. The SDQ is a parent-rated questionnaire about children's emotional and behavioural difficulties. It comprises four scales (emotional problems [0-10], peer problems [0-10], conduct problems [0-10] and hyperactivity problems [0-10]) which can be summed to generate a total problems score, or combined to make an internalising (emotional, peers problems) and externalising (conduct, hyperactivity problems) problems score.

At 10 years 8 months and 13 years 10 months, maternal ratings of child depressive symptoms in the past month were summed separately to generate two measures (10, 13 years) of DSM-IV depression symptoms (0-12). Similarly, maternal ratings of symptoms of attention deficit hyperactivity disorder (ADHD), conduct disorder (CD) and oppositional defiant disorder (ODD), based on presence in the last 6 months for ADHD and ODD, and last 12 months for CD, were summed for each time point separately to generate a 10-year and 13-year measure of DSM-IV disruptive behaviour disorder (DBD) symptoms (0-34). Individual subscale scores of the SDQ at 11 years 8 months were used as measures of 11-year emotional and behavioural problems.

Confounding variables. Mothers reported on their partner status at 8 months (1 = single, 0 = partnered), their level of education at 32 weeks of pregnancy (non completion of school = 0, O levels = 1, vocational qualification = 2, A levels = 3 and bachelor degree or greater = 5) and their smoking (number of cigarettes per day) and drinking (number of drinks per day) during pregnancy at 32 weeks' gestation. At 12 weeks' gestation mothers were asked if they'd ever experienced severe depression, anorexia nervosa, schizophrenia, alcoholism or a drug addiction (yes/no). Mothers were rated with a psychiatric history if they answered yes to one form of psychiatric problem (history = 1, no history = 0). At 1 year 9 months mothers reported on their perceived

level of social support on a 10-item questionnaire, whereby higher scores indicated greater social support, and lower scores less perceived social support. Child gender was coded 0 = boy, 1 = girl.

Ethics

Ethical approval for each stage of original data collection was obtained by the ALSPAC researchers from the relevant Local Research Ethics Committees (see Appendix G for full list of approvals). The ALSPAC Ethics and Law Committee provided ethical approval to carry out this specific study using existing ALSPAC data (see Appendix H).

Data Analysis

Statistical analyses were conducted in IBM SPSS Statistics Version 21 (IBM Corp, 2013) and Mplus Version 7.1 (Muthen & Muthen, 2012). Data were assessed for normality using probability-probability plots and the Kolmogorov-Smirnov test, and for homogeneity of variance using Levene's test. For data that did not satisfy tests of normality and homogeneity of variance, non-parametric statistical tests were applied. Multicollinearity between variables was assessed using the variance inflation factor.

Data analysis proceeded in four main steps. First, univariate associations between study variables were analysed in order to determine the relationship between maternal child maltreatment and measures of child psychopathology, as well as to identify potential mediators and confounders to this association. At the second step, confirmatory factor analysis (CFA) was applied to evaluate whether a two-factor model of child internalising and externalising difficulties was appropriate, in comparison with a one-factor solution of generalised difficulties (i.e. non differentiation of emotional and behaviour difficulties). At the third step, structural equation modelling (SEM) was conducted through the estimation of structural regression models with the aim of testing the predictive effect of maternal child maltreatment on child internalising and

externalising difficulties. A series of three nested structural regression models were specified and evaluated, which varied in their pathways between mediator variables. Finally, mediation analysis was conducted to assess mediating pathways. As a general rule, statistics are reported to one decimal place except when two or three decimal places would yield particularly informative further information, and when reporting p values.

Confirmatory factor analysis and structural equation modelling. CFA and SEM generate latent continuous variables of constructs, such as internalising and externalising difficulties, based on indicator (observed) variables. First, a model should be specified based on theory. Next, this model is estimated and evaluated in regards to how well it fits the observed data. Use of multiple fit indices has been advocated, which include the Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), the Standardised Root Mean Square Residual (SRMR) and the model chi square (χ^2_M). A CFI ≥ 0.90 is suggestive of satisfactory fit, whilst a value of ≥ 0.95 is suggestive of a good fit. RMSEA values ≤ 0.06 and SRMR values ≤ 0.08 are suggestive of acceptable fit (Kline, 2011).

A significant χ^2_M suggests discrepancies between the model and the data, however, larger sample sizes can generate statistical significance when the absolute size of discrepancies is small, and so in larger samples the CFI, RMSEA and SRMR are regarded as the most appropriate fit indices from which to evaluate a solution (Kline, 2011). Good analytic practice advocates the evaluation of models in relation to alternative possible models. Typically, a simple model is first specified, with successively more complex models specified and model fit evaluated. This is known as a hierarchical approach, in which nested solutions are specified through the estimation of more paths between variables in successive solutions (i.e. increased parameter constraints are

applied). Parameter estimates were computed using maximum likelihood (ML) estimation in all models.

Mediation analysis. Mediation analysis is a statistical method aimed to estimate the explained variance in an outcome variable (Y) by a predictor variable (X) through a mediator variable (M). In its most basic form, as depicted in Figure 2, the mediation model contains two consequent variables, Y and M, and two antecedent variables, X and M. In such a model, X is proposed to influence outcome Y through M. There are two pathways linking X to Y. One pathway leads from X to Y without passing through M, the *direct effect* (path c'), and a second passes from X to M (path a) and then from M to Y controlling for X (path b). This latter pathway is known as the *indirect effect* (path ab), quantified by computing the product term of the coefficients a multiplied by b (ab), and explains the effect of X on Y via M. Quantitatively, the *indirect effect* (ab) and *direct effect* (c') sum to make the *total effect* (c) of X on Y.

In classic mediation techniques, such as the causal steps approach as popularised by Baron and Kenny (1986), there is no formal quantification of the indirect effect. Whilst this methodology is popular, it has many problems. Chiefly, as there is no formal quantification of the indirect effect, mediation is simply inferred using logic about the set of outcomes from a series of multiple regression models about the quantification of something other than the indirect effect. Thus, making an assertion of mediation rests upon the rebuttal of multiple null hypotheses, which inflates Type II error.

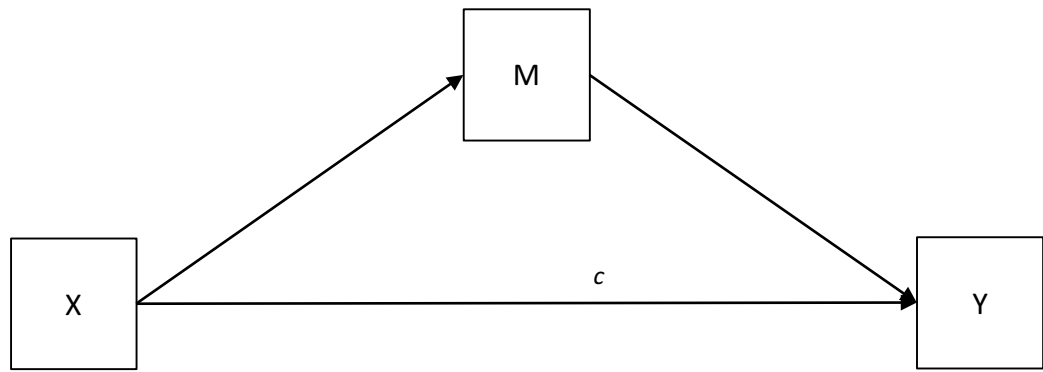


Figure 2. Conceptual diagram of a simple mediation model

An alternative is the formal quantification of the indirect effect (ab) followed by an inferential test that it does not equal zero. There are numerous approaches to statistical inference of the indirect effect (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; Preacher & Hayes, 2008), however one of the most robust methods is the use of bootstrap confidence intervals (CIs; Hayes, 2013). This technique is superior as it does not make any assumptions about the nature of the distribution of the indirect effect, thus it is a “non-parametric” statistical method. If the estimated CIs include zero the null hypothesis cannot be rejected, however if they do not contain zero, the null hypothesis can be rejected. Bootstrapping was therefore applied with the generation of 95% bias-corrected bootstrap CIs as inferential test of the direct and indirect effects in all mediation analyses.

Results

Descriptive Statistics

Maternal child maltreatment. Overall, 6.2% ($n = 586$) of mothers reported sexual abuse, 7.1% ($n = 665$) reported physical abuse, 7.5% ($n = 706$) reported emotional abuse and 21.9% ($n = 2,058$) reported neglect. Of the mothers who reported maltreatment, 62.0% ($n = 1,572$) experienced one form of maltreatment, 22.4% ($n = 569$) experienced

two forms of maltreatment, 10.9% ($n = 275$) experienced three forms of maltreatment and 4.7% ($n = 120$) experienced all forms of maltreatment. There was significant association between maltreatment types, as presented in Table 3. Given that maltreatment was rated if a mother experienced one or more forms of abuse and neglect, overall, 27.0% ($n = 2,536$) of mothers were classed as having been maltreated during their childhood.

Table 3. Inter-associations between types of maternal child maltreatment

	1	2	3	(<i>n</i>)
(1) Physical abuse				9,397
(2) Sexual abuse	.28**			9,397
(3) Emotional abuse	.47**	.22**		9,397
(4) Neglect	.38**	.20**	.38**	9,397

Note. Kappa coefficients are presented.

** $p < .01$.

Maternal depression. Measures of a mother's depression during pregnancy (antenatal depression) and across her child's first 3 years of life (post-birth depression) were calculated. The mean EPDS score across pregnancy was 6.70 ($SD = 4.4$, $n = 9,160$), and 5.80 ($SD = 4.0$, $n = 9,396$) across the first 3 years of life. Mothers were rated as depressed (≥ 13) versus non-depressed for both time periods: 18.1% ($n = 1,704$) of mothers met threshold for antenatal depression and 22.2% ($n = 2,085$) of mothers met threshold for post-birth depression. There was a high degree of association between antenatal and post-birth depression: mothers depressed during pregnancy were significantly more likely to be depressed during their child's early years, 57.5%,

compared to mothers not depressed during pregnancy, 13.9% (OR = 8.4, 95% CI [7.4, 9.4], $\chi^2(1) = 1,532.5$ $p < 0.001$, $n = 9,159$).

Maladaptive parenting. Indices of maladaptive parenting comprised daily use of maternal shouting (24.7%, $n = 2,185$) and slapping (1.2%, $n = 103$), and maternal reports of frequent irritation (33.1%, $n = 3,111$) and disagreement (49.4%, $n = 4,638$) with her child. Indices were summed to generate a maladaptive parenting score ranging from 0-4 ($M = 1.6$, $SD = 1.1$, $n = 9,197$).

Child maltreatment. Indices of child maltreatment included physical abuse (13.4%, $n = 1,259$), sexual abuse (0.5%, $n = 49$), emotional abuse (9.8%, $n = 920$) and bullying by peers (24.3%, $n = 2,286$). Given that maltreatment was rated if a child was reported to have experienced any type of abuse, neglect or bullying, 39.0% ($n = 9,397$) of children were classified as having experienced maltreatment. A summed score of number of maltreatment types was also generated which ranged from 0-4 ($M = 0.5$, $SD = 0.7$, $n = 9,397$). Of the children classed as having experienced maltreatment, 79.7% ($n = 2,922$) experienced one form of maltreatment, 17.6% ($n = 645$) experienced two forms of maltreatment, 2.7% ($n = 98$) experienced three forms of maltreatment and 0.05% ($n = 2$) experienced all forms of maltreatment.

Child emotional and behavioural difficulties. Maternal ratings of child DSM-IV depressive disorder symptoms were summed at 10 ($M = 0.3$, $SD = 1.0$, $n = 6,207$) and 13 ($M = 0.3$, $SD = 1.0$, $n = 5,591$) years. Mothers also reported on child internalising difficulties as defined by the SDQ at 11 years: emotional problems ($M = 1.4$, $SD = 1.7$, $n = 6,025$) and peer problems ($M = 1.0$, $SD = 1.5$, $n = 5,791$). Maternal ratings of child DSM-IV DBD (ADHD, CD, ODD) symptoms were summed at 10 ($M = 5.6$, $SD = 8.4$, $n = 6,599$) and 13 ($M = 5.1$, $SD = 8.1$, $n = 6,075$) years. Mothers also reported on child externalising

difficulties as defined by the SDQ at 11 years: conduct problems ($M = 1.1$, $SD = 1.4$, $n = 5,983$) and hyperactivity problems ($M = 2.7$, $SD = 2.2$, $n = 5,981$).

Group Differences between Maltreated and Non-Maltreated Mothers

Group differences between mothers classed as maltreated versus non-maltreated were calculated. As presented in Table 4, analyses revealed that children of maltreated mothers had significantly greater emotional and behavioural difficulties at 10, 11 and 13 years, as evidenced by greater DSM-IV symptoms of depression (major depressive disorder [MDD], depression not otherwise specified [NOS]) and DBDs (attention deficit hyperactivity disorder [ADHD], conduct disorder [CD] and oppositional defiant disorder [ODD]), as well as greater emotional, peer, conduct and hyperactivity problems as captured by the SDQ. Significant positive associations were also observed between maternal child maltreatment and all four potential mediating variables: maternal antenatal depression, maternal post-birth depression, maladaptive parenting and child maltreatment. Furthermore, in comparison with non-maltreated mothers, mothers maltreated in childhood were significantly more likely to have a lower level of education, to have a psychiatric history, to drink and smoke more in pregnancy and to have lower social support.

Table 4. Group differences between mothers maltreated in childhood versus non-maltreated mothers

	Maternal child maltreatment		Group effect
	No (<i>n</i> = 6,861)	Yes (<i>n</i> = 2,536)	
Maternal factors			
Post 16 years education, %	61.3	58.7	$\chi^2(1) = 5.2^*$
Single, %	47.1	49.1	$\chi^2(1) = 2.3$
Psychiatric history, %	6.2	19.1	$\chi^2(1) = 341.7^{**}$
Antenatal depression, %	14.6	29.4	$\chi^2(1) = 260.4^{**}$
Antenatal drinking, <i>M</i> (<i>SD</i>)	0.7 (0.8)	0.8 (0.8)	$z = 3.1^{**}$
Antenatal smoking, <i>M</i> (<i>SD</i>)	1.6 (4.4)	2.6 (5.5)	$z = 10.8^{**}$
Post-birth depression, %	16.7	37.1	$\chi^2(1) = 447.5^{**}$
Maladaptive parenting, <i>M</i> (<i>SD</i>)	1.1 (1.0)	1.2 (1.0)	$z = 5.4^{**}$
Social support, <i>M</i> (<i>SD</i>)	21.6 (4.7)	19.2 (5.5)	$z = -17.7^{**}$
Child factors			
Child maltreatment, %	35.2	49.3	$\chi^2(1) = 155.1^{**}$
DSM-IV depression symptoms at 10 years, <i>M</i> (<i>SD</i>)	0.2 (0.9)	0.4 (1.2)	$z = 6.0^{**}$
DSM-IV DBD symptoms at 10 years, <i>M</i> (<i>SD</i>)	5.1 (7.7)	7.2 (10.0)	$z = 8.6^{**}$
SDQ emotional problems, 11 years, <i>M</i> (<i>SD</i>)	1.3 (1.6)	1.7 (1.8)	$z = 7.1^{**}$
SDQ peer problems at 11 years, <i>M</i> (<i>SD</i>)	0.9 (1.4)	1.3 (1.7)	$z = 6.4^{**}$
SDQ conduct problems at 11 years, <i>M</i> (<i>SD</i>)	1.1 (1.3)	1.3 (1.5)	$z = 6.0^{**}$
SDQ hyperactivity problems at 11 years, <i>M</i> (<i>SD</i>)	2.6 (2.1)	3.0 (2.3)	$z = 4.7^{**}$
DSM-IV depression symptoms at 13 years, <i>M</i> (<i>SD</i>)	0.2 (0.9)	0.4 (1.3)	$z = 4.8^{**}$
DSM-IV DBD symptoms at 13 years, <i>M</i> (<i>SD</i>)	4.7 (7.6)	6.2 (9.2)	$z = 6.1^{**}$
Gender, % female	49.0	47.3	$\chi^2(1) = 2.1$

Note. Group effects are based upon (i) Pearson's χ^2 test for independence for associations with two dichotomous variables and (ii) the Mann-Whitney test for associations with a dichotomous and continuous variable that did not permit parametric analyses.

* $p < 0.05$, ** $p < 0.01$.

Identifying Potential Mediators and Confounders: Univariate Associations

Given that all four potential mediators were significantly positively associated with maternal child maltreatment, the second step to identifying them as viable mediating factors comprised assessing associations between each variable and child psychopathology. As presented in Table 5, all four potential mediators (maternal antenatal depression, maternal post-birth depression, maladaptive parenting and child maltreatment) were significantly associated with all dimensions of child emotional and behavioural difficulties across all three time points (10, 11, 13 years). These findings therefore justified their use as mediators in the association between maternal child maltreatment and child psychopathology. Furthermore, a prerequisite to estimating serial mediation pathways, is the observation of significant univariate associations between mediators; all four mediator variables were significantly associated with one another. Furthermore, maternal education, partner status, psychiatric history, antenatal smoking and drinking, social support and child gender were all identified as potential confounding variables to the association between maternal child maltreatment and child psychopathology, based on significant univariate associations with child psychopathology variables and an array of mediator variables.

Table 5. Inter-associations between study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Maternal factors																			
1. Education																			
2. Single	-.10**																		
3. Psych. hx.	-.05**	.07**																	
4. Child mal.	.02*	.01	.21**																
5. Ante. dep.	-.11	.09**	.20**	.20**															
6. Post-birth dep.	-.05**	.07**	.21**	.23**	.68**														
7. Malad. parenting	.03*	.02**	.03**	.06**	.13**	.20**													
8. Social support	.02	-.04**	-.12**	-.20**	-.30**	-.40**	-.11**												
9. Ante. drinking	.05**	.02	.01	.03**	.04**	.06**	.05**	-.04**											
10. Ante. smoking	-.23**	.16**	.13**	.11**	.15**	.10**	.04**	-.03**	.11**										
Child factors																			
11. Gender	.01	.01	-.00	-.01	.00	.00	-.02*	.00	-.01	-.01									
12. Mal.	.07**	.03**	.07**	.16**	.12**	.17**	.12**	-.12**	.05**	.03**	-.56**								
13. DSM-IV dep. at 10	.03*	.00	.05**	.08**	.11**	.13**	.08**	-.08**	-.00	.04**	.04**	.06**							

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
14. DSM-IV DBD at 10	-.04**	.03**	.08**	.11**	.19**	.24**	.24**	-.15**	.03**	.08**	-.13**	.16**	.16**						
15. SDQ em. probs.	-.04**	.02	.09**	.09**	.21**	.22**	.16**	-.13**	-.01	.04**	.01**	.11**	.20**	.23**					
16. SDQ peer probs.	-.07**	.04**	.08**	.09**	.13**	.17**	.15**	-.13**	.00	.06**	-.06**	.14**	.12**	.28**	.32**				
17. SDQ cond. probs.	-.08**	.02	.03*	.08**	.14**	.17**	.26**	-.12**	.03*	.08**	-.03*	.11**	.10**	.40**	.25**	.22**			
18. SDQ hyp. probs.	-.12**	.05**	.06**	.06**	.16**	.19**	.24**	-.14**	.03*	.08**	-.21**	.13**	.08**	.58**	.24**	.24**	.43**		
19. DSM-IV dep. at 13	-.02	.04**	.04**	.07**	.10**	.12**	.06**	-.07**	.00	.06**	.06**	.05**	.21**	.12**	.15**	.09**	.10**	.08**	
20. DSM-IV DBD at 13	-.06**	.06**	.09**	.08**	.18**	.21**	.21**	-.14**	.04**	.08**	-.13**	.14**	.12**	.62**	.21**	.22**	.38**	.54**	.16**

Note. Spearman's correlation coefficients are presented for continuous variables that did not permit parametric analysis. Point-biserial correlation coefficients are reported for associations between a continuous and a dichotomous variable (based on rank scores for continuous variables not permitting parametric analysis), w kappa coefficients are presented for associations between two dichotomous variables. Ante. = antenatal; DBDs = disruptive behaviour disorders; cond. = conduct; = depression; em. = emotional; hx. = history; hyp. = hyperactive; mal = maltreatment; malad. = maladaptive; probs. = problems; psych = psychiatric; SDQ = Strength and Difficulties Questionnaire; (2) partnered vs. single; (3) no psychiatric history vs. psychiatric history; (9) male vs. female.

* $p < 0.05$, ** $p < 0.01$.

Testing a Measurement Model of Child Psychopathology: Confirmatory Factor Analysis

In order to generate an overall construct of child psychopathology, given that assessments were made at several time points using multiple measures, CFA was applied. Of interest was determining whether the assessed symptoms of child psychopathology better reflected a single solution of generalised difficulties, or a two-factor solution of internalising and externalising dimensions. First, a one-factor confirmatory solution was fitted in which DSM-IV symptoms of depression and DBD at both 10 and 13 years and all four SDQ subscales (emotional, peer, conduct and hyperactivity problems) at 11 years were entered as indicators of a single latent factor. This one-factor model exhibited satisfactory model fit (CFI = 0.94; RMSEA = 0.067, 90% CI [0.063 - 0.072]; SRMR = 0.051; $\chi^2_M(20) = 692.2, p < 0.01, n = 7,416$).

Next, a two-factor confirmatory solution was specified in which DSM-IV symptoms of depression at 10 at 13 years, and SDQ emotional and peer problems scales at 11 years, were entered as indicators of an “internalising” latent factor, whilst DSM-IV symptoms of DBD at 10 and 13 years, and SDQ conduct and hyperactivity problems scales at 11 years, were entered as indicators of an “externalising” latent factor. This two-factor solution demonstrated good model fit (CFI = 0.95, RMSEA = 0.066 [90% CI, 0.61 - 0.70], SRMR = 0.041, $\chi^2_M(19) = 628.4, p < 0.01, n = 7,416$), and was observed to be a better solution in comparison with the one-factor model, as assessed via inspection of fit indices and a significant chi-square difference test of hierarchical solutions ($\Delta\chi^2(1) = 63.8, p < 0.01$). Standardised factor loadings ranged from 0.37 to 0.61 for internalising, and from 0.61 to 0.86 for externalising. The two-factor solution comprising internalising and externalising latent factors was therefore selected as the model from which to proceed with path analysis using a SEM framework.

Testing Mediating Pathways: Structural Regression Models

Analysis proceeded in two main steps. First, a series of three nested structural regression models, which varied in the constraints of their parameters (i.e. additional regression paths were estimated amongst mediator variables), were specified and evaluated. Second, mediation analysis was conducted to generate estimates of the total, direct and indirect (mediated) effects.

Evaluating nested solutions. In all models, maternal child maltreatment was entered as the predictor variable (X), internalising (Y1) and externalising (Y2) latent factors indicated by DSM-IV and SDQ symptoms and problems (i1-8) operated as the outcome variables, and maternal antenatal depression (M1), maternal post-birth depression (M2), maternal maladaptive parenting (M3) and child maltreatment (M4) were entered as mediator variables. Maternal education, partner status, psychiatric history, antenatal drinking and smoking, social support and child gender were entered as covariates (C_i) in all models.

In model 1, child internalising and externalising difficulties (Y1, Y2) were regressed on maternal child maltreatment (X) and all mediator variables (M1-4). All mediators (M1-4) were regressed on maternal child maltreatment (X). Thus, a model of multiple parallel mediation was evaluated. A visual illustration of this conceptual model is depicted in Figure 3. In the second model (Figure 4) maternal post-birth depression (M2), maladaptive parenting (M3) and child maltreatment (M4) were regressed on maternal antenatal depression (M1), in addition to existent paths as in model 1. In the final model (Figure 5), maladaptive parenting (M3) and child maltreatment (M4) were regressed on maternal post-birth depression (M2). All other paths as in models 1 and 2 remained.

Model 1 demonstrated poor fit (CFI = 0.75, RMSEA = 0.081 [90% CI, 0.079 - 0.083], SRMR = 0.047, $\chi^2_{M(99)} = 5,045.6$, $p < 0.01$, $n = 7,689$). Model 2 demonstrated satisfactory fit (CFI = 0.93, RMSEA = 0.040 [90% CI, 0.038 - 0.042], SRMR = 0.027, $\chi^2_{M(96)} = 1,301.5$, $p < 0.01$, $n = 7,689$), whilst model 3 demonstrated good fit (CFI = 0.95, RMSEA = 0.037 [90% CI, 0.035 - 0.039], SRMR = 0.025, $\chi^2_{M(94)} = 1,067.3$, $p < 0.01$, $n = 7,689$). Model 3 was thus observed to be the better fitting model, as assessed via inspection of fit indices and a significant chi-square difference test of nested solutions (model 3 vs. model 2: $\Delta \chi^2(2) = 234.2$, $p < 0.01$). Path estimates (standardised regression coefficients [β s]) for model 3 are presented in Figure 6.

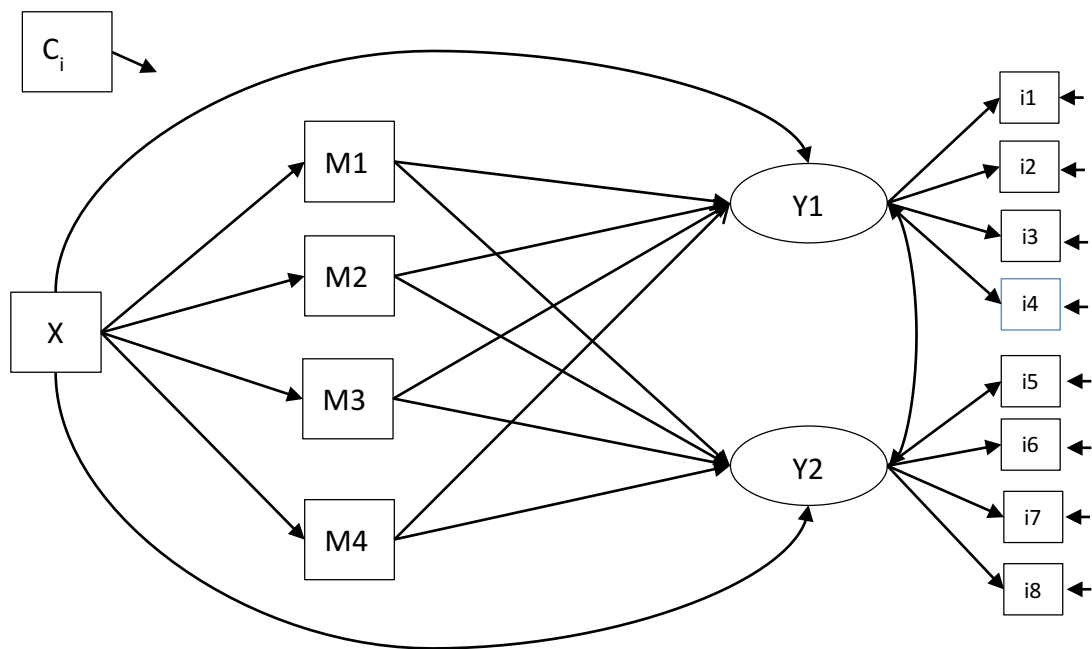


Figure 3. Model 1: conceptual multiple parallel mediation model for the effect of maternal child maltreatment (X) on child internalising (Y1) and externalising (Y2) difficulties through maternal antenatal depression (M1), post-birth depression (M2), maladaptive parenting (M3) and child maltreatment (M4)

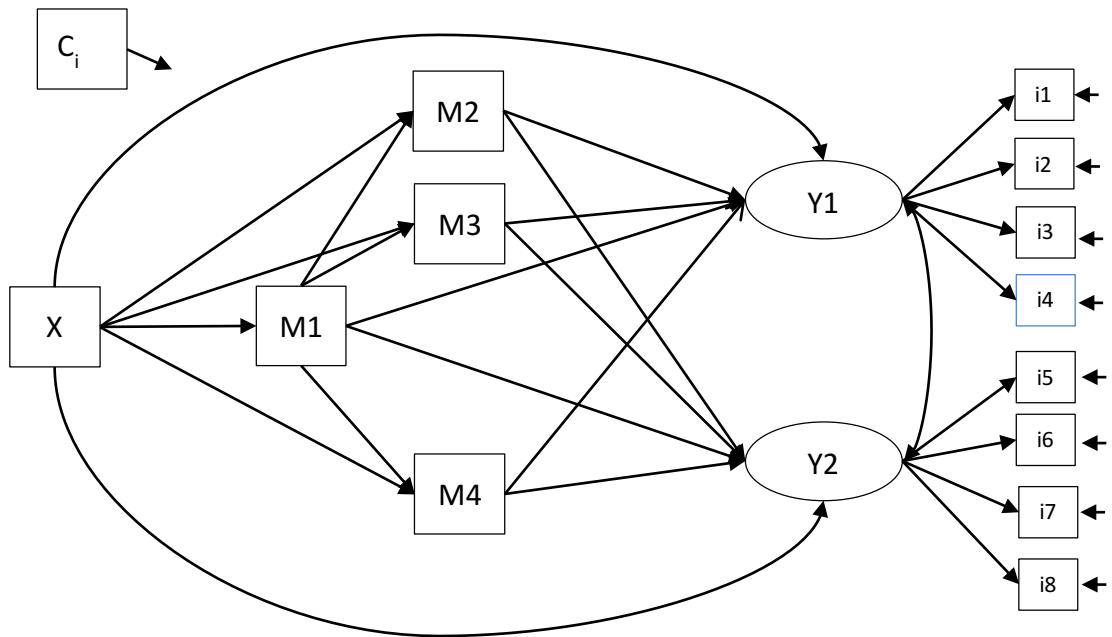


Figure 4. Model 2: conceptual multiple parallel and double serial mediation model for the effect of maternal child maltreatment (X) on child internalising (Y1) and externalising (Y2) difficulties through maternal antenatal depression (M1), post-birth depression (M2), maladaptive parenting (M3) and child maltreatment (M4)

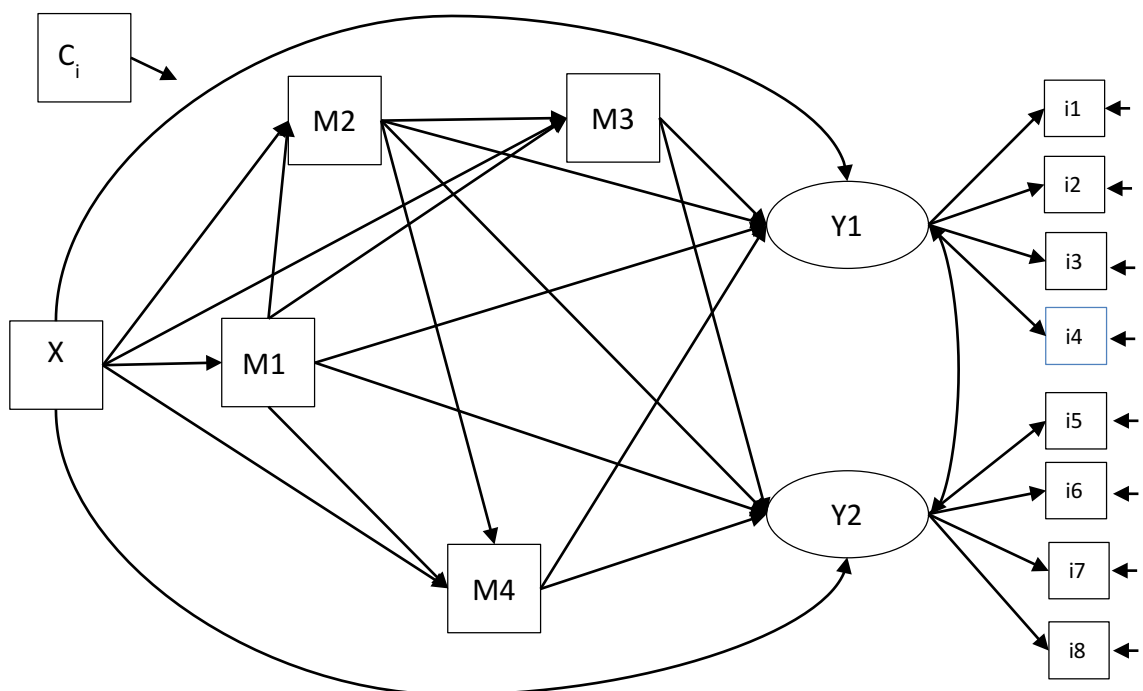


Figure 5. Model 3: conceptual multiple parallel and multiple serial mediation model for the effect of maternal child maltreatment (X) on child internalising (Y1) and externalising (Y2) difficulties through maternal antenatal depression (M1), post-birth depression (M2), maladaptive parenting (M3) and child maltreatment (M4)

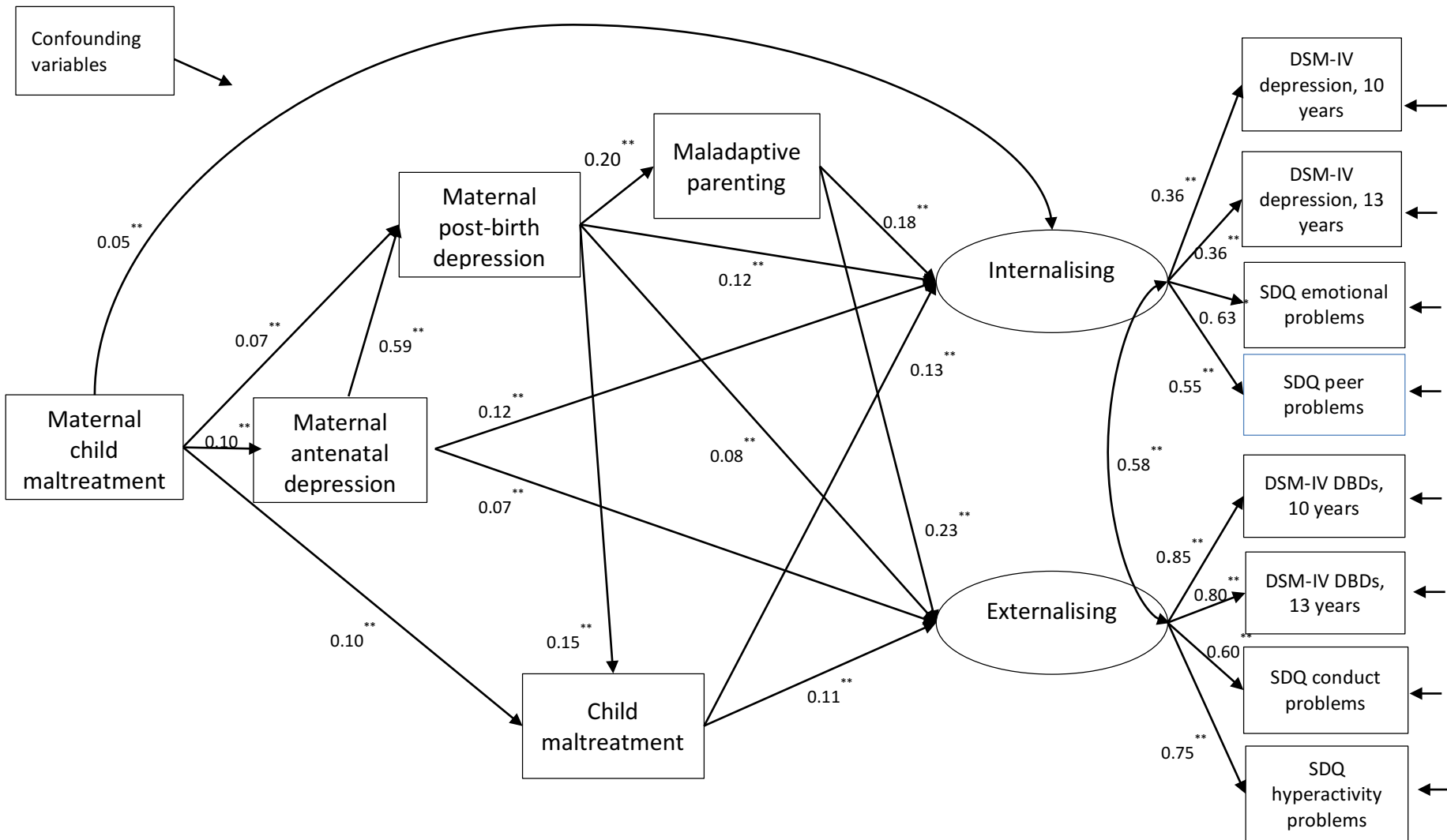


Figure 6. Structural regression model for the effect of maternal child maltreatment on child internalising and externalising difficulties mediated by maternal depression, maladaptive parenting and child maltreatment. Presented estimates are beta coefficients, with only statistically significant paths shown. ** $p < 0.01$.

Mediation analysis. The purpose of mediation analysis is to cast light on putative mechanisms by which an effect is exerted. In the case of longitudinal studies, mediation analyses can thus be used to characterise the pathways by which an effect is transmitted. The total, direct and indirect (mediated) effects were estimated for internalising and externalising difficulties separately. Inference about the statistical significance of the direct and indirect effects were made through the construction of 95% bias-corrected bootstrap CIs, in which 10,000 bootstrap samples (with replacement) were generated.

Analysis revealed that maternal child maltreatment significantly predicted child internalising difficulties directly (direct effect: $\beta = 0.05$, 95% bootstrap CI [0.03, 0.08]). There was also evidence of significant mediation (total indirect effect: $\beta = 0.05$, 95% bootstrap CI [0.04, 0.06]). Table 6 presents estimates of the specific indirect effects for each individual pathway. The total effect of maternal child maltreatment on child internalising difficulties was therefore $\beta = 0.10$ (95% bootstrap CI [0.08, 0.13]). In contrast, the direct effect of maternal child maltreatment on child externalising difficulties was no longer significant when mediators were accounted for ($\beta = 0.03$, 95% bootstrap CI [-0.003, 0.067]). However, there was evidence of a significant mediated effect through the examined mediators (total indirect effect: $\beta = 0.04$, 95% bootstrap CI [0.03, 0.05]). Estimates of the the specific indirect effects of maternal child maltreatment on child externalising difficulties are also presented in Table 6.

Table 6. Specific indirect effects of maternal child maltreatment on child internalising and externalising difficulties via maternal antenatal depression, post-birth depression, maladaptive parenting and child maltreatment

	Internalising difficulties		Externalising difficulties	
	β	95% CI	β	95% CI
Antenatal depression	0.012	0.008, 0.016*	0.007	0.003, 0.011*
Post-birth depression	0.008	0.004, 0.013*	0.006	0.002, 0.009*
Maladaptive parenting	0.001	-0.003, 0.005	0.001	-0.004, 0.006
Child maltreatment	0.013	0.07, 0.018*	0.011	0.008, 0.015*
Antenatal depression → post-birth depression	0.007	0.004, 0.010*	0.005	0.002, 0.007*
Antenatal depression → maladaptive parenting	0.000	-0.001, 0.001	0.000	-0.001, 0.001
Antenatal depression → child maltreatment	0.000	-0.001, 0.001	0.000	-0.001, 0.001
Post-birth depression → maladaptive parenting	0.002	0.001, 0.003*	0.003	0.002, 0.004*
Post-birth depression → child maltreatment	0.001	0.001, 0.002*	0.001	0.001, 0.002*
Antenatal depression → post-birth depression → maladaptive parenting	0.002	0.001, 0.003*	0.003	0.002, 0.003*
Antenatal depression → post-birth depression → child maltreatment	0.001	0.001, 0.002*	0.001	0.001, 0.001*

Note. Presented estimates are beta coefficients. → = via.

* = significant indirect effect (i.e. the 95% bias-corrected bootstrap CIs do not cross zero).

As can be seen in Table 6, maternal antenatal depression, post-birth depression and child maltreatment, but not maladaptive parenting, were observed to mediate significantly maternal child maltreatment and both internalising and externalising difficulties, in an independent manner. Maladaptive parenting only exerted an indirect effect through preceding post-birth maternal depression. Furthermore, the mediated effects of maternal child maltreatment on both internalising and externalising difficulties

via (i) antenatal depression and maladaptive parenting, and (ii) antenatal depression and child maltreatment, were only observed to be significant when mediated by maternal depression after birth. These data suggest that the timing of maternal depression is relevant, such that maternal depression after birth (whether preceded by depression during pregnancy or not) appears to be a salient mechanism by which risk for child psychopathology is increased through increasing the risk for maladaptive parenting and child maltreatment. The mediated effect of maternal depression during pregnancy appears to exert its effect via later depression during early childhood, as well as by conferring independent increased risk for child psychopathology, but not by directly increasing risk of maladaptive parenting or child maltreatment.

Discussion

The present study used a 14-year longitudinal cohort design to investigate the impact of a mother's history of child maltreatment on her child's experience of internalising and externalising difficulties in preadolescence, with a focus on characterising key mediating pathways. The study revealed that maternal child maltreatment directly and indirectly predicted child internalising difficulties, whereas only indirect effects were observed for child externalising difficulties. These findings suggest that the association between maternal child maltreatment and child externalising difficulties can be fully accounted for by maternal experience of depression during pregnancy and her child's early years, maladaptive parenting practices, and child maltreatment. In contrast, results suggest that whilst these mediating factors were observed to explain some of the key risk pathways of how maternal child maltreatment can affect child internalising difficulties, unexplained mechanisms of risk transmission

also remain. One could speculate that these may include factors such as cognitive vulnerability, which are particularly idiosyncratic to internalising psychopathologies, including the role of dysfunctional attitudes, negative cognitive style and rumination (Hankin et al., 2009).

Independent Mediating Effects

Results indicated that maternal antenatal depression, post-birth depression and child maltreatment, but not maladaptive parenting, showed some level of operation at an independent level in terms of mediating the association between maternal child maltreatment and both internalising and externalising difficulties. That is, variance in child psychopathology as a function of variation in maternal child maltreatment experiences could be accounted for by variation in each of these mediators (apart from maladaptive parenting) separately. These results corroborate existing findings in the literature that identify maternal psychological distress (timing not specified) to be a key mechanism of vulnerability transmission from mother to child (Collishaw et al., 2007; Min et al., 2013; Miranda et al., 2013; Myhre et al., 2014; Rijlaarsdam et al., 2014; Roberts et al., 2004; Thompson, 2007).

In regards to existing mixed findings on the mediating effect of child maltreatment (Miranda et al., 2013; Plant et al., 2013; Thompson, 2007), the current study's findings suggest child maltreatment to indeed be a specific mediating factor in the association between maternal child maltreatment and child psychopathology. A key difference between the present study and those that did not observe a significant effect (Miranda et al., 2013; Thompson, 2007) is the measurement of child exposure to maternal adulthood violence. Child exposure to domestic violence is an increasingly

recognised form of child maltreatment that frequently co-occurs with other maltreatment types (Gilbert et al., 2009). Thus, it is likely that reduced power to detect an effect of child maltreatment, as defined by sexual, physical, emotional abuse and neglect, was observed in Miranda et al.'s (2013) and Thompson's (2007) studies, due to likely issues of confounding when including measurement of maternal adulthood violence experiences as a separate variable. Admittedly, the non-inclusion of exposure to maternal adulthood violence as a child maltreatment type in this study, also limits these findings to possible issues of residual confounding by unmeasured potential co-occurrence of child exposure to this form of violence.

The fact that maladaptive parenting practices were not observed to function as an independent mediator, but that they were observed to operate in serial mediation, speaks to the literature detailing associations between maladaptive parenting and the other measured mediator variables, namely maternal depression and child maltreatment (Brown, Cohen, Johnson, & Salzinger, 1998; Lereya & Wolke, 2013; Lovejoy et al., 2000), and highlights issues of aggregation and confounding of risk when accounting for multiple associated risk factors. Given that maternal depression, maladaptive parenting and child maltreatment frequently co-occur, the present study's findings therefore highlight that the intergenerational transmission of vulnerability conferred by maladaptive parenting, as reported by previous research (Collishaw et al., 2007; Rijlaarsdam et al., 2014; Roberts et al., 2004; Thompson, 2007), is likely better explained by the influence of maternal depression and child maltreatment, when these intergenerational risks are also taken into account.

Timing of Maternal Depression and Serial Mediation Links

Findings relating to the indirect effects of maternal antenatal and post-birth depression were similar for both child internalising and externalising disorders. The data indicate that the indirect effects of maternal child maltreatment on child psychopathology through maternal depression and subsequent (i) maladaptive parenting or (ii) child maltreatment, were only observed if depression after birth was experienced, whether preceded by depression during pregnancy or not. These findings suggest that variances in parenting practices and child maltreatment experiences are better explained by variation in a mother's depressive symptomatology after birth than during pregnancy, signifying the likely role of mother-child interactions in underlying the links between maternal depression and (i) maladaptive parenting and (ii) child maltreatment, as identified in univariate analyses and the literature (Conron et al., 2009; Lereya & Wolke, 2013; Lovejoy et al., 2000; Pawlby et al., 2011).

Indeed, proposed explanations of the association between maternal antenatal depression and child maltreatment and parenting practices include a reduced capacity for care, hostility, reduced reflective function and a poorer mother-child attachment relationship (Alhusen, 2008; Feldman, Weller, Zagoory-Sharon, & Levine, 2007; Misri & Kendrick, 2008) all of which are regarded as central to underpinning the link between maternal depression in the child's early life with both maladaptive parenting and child maltreatment. Thus, it makes sense that maternal depression after birth exerts more influential effects on these factors, given this is the precise period in which the development of mother-child attachment security originates (Bowlby, 1969, 1980), as well as being a period when maternal scripts and beliefs for maternal-child relating are

likely to be particularly active (Byng-Hall, 1986). This highlights the likely influence of psychological mechanisms such as the development of secure attachment between mother and child and influences of scripts and beliefs for parenting practices, as underpinning the observed associations in the data. Nevertheless, the finding that maternal antenatal depression exerts an independent mediating effect, highlights a portion of risk that appears unique to depression during pregnancy. Prominent theories of maternal antenatal affective distress effects on child vulnerability to psychopathology, emphasise psychobiological processes, specifically, that the adverse hormonal environment afforded by an unwell expectant mother during pregnancy can programme persistent foetal brain changes, such as that of enhanced sensitivity of the hypothalamic-pituitary-adrenal axis, which confer risk for the later experience of emotional and behavioural adjustment difficulties (Bowers & Yehuda, 2016; Talge, Neal, & Glover, 2007).

Strengths and Limitations

Whilst the study has several strengths, including investigation of mediation pathways using a 14-year longitudinal design of a community-based sample, and the measurement of child psychopathology at the level of both clinical disorder and problem symptomatology, there are methodological issues that warrant consideration. First, measures of a mother's history of child maltreatment were made through self-report retrospectively using a non-validated scale, thereby increasing the likelihood of recall and measurement error, although recent research has reported good convergent validity between adult patients' self-reports of child maltreatment with clinical case notes and a psychometric self-report measure (Fisher et al., 2011). Whilst the study

benefited from a large sample size and thereby good levels of power to detect mediating effects over long time periods, which one would expect to inherently be smaller magnitude effects, using a non-experimental design has its drawbacks. Namely, natural aggregation of the occurrence of factors, such as maternal depression during pregnancy and after birth, cannot be prevented. Whilst advanced statistical procedures were applied to deal with issues of natural confounding and uneven group sizes, quasi-experimental designs that recruit groups based on the factor of interest, would likely allow for greater control of error variance amongst the data, which has the propensity to be higher in naturalist observations studies such as this one.

It would have been useful to corroborate maternal ratings of child psychopathology with child-self reports of their perceived difficulties. Furthermore, given that psychological mechanisms argued to underpin effects related primarily to attachment, the study would have benefited from explicit measurement of both maternal and child attachment statuses. Another issue relating to validity and reliability concerns maternal ratings of negative occurrences such as child maltreatment and maladaptive parenting. To circumvent possible biases in disclosure, third-party data such as social services records of children on the safeguarding register could be used in conjunction with maternal reports. Finally, it would have been useful to assess and account for maternal adulthood victimisation experiences.

Implications

Findings suggest a need for early identification of, and provision of support to, mothers with traumatic childhoods as a means to protecting their own and their children's psychological wellbeing. As maternal depression during pregnancy was

observed to temporally be at the start of a chain of serial mediators, through later maternal depression, maladaptive parenting and child maltreatment, this highlights that mothers with gross child maltreatment histories would likely benefit from targeted preventative psychological and psychosocial interventions to be offered in the antenatal period, a time also when expectant women naturally approach clinical services. Indeed, this recommendation is in line with a recent UK parliament cross-party manifesto advocating support to vulnerable women during the perinatal period as a crucial, cost-effective and preventative means to stemming the tide of the intergenerational transmission of adversity, and investing in future generations' psychological health (Leadsome, Field, Burstow, & Lucas, 2013). Interventions for expectant women with a maltreatment history and/or depression could include offering high-quality social support and improved access to psychological therapies, particularly interventions that allow for working through unresolved childhood issues of loss and trauma, such as psychotherapy. Psychological interventions aimed at improving the parent-infant attachment relationship through enhancing maternal reflective function and her ability to mentalise her child's needs, such as parent-infant psychotherapy would also seem particularly relevant (Barlow et al., 2015).

Future research would benefit from assessing the impact of maternal child maltreatment on mother-child attachment security and its contribution to explaining variation in child psychopathology outcomes. Furthermore, studies could also benefit from exploring cognitive vulnerabilities of affected children alongside affect regulation capacities as means to informing possible child-based intervention strategies. It would also be important to investigate the possible contribution of exposure to domestic

violence and inter-parental violence as a viable mechanism of intergenerational vulnerability transmission.

Conclusion

Children of mothers with a history of child maltreatment appear to be at an increased risk of experiencing internalising and externalising difficulties in preadolescence. Key mediating pathways appear to include maternal experience of antenatal depression, maternal experience of depression after birth, maladaptive parenting practices, and child exposure to maltreatment. Given, that maternal experience of depression during pregnancy was observed to be an initial mediator in serial mediation pathways, the pregnancy period is identified as a key opportunity to support mothers with a history of child maltreatment, through increased access to psychological and psychosocial interventions. Provision of such interventions would promote maternal wellbeing and protect against poorer psychological health in their children.

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Section C: Appendices

Please note, the ALSPAC study website contains details of all the data that was collected through a fully searchable data dictionary and can be retrieved at:

<http://www.bris.ac.uk/alspac/researchers/data-access/data-dictionary/>

List of Appended Supporting Material:

Appendix A: List of ethical approvals attained by ALSPAC for each stage of data collection

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Research Ethics Committee approval references

Please note that all self-completion Questionnaire content is approved by the ALSPAC Ethics and Law Committee

Initial Approval:

- Bristol and Weston Health Authority: E1808 Children of the Nineties: Avon Longitudinal Study of Pregnancy and Childhood (ALSPAC). (28th November 1989)
- Southmead Health Authority: 49/89 Children of the Nineties - "ALSPAC". (5th April 1990)
- Frenchay Health Authority: 90/8 Children of the Nineties. (28th June 1990)

7 Year Clinic:

- United Bristol Healthcare Trust: E4168 ALSPAC Hands on Assessments at Age Seven. (30th September 1998)
- Southmead Health Services: 67/98 Avon Longitudinal Study of Pregnancy and Childhood (ALSPAC) - Hands on Assessments at Age Seven. (14th September 1998)
- Frenchay Healthcare Trust: 98/52 Avon Longitudinal Study of Pregnancy and Childhood (ALSPAC). Hands on Assessments at Age Seven. (8th December 1998)

8 Year Clinic:

- United Bristol Healthcare Trust: E4445 ALSPAC Focus at Eight. (28th January 2000)
- Southmead (North Bristol Trust): Project 084/99 ALSPAC Assessments at Age Eight. (November 1999)
- Frenchay (North Bristol Trust): Project 99/42 Avon Longitudinal Study of Parents and Children (ALSPAC). Assessments at Age Eight (ALSPAC Focus at Eight). (15th December 1999)
- Weston Area Health Trust: E177 Avon Longitudinal Study of Parents and Children (ALSPAC). Assessments at Age Eight (21st September 1999)

9 Year Clinic:

- United Bristol Healthcare Trust: E5018 Avon Longitudinal Study of Parents and Children – Assessments at Age Nine (ALSPAC Focus@9). [Reciprocal Arrangement] (7th February 2002)
- Southmead (North Bristol Trust): 008/01 ALSPAC Assessments at Age Nine. (20th March 2001)
- Frenchay (North Bristol Trust): 2001/35 Avon Longitudinal Study of Parents and Children (ALSPAC) Assessments at Age Nine. (9th May 2001)

10 Year Clinic:

- United Bristol Healthcare Trust: E5215 ALSPAC – Focus at 10+. [Reciprocal]. (31st January 2002)
- Southmead (North Bristol Trust): 138/01 ALSPAC – Focus 10+. (18th January 2002)
- Frenchay (North Bristol Trust): 2001/90 Avon Longitudinal Study of Parents and Children (ALSPAC) Assessments at Age Ten Plus. (28th January 2002)
- Weston Area Health Trust: E280R – ALSPAC Focus 10+. (12th December 2001)

11 Year Clinic:

- Southmead (North Bristol Trust): 137/02: ALSPAC – Focus at 11+. (17th April 2003)
- United Bristol Healthcare Trust: E5691 ALSPAC Focus @ 11+. [Reciprocal] (29th May 2003)
- Frenchay (North Bristol Trust): 2002/110 Avon Longitudinal Study of Parents and Children (ALSPAC) Assessments at Age Eleven Plus. (23rd June 2003)
- Weston Area Health Trust: E325 (R) – 137/02 Avon Longitudinal Study of Parents and Children (ALSPAC) Assessments at Age Eleven Plus. (28th February 2003)

12 Year Clinic:

- Central & South Bristol Research Ethics Committee (UBHT): E5806 ALSPAC Teen Focus 1. (19th February 2004)
- Confirmation of Site Specific Approval (Southmead and North Somerset) (26th May 2004) Southmead Research Ethics Committee: Project 030/04 ALSPAC Hands on Assessments: Teen Focus 1. (26th April 2004)
- Frenchay Local Research Ethics Committee: 2004/18 Avon Longitudinal Study of Parents and Children (ALSPAC) Hands on Assessments: Teen Focus 1. (22nd April 2004)
- North Somerset Research Ethics Committee (Weston): 04/Q2003/5 Avon Longitudinal Study of Parents and Children (ALSPAC) Hands on Assessments: Teen Focus 1. (7th April 2004) 12 Year Clinic Amendment (TF1 Fast-track):
- Central & South Bristol Research Ethics Committee (UBHT): E5806 ALSPAC Teen Focus 1 fasttrack Amendment. (16th February 2005)

13 Year Clinic:

- Central & South Bristol Research Ethics Committee (UBHT): 04/Q2006/168 Avon Longitudinal Study of Parents and Children (ALSPAC), Hands on Assessments: Teen Focus 2 (Focus 13+). (11th March 2005)
- Approval for use of Biosamples (8th June 2007)