Attachment and Reactions to Trauma in Children and Adolescents

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Abstract

Background: Research conducted within adult samples demonstrates an association between insecure attachment and increased posttraumatic stress symptoms. Such relationships have been examined in children and adolescents, though to a lesser extent and findings are equivocal. Furthermore, there are few studies examining how attachment moderates the relation between adverse childhood experiences and mental health. **Methods:** This thesis consists of a meta-analytic review and an empirical study. The meta-analytic review conducted a comprehensive literature review to synthesise studies reporting effect sizes of the relation between attachment and posttraumatic stress within child and adolescent samples. The empirical study examined moderating effects of infant attachment security on the relation between childhood adversity during sixth grade (aged approximately 11-12 years) and mental health outcomes at 15 years using data from the Study of Early Child Care and Youth Development (SECCYD) by the National Institute of Child Health and Human Development (NICHD). **Results:** Results of the review demonstrate a significant negative correlation between secure attachment and PTSS ($r = -.16$) and a significant positive correlation between insecure attachment ($r = .26$). Results of the empirical study indicate a positive association between adverse relational experiences and internalising and externalising problems. Attachment security did not account for any additional variance in symptom-reporting. Infant attachment security did not moderate the relationship between adverse relational experiences during sixth grade and mental health outcomes at 15 years. **Conclusions:** Infant attachment security may not be a great risk factor for adolescent internalising and externalising problems, however, attachment during childhood and adolescence may be relevant in the development of posttraumatic stress.

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Chapter 1. Introduction

1.1 Summary of Attachment Theory

Attachment theory proposes that human beings are biologically predisposed to develop and maintain an affiliative bond with an attachment figure in order to ensure survival during the first years of life (Bowlby, 1969; Bowlby, 1982). This innate drive is referred to as the attachment behavioural system. According to attachment theory, infants and children have a desire to maintain proximity to an attachment figure, use the attachment figure as a 'safe haven' when they are distressed, and use the attachment figure as a 'secure base' from which to explore the environment. During infancy and childhood, the attachment figure is most likely to be a caregiver (such as parents), whereas during adolescence and adulthood, close friendships with peers become increasingly important (Buhrmester, 1990).

Extensive research and observations of caregiver-infant dyads led to the classification of attachment patterns during infancy: secure, insecure-resistant, and insecure-avoidant (Ainsworth, Blehar, Waters, & Wall, 1978), with the later addition of disorganised attachment (Main & Solomon, 1986). Differences in attachment patterns are believed to arise as a result of differing histories of interactions with attachment figures. For example, an infant who experiences their caregiver as sensitive and responsive in times of need may form a secure attachment. Alternatively, an infant who experiences their caregiver as not reliable or sensitive may develop an insecure attachment. Attachment theory posits that previous experiences with the caregiver form an internal working model of future relationships, whereby early relationship patterns are internalised and used to inform expectations of future relationships (Bowlby, 1973).

1.2 Theoretical Links Between Attachment and Mental Health

Authors within the field have proposed that we can expect the attachment behavioural system to be activated in response to stressful and traumatic life events. For example, Mikulincer, Shaver, and Solomon (2015) discussed that emotional responses to stressful and traumatic events, which include feelings of panic and vulnerability (Horowitz, 1982), are likely to activate the attachment behavioural system, thus encouraging a person to seek support from others at times of distress. They argued that a person with a secure attachment may expect others to offer care and support in order to reduce distress, whereas a person with an insecure attachment may not have expectations of others being supportive, thus preventing the regulation of distress (Mikulincer, Shaver, & Solomon, 2015).

Extensive research efforts have been carried out to determine whether attachment representations are associated with difficulties with social and emotional adjustment in children. Meta-analytic reviews of this research have documented effect sizes of $d = .15$ in the relation between attachment insecurity and internalising problems (Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012) and $d = .31$ in the relation between attachment insecurity and externalising problems (Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010). Furthermore, attachment insecurity has been associated with a range of mental health disorders such as Posttraumatic Stress (Woodhouse, Ayers, & Field, 2015; Barazzone, Santos, McGowan, & Donaghay-Spire, 2019), depression (Suzuki & Tomoda, 2015), and psychosis (Sitko et al., 2014).

There have been calls for research to examine the causality of these relationships, which has led to the development of a number of theoretical models, such as the social-cognitive perspective of Posttraumatic Stress Disorder (PTSD) developed by Sharp, Fonagy, and Allen (2012). The social-cognitive perspective of

PTSD posits that traumatic experiences with caregivers lead to the development of maladaptive attachment-based schemas of self and other. These attachment schemas are activated when individuals experience a traumatic event, leading to impaired social cognition. This in turn prevents individuals from making effective use of social support to reduce the impact of the traumatic event. There is some empirical evidence to support this model in both child (Venta, Hatkevich, Mellick, Vanwoerden, & Sharp, 2017) and adult populations (Muller, Sicoli, & Lemieux, 2000). The Social Model of PTSD highlights the role of fearful attachment and social processes in the development of PTSD (Woodhouse, Brown, & Ayers, 2018). The authors propose that group identification, social acknowledgement and posttraumatic cognitions have a role in the symptom severity of PTSD.

1.3 Attachment Theory in Clinical Practice

Attachment theory has informed the development of a range of therapeutic interventions within clinical practice. Examples include Attachment-Based Family Therapy (ABFT; Diamond & Siqueland, 1995), Attachment and Bio-behavioural Catch-up (ABC; Dozier et al., 2006), and Circle of Security (Hoffman, Cooper, Powell, & Marvin, 2006). Such interventions differ in their focus, for example, the aim of Circle of Security is to improve attachment security in infants and intervention is primarily carried out with the primary attachment figure. Conversely, ABFT aims to reduce depression and suicidality in adolescents and the intervention focuses on the family as whole. Furthermore, some services have adopted an attachment-based service model for individuals with complex trauma histories (Fyvie, Easton, Moreton, McKeever, & Karatzias, 2019).

Chapter 2. The Relationship Between Attachment Style and Posttraumatic Stress in Children and Adolescents: A Meta-Analytic Review

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2.1 Abstract

The relationship between attachment and Posttraumatic Stress Symptoms (PTSS) has been researched extensively within adult samples, with findings consistently demonstrating a relationship between insecure attachment and increased PTSS, and secure attachment and decreased PTSS. To a lesser extent, such relationships have also been explored within child and adolescent samples. The evidence to date is equivocal and there have been no attempts to synthesise studies within child and adolescent samples. This meta-analysis aims to provide a quantitative synthesis of studies reporting a relationship between attachment orientation and PTSS within children and adolescents. A random-effects model was used to analyse 16 studies (n=2964) reporting exposure to a range of traumatic events including maltreatment and war trauma. Results demonstrate a significant negative correlation between secure attachment and PTSS ($r = -.16$) and a significant positive correlation between insecure attachment ($r = .26$), avoidant attachment ($r = .26$), and disorganised attachment ($r = .17$) and PTSS. Clinical and research implications are discussed.

Keywords: Attachment; Posttraumatic Stress; Children; Adolescents; Meta-analysis

2.2 Introduction

2.2.1 Posttraumatic Stress in Childhood and Adolescence

In recent years, our understanding of children and adolescent's responses to traumatic events has greatly improved following extensive research efforts to provide evidence-based interventions for those experiencing Posttraumatic Stress Disorder (PTSD). Exposure to traumatic events during childhood and adolescence is not uncommon. Many children witness severe domestic violence (Meltzer, Doos, Vostanis, Ford, & Goodman, 2009) and experience abuse (Finkelhor, Turner, Shattuck, & Hamby, 2015), war trauma, natural disasters, and serious accidents (Costello, Erkanli, Fairbank, & Angold, 2002). A recent meta-analysis concluded that 15.9% of children exposed to traumatic events subsequently experience PTSD (Alisic et al., 2014). Whilst it is necessary for a child to have been directly or indirectly exposed to a traumatic event to diagnose PTSD, it is recognised that exposure to a traumatic event alone is not sufficient and several risk factors have been identified as increasing the likelihood of experiencing PTSD. Individual risk factors such as low social support and social withdrawal, along with peri-traumatic risk factors such as peri-trauma fear have been identified as increasing a child's risk of experiencing PTSD (Trickey, Siddaway, Meiser-Stedman, Serpell, & Field, 2012). Exposure to interpersonal trauma can lead to more severe Posttraumatic Stress Symptoms (PTSS) when compared to events which are non-interpersonal in nature (for a review, see Charuvastra & Cloitre, 2008). This has led to recommendations for research to further investigate the role of social factors in the development of PTSD.

2.2.2 Attachment Theory and Posttraumatic Stress

Attachment theory highlights the importance for children's socioemotional development and resilience of the provision of a safe haven by their caregivers (Bowlby, 1969). Ainsworth and colleagues carried out extensive research and observations of caregiver-infant dyads which led to the classification of attachment patterns: secure, insecure-resistant, and insecure-avoidant, with the later addition of disorganised attachment (Ainsworth, Blehar, Waters, & Wall, 1978; Main & Solomon, 1986). Attachment is measured differently across the lifespan; besides observational measures of caregiver-infant relationships, other measures used to assess attachment in children and adolescents include narrative interviews, projective measures such as doll play and story stems, and self-report. Self-report measures adopt two latent factors as opposed to four categories, known as attachment anxiety and attachment avoidance.

In recent years, researchers have made use of attachment theory to understand individual differences in response to a traumatic event. Two theoretical accounts have been proposed which capture the role of attachment theory in the development of PTSD: the social-cognitive perspective of PTSD (Sharp, Fonagy, & Allen, 2012) and the social model of PTSD (Woodhouse, Brown, & Ayers, 2018). The social-cognitive perspective emphasises the individual's capacity to effectively seek social support at times of distress, whereas the social model highlights the role of fearful attachment and social processes in the development of PTSD.

Attachment theory is regarded as a model of protection and resilience indicating an individual's ability to value closeness and seek safety from others (Gumley, Taylor, Schwannauer, & MacBeth, 2014). Lieberman (2004) argued that a child's ability to recover from a traumatic event is influenced by the quality of the child's attachment to the caregiver and the caregiver's ability to respond to distress

in a sensitive way. A child's proximity to their caregiver appears to be important in their sense of safety following a traumatic event. For example, children suffering from severe burns experienced more PTSS when separated from their parents, and this was not linked to injury severity (Saxe et al., 2005).

Experiencing caregiver-perpetrated maltreatment can negatively impact attachment security. Two meta-analytic reviews (Baer & Martinez, 2006; Cyr, Euser, Bakermans-Kranenburg, & van IJzendoorn, 2010) have reported that children who experience caregiver-perpetrated maltreatment are more likely to show insecure or disorganised attachment behaviour than children who have not experienced maltreatment. Indeed, the context of domestic abuse can create a difficult paradox whereby infants are frightened of their care-giver but equally rely on them for protection and survival (Charuvastra & Cloitre, 2008). When considering this evidence with previous findings that interpersonal trauma (Charuvastra & Cloitre, 2008) and disorganised attachment are associated with increased PTSS (Woodhouse, Ayers, & Field, 2015), it is pertinent to examine whether the relationship between attachment and PTSS is moderated by exposure to maltreatment in comparison to other types of traumatic events.

A large number of studies have examined the relationship between attachment and PTSS within the adult population (for a review, see Barazzone, Santos, McGowan, & Donaghay-Spire, 2019). Woodhouse et al. (2015) conducted a quantitative synthesis of these studies and identified an association between secure attachment and lower PTSS ($\hat{\rho} = -.27$), and an association in the opposite direction between insecure attachment and PTSS ($\hat{\rho} = .26$).

2.2.3 Rationale

Previous reviews have focused exclusively on research within adult populations (Barazzone et al., 2019; Marshall & Frazier, 2019; Woodhouse et al., 2015), yet there is considerable clinical and theoretical benefit to considering the role of attachment within child and adolescent populations. Firstly, improved understanding of the role of attachment in the development of PTSS in children and adolescents may assist in assessment and intervention which may in turn improve treatment outcomes. Current models of PTSD incorporate prior experiences and the coping capacity of the individual but do not incorporate attachment (Ehlers & Clark, 2000). Secondly, if PTSS is associated with attachment insecurity in children, it may need to be incorporated in to theoretical models and interventions may need to promote attachment security. Further research would then need to be carried out to examine whether such modifications enhance treatment outcomes.

2.2.4 Aims

The aim of this meta-analytic review is to provide a quantitative synthesis of studies examining the relationship between attachment and PTSS in children and adolescents. This meta-analysis also aims to identify whether the relationship between attachment and PTSS differs according to the type of traumatic event experienced, specifically the experience of childhood maltreatment compared to other types of trauma. It is recognised that many children experience symptoms of posttraumatic stress without meeting the diagnostic criteria for PTSD. This review will focus on PTSS rather than diagnosed PTSD to ensure that findings are generalizable to both clinical and non-clinical populations.

The research questions are as follows:

1) What does the current evidence tell us about the relationship between attachment style and posttraumatic stress symptoms in children and adolescents?

2) Does the relationship between attachment style and posttraumatic stress differ in children and adolescents who have experienced maltreatment compared to other types of traumatic events?

It is hypothesised that attachment security will be associated with lower levels of PTSS and attachment insecurity will be associated with higher levels of PTSS and that exposure to maltreatment will lead to increased PTSS when compared with other types of traumatic events.

2.3 Method

2.3.1 Inclusion and Exclusion Criteria

Papers identified for full-text review were assessed for their eligibility according to the following exclusion criteria:

- Attachment was not measured

- PTSS was not measured

- The paper was an intervention study that did not report a correlation coefficient

- There was insufficient information to calculate a correlation coefficient

- Studies were not written in the English language

- Study sample consisted of adult participants

- Participants had neurodevelopmental disorders or learning disabilities

2.3.2 Database Searches

The review was registered on PROSPERO in April 2019 (registration number CRD42019132799). A systematic search was conducted in May 2019 using four literature databases (PubMed, PsycINFO, Web of Science and OpenGrey). Search terms were selected by reviewing terms used in similar reviews and refining to allow for identification of relevant papers within the current area. The following search terms were entered within each database: ("posttraumatic stress" OR "posttraumatic stress disorder" OR "post-traumatic stress" OR "post-traumatic stress disorder" OR "traumatic stress" OR "acute stress disorder" OR PTSD OR PTSS) AND (attachment OR attach* OR "strange situation"). Age-specific search terms were not included at this stage to allow for the identification of studies which report on both child and adult samples. The initial searches identified 2091 articles which were transferred to Endnote. Endnote removed 381 duplicates, leaving 1710 abstracts for screening. Following a review of all titles and abstracts, irrelevant papers were excluded leaving 42 articles for full-text review. The search terms returned one meta-analysis and one systematic review, the reference lists of both papers were searched. Since both papers excluded participants from child populations no additional papers were identified.

Six papers were not available therefore authors were contacted to request the full text. This did not result in any additional papers being returned. Of the 42 full papers that were reviewed, 26 were excluded leaving 16 papers for inclusion in the meta-analysis. Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA; Moher, Liberato, Tetzlaff, & Altman, 2009) was used during the article selection process which is reported in Figure 1.1. The papers included in the meta-analysis are marked with a * in the reference section.

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┌─────────────────────┐                    ┌─────────────────────┐
│ Records identified  │                    │     Duplicates      │
│ through database    │ ─────────────────▶ │  removed (n=381)    │
│ searching (n=2091)  │                    │                     │
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│ Records after       │
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│ removed (n=1710)    │
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│                     │                    │  Records excluded   │
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│     (n=1710)        │                    │  abstract (n=1668)  │
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│ Full-text articles  │                    │ Full-text articles  │
│ assessed for        │ ─────────────────▶ │     excluded:       │
│ eligibility (n=42)  │                    │                     │
└─────────────────────┘                    │ Not in English      │
          │                                │ language: 1         │
          ▼                                │ Learning disability │
┌─────────────────────┐                    │ population: 1       │
│ Studies included in │                    │ Paper not           │
│ quantitative        │                    │ available: 6        │
│ synthesis (n=16)    │                    │ No measure of       │
└─────────────────────┘                    │ PTSS: 2             │
                                           │ No measure of       │
                                           │ attachment: 9       │
                                           │ Intervention study: │
                                           │ 3                   │
                                           │ Insufficient        │
                                           │ information to      │
                                           │ calculate r: 4      │
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Identification — Screening — Eligibility — Included

Figure 1.1. PRISMA flow diagram demonstrating article screening and selection

based on Moher et al. (2009)

2.3.3 Data Extraction

Relevant information was extracted from each study and collated within a database. This was summarised as: study title, authors, journal title, year of publication, country of origin, study design (e.g. prospective, cross-sectional), sample size, type of traumatic event, mean participant age and age range, percentage male and female, participant ethnicity, type of sample (e.g. clinical, community), name of attachment measure, type of attachment measure (e.g. interview, questionnaire), type of attachment classification (e.g. categorical, continuous), name of PTSS measure, PTSS measure type (e.g. interview, questionnaire), study quality, effect size and p-value. Three studies reported a correlation coefficient of the relationship between attachment orientation and PTSS for each parent. The majority of the remaining studies (k=7) reported on the relationship where the attachment figure being rated was the mother. Where correlation coefficients for both parents was available, information for the mother relationship was chosen to ensure consistency between studies.

2.3.4 Categorisation of Attachment

The studies included in the meta-analysis reported effect sizes to estimate the strength of the relationship between PTSS and six types of attachment classification. These are summarised as secure (n=11), insecure (n=2), avoidant (n=5), ambivalent (n=2), anxious (n=1), and disorganized (n=4). Studies reporting effect sizes for forms of insecure attachment (i.e. avoidant attachment, disorganised attachment, ambivalent attachment, anxious attachment) were grouped together for one meta-analysis. Studies reporting effect sizes for secure attachment were grouped together for one meta-analysis. Avoidant attachment and disorganised attachment were then analysed separately in order to provide effect sizes for distinct attachment patterns.

This categorisation of attachment classification led to four separate meta-analyses. One study reported on the effect size of the relationship between anxious attachment and PTSS. Two studies reported ambivalent attachment (Levendosky et al., 2002; Punamaki et al., 2015). These have not been meta-analysed because they are included in the overall insecure attachment meta-analysis. Furthermore, there was variation in the measurement of these attachment classifications with some studies adopting continuous measures of attachment anxiety and some adopting categorical measures, reflecting changes in measurement across the span of childhood and adolescence. Nine continuous measures and three categorical measures of attachment were reported by studies in the review.

2.3.5 Calculation of Effect Size

A correlation coefficient (Pearson's *r*) was selected to represent effect sizes because it was reported in the majority of studies eligible for inclusion and can be estimated from other effect size statistics. Where a correlation coefficient was not reported, calculations were carried out to estimate Pearson's *r* from the reported statistic such as Cohen's *d* (Rosenthal, 1994), odds ratio (Borenstein, Hedges, Higgins, & Rothstein, 2009) and standardized regression coefficient (β) (Peterson & Brown, 2003). In cases where studies reported two correlation coefficients for two different types of insecure attachment classification for the insecure attachment meta-analysis, both correlation coefficients were transformed to Fisher's Z and the mean of both scores was calculated. The mean was then transformed back to Pearson's *r*.

2.3.6 Quality Assessment and Risk of Bias Tool

The quality appraisal and risk of bias tool used for this meta-analysis was developed based on the quality assessment tool for observational cohort and cross-

sectional studies (National Heart, Lung and Blood Institute, 2014). The assessment tool contained three sections. The first section was designed to capture study and rater information. The second section comprised of nine items designed to assess study quality and risk of bias. The third section was designed to summarise the overall rating. Scores for individual items were summed and converted to a percentage. All studies were assessed for quality and risk of bias independently by two researchers. Interrater reliability was calculated (85.7%).

2.3.7 Meta-Analytic Method

Meta-analytic calculations were undertaken using MAVIS version 1.1.3 (Hamilton, 2017) which uses the Metafor package for R (Viechtbauer, 2010). A random effects model (Hedges & Vevea, 1998) was used in each of the meta-analyses. This approached was deemed to be most suitable because it was expected that there would be variability in effect size of the included studies, as samples were recruited from varying populations and had been exposed to differing types of traumatic events. Moderator analyses were conducted to examine whether the relationship between attachment and PTSS differed according to whether the sample had been exposed to maltreatment compared with other types of traumatic events. All moderator analyses were conducted using a random effects model and were conducted separately. It is recommended that a minimum of four studies are required to run moderator analyses (Fu et al., 2011), therefore where this recommendation was not met, sensitivity analyses were conducted instead. Two studies included in the review reported effect sizes based on Odds Ratio statistics which are a different measure of effect size in comparison to Pearson's r; this can lead to over or under-estimation of Pearson's r when estimated from an Odds Ratio statistic. Sensitivity analyses were run to examine whether the removal of these studies made a difference

to the overall estimated effect size. Some studies included in the meta-analysis used proxy measures of attachment. For example, Feldman and Vengrober (2011) made behavioural observations of child participants during the discussion of trauma memories. Behaviour was coded according to the Coding Interactive Behaviour (Feldman, 1998) in order to derive scores of secure base and avoidant behaviour. Boeckel et al. (2015) used the Maternal Bond Inventory (Boeckel et al., 2011) as a proxy measure for the measurement of secure attachment, whereby higher scores of the maternal bond indicate attachment security. Sensitivity analyses were conducted to assess whether the removal of these studies had an effect on the overall result.

2.4 Results

2.4.1 Study Characteristics

Sixteen studies were included in the overall meta-analytic review. Characteristics of each study are reported in Table 1.1. Within the studies included, the sample size ranged from 18 to 551 and the total sample size was 2964. The majority of studies used a cross-sectional design (k=12) with four studies using a prospective design. Of the studies that used a prospective design, two studies measured attachment prior to the child's exposure to a traumatic event. A range of measures were used to assess attachment style and PTSS which are summarised in Table 1.1. Twelve attachment assessments were used, ranging from self-report (Experiences in Close Relationships – Short Form; Wei, Russell, Mallinckrodt, & Vogel, 2007), interview-based assessments (Child Attachment Interview; CAI; Target, Fonagy & Shmueli-Goetz, 2003), and observation-based assessments (Strange Situation Procedure; SSP; Ainsworth et al., 1978). This led to varying types of reporting of attachment such as classification and dimensions. Nine measures were used to assess PTSS, ranging from self-report (Impact of Events Scale Revised;

Weiss & Marmar, 1997) and interview-based measures (Diagnostic Interview of

Children and Adolescents – PTSD Section; Reich et al., 1995), and were based on

DSM diagnostic criteria for PTSD.

Table 1.1.

Study characteristics

Study	N	Traumatic event	Mean age (years)	Sex	Country of origin	Attachment measure	PTSS measure	Design	Study quality
An et al., (2018)	443	Natural disaster	14.44	53% female	China	Inventory of Parent and Peer Attachment (Armsden & Greenberg, 1987)	Child PTSD Symptom Scale (Foa, Johnson, Treadwell, & Kimberli, 2001)	Cross-sectional	High
Bederian-Gardner et al., (2018)	146	Family instability and maltreatment	17	37% female	United States of America	Experiences in Close Relationships – Short Form (Wei, Russell, Mallinckrodt, & Vogel, 2007)	Los Angeles Symptom Checklist (King, King, Leskin, & Foy, 1995)	Cross-sectional	Medium
Bizzi et al., (2015)	18	Not reported	11.99	50% female	Italy	Child Attachment Interview (Target, Fonagy & Shmueli-Goetz, 2003)	Trauma Symptom Checklist for Children (Briere, 1996)	Cross-sectional	Medium
Boeckel et al., (2015)	36	Maltreatment	8.81		Brazil	*Maternal Bond Inventory (Boeckel et al., 2011)	Child PTSD Symptom Scale (Foa et al., 2001)	Cross-sectional	Medium
Bosquet-Enlow et al., (2014)	96	Not reported	17.5	76% female	United States of America	Strange Situation Procedure (Ainsworth et al., (1978)	Kiddie Schedule for Affective Disorders and Schizophrenia	Prospective	High

							(Orvaschel et al., 1982)		
Bosqui et al., (2017)	99	War trauma	15	53.5% female	Palestine	The Adolescent Attachment Questionnaire (West et al., 1998)	Child Impact of Events Scale – Revised (Weiss & Marmar, 1997)	Cross-sectional	High
Feldman & Vengrober (2011)	232	War trauma	33 months	52.4% female	Isreal	*Coding Interactive Behaviour (Feldman, 1998)	Diagnostic classification: o-3 revised (Zero To Three, 2005)	Cross-sectional	High
Hatton (2010)	19	Not reported	35 months	23.8% female	Canada	Attachment Q-Sort (Waters & Deane, 1985)	The Posttraumatic Stress Disorder Semi-Structured Interview and Observational Record for Infants and Young Children (Scheeringa & Zeanah, 1994)	Cross-sectional	Medium
Hebert et al., (2018)	505	Sexual abuse	8	67.1% female	Canada	Kern's Security Scale (Kerns, Klepac,& Cole, 1996)	Children's Impact of Events Scale II (Wolfe, 2002)	Cross-sectional	Medium
Levendosky et al., (2002)	111	Maltreatment	14	49.5% female	United States of America	Adult Attachment Scale (Collins & Read, 1990)	Trauma Symptom Checklist (Briere, 1996)	Cross-sectional	High
London et al., (2015)	75	Maltreatment	16	40% female	United States of America	Inventory of Parent and Peer Attachment	Diagnostic Interview of Children and	Cross-sectional	High

						(Armsden & Greenberg, 1987)	Adolescents – PTSD Section (Reich, Welner, & Herkanic, 1995)		
MacDonald et al., (2008)	78	Maltreatment	5.5	47% female	United States of America	Strange Situation Procedure (Ainsworth et al., (1978)	Diagnostic Interview of Children and Adolescents – PTSD Section (Reich et al., 1995)	Prospective	High
McGinnis (2017)	170	Maltreatment	14	32.4% female	South Korea	Relationship Questionnaire (Griffin & Bartholomew, 1994)	Child PTSD Symptom Scale (Foa et al., 2001)	Cross-sectional	High
Okello et al., (2014)	551	War trauma	16.7		Uganda	Inventory of Parent and Peer Attachment (Armsden & Greenberg, 1987)	Impact of Events Scale Revised (Weiss & Marmar, 1997)	Cross-sectional	High
Punamaki et al., (2015)	240	War trauma	11	50% female	Palestine	Coping Strategies Questionnaire; Kern's Security Scale (Kerns et al., 1996; Finnegan, Hodges, & Perry, 1996).	Children's Revised Impact of Events Scale (Weiss & Marmar, 1997)	Prospective	High
Venta et al., (2017)	142	Not reported	15.53	66.9% female	United States of America	Child Attachment Interview (Target et al., 2003)	Trauma Symptom Checklist for	Prospective	High

	Children (Briere, 1996)

Note. Attachment measures marked with a * used proxy measures of attachment and were removed in the sensitivity analyse

2.4.2 Sample Characteristics

The mean age of participants ranged from 33 months to 17.5 years, with an overall mean age of 11.9 years. Two of the included studies had samples in which some participants exceeded the upper age limit for inclusion. Bosqui, Marshoud, and Shannon (2017) had a sample with ages ranging from 12 to 19 years and Okello et al. (2014) had a sample with ages ranging from 13 to 21 years. The mean age of study participants in these two studies were 15 years and 16 years respectively. These studies were included in the meta-analysis because the mean age of the sample was under the age of 18 years. Of the studies that reported demographic information of participant sex (k=14), gender split ranged from 23.8% female to 76% female with the gender split of the total sample being 49.9% female. Four studies recruited participants from a clinical sample and 12 studies recruited participants from a community sample. The nature of trauma exposure varied from maltreatment (k=7), war trauma (k=4), and natural disaster (k=1). Four studies did not specify the type of trauma exposure.

2.4.3 Assessment of Study Quality and Risk of Bias

All studies included in the meta-analysis were assessed for quality and risk of bias using the assessment tool described in 1.3.6. The majority of studies were rated as being high quality (k=11) and the remaining studies were rated as being medium quality (k=5).

2.4.4 Meta-Analysis of Secure Attachment and PTSS

Of the 16 studies included in the review, 11 studies reported an effect size of the relationship between secure attachment and PTSS. The total sample size of the 11 studies in this meta-analysis was 2453. An overall effect size of $r = -.16$ (95% CI=-.30 - -.01, z=-2.34, $p<.0194$) was estimated by the random effects model.

Heterogeneity estimates indicated that there was significant variance within the included studies (Q=89.44, *df*=9, *p*<.0001). I² was 88.8%, indicating a high level of heterogeneity. The forest plot for this meta-analysis is shown in Figure 1.2.

A funnel plot using the 'trim and fill' method was generated and visually inspected. The funnel plot was approximately symmetrical upon visual inspection and estimated no missing studies in the meta-analysis. Kendall's tau was -.27, *p*=.28, indicating no significant asymmetry.

An et al., (2018)	-0.28 [-0.36, -0.19]
Boeckel et al., (2015)	-0.35 [-0.61, -0.02]
Bosqui et al. (2017)	-0.26 [-0.44, -0.07]
Feldman & Vengrober (2011)	-0.32 [-0.43, -0.20]
Hatton (2008)	-0.64 [-0.85, -0.26]
Herbert et al., (2018)	-0.02 [-0.11, 0.07]
Levendosky et al., (2002)	0.30 [0.12, 0.46]
London et al., (2015)	-0.35 [-0.53, -0.13]
Okello et al., (2014)	0.07 [-0.01, 0.15]
Punamaki et al., (2015)	0.06 [-0.07, 0.19]
Venta et al., (2017)	-0.20 [-0.35, -0.04]
RE Model	-0.16 [-0.30, -0.01]
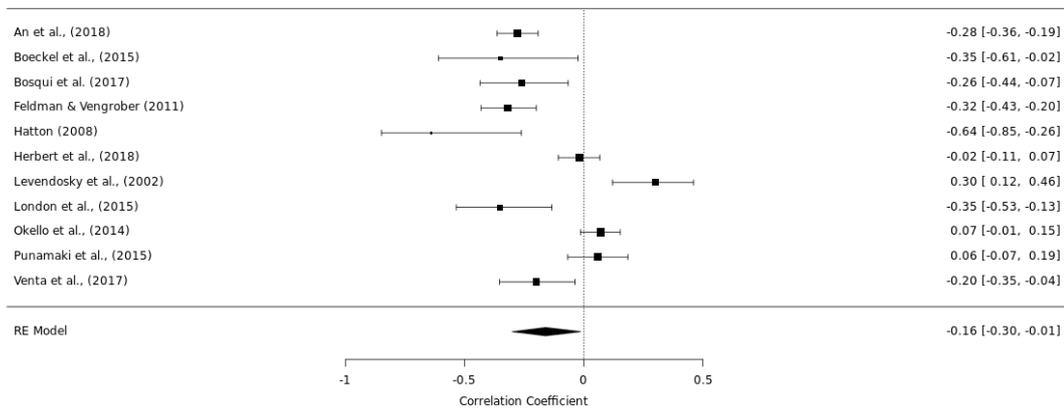
Figure 1.2. Forest plot of studies reporting the relationship between secure attachment and PTSS with overall effect size and confidence intervals for each study

2.4.4.1 Moderators of the relationship between secure attachment and PTSS. Moderator analyses were conducted to assess whether exposure to maltreatment had a moderating effect on the strength of the relationship between secure attachment and PTSS compared to other types of trauma. Maltreatment did not moderate the relationship between secure attachment and PTSS. The results of these analyses are summarised in Table 1.2.

Table 1.2.

Trauma type as a moderator of the relationship between secure attachment and PTSS.

	Estimate (*r*)	SE	l.CI	u.CI	*p*
Maltreatment (k=4)	-.0823	.1193	-0.3061	.1501	
Non-maltreatment (k=7)	-.1966	.0876	-.3548	.0274	
Moderator analysis	-.1569	.0706	-.2883	-.0198	.4306

Note. U.CI refers to the lower limit of the 95% confidence interval; u.CI refers to the upper limit of the 95% confidence interval.

2.4.4.2 Sensitivity analyses of the relationship between secure attachment and PTSS. One study reported on Pearson's *r* which had been calculated from an Odds Ratio statistic (Punamaki, Palosaari, Diab, Peltonen, & Qouta, 2015). When removed from the meta-analysis, a random effects model estimated an overall effect size of $r = -.18$ (95% CI = -.33-.03, z=-2.52, $p=.0118$). Heterogeneity estimates maintain significant variance of effect sizes within the included studies (Q=83.09, *df* = 9, $p<.0001$). Two studies used non-standardized measures of attachment (Feldman & Vengrober, 2011; Boeckel, Wagner, & Grassi-Oliviera, 2015). When these studies were removed from the meta-analysis, a random effects model estimated an overall effect size of $r = -.12$ (95%CI=-.29-.04, z = -1.64, $p=.1011$), making the relationship between secure attachment and PTSS non-significant. Heterogeneity estimates maintained significant variability in effect sizes within the included studies (Q=72.40, *df* = 8, $p<.0001$).

2.4.5 Meta-Analysis of Insecure Attachment and PTSS

Of the 16 studies included in the review, seven studies reported an effect size of the relationship between insecure attachment (i.e. including measures of attachment labelled avoidant, disorganized, ambivalent and anxious attachment, as well as measures labelled insecure) and PTSS, with an overall sample size of 1013. An overall effect size of $r = .26$ (95% CI=.16-.35, z=4.83, p<.0001) was estimated by the random effects model. Heterogeneity estimates indicated that there was significant variance between effect sizes (Q=15.59, df=6, p=.0162). I^2 was 61.5%, indicating a moderate degree of variance in the effect sizes. The forest plot for this meta-analysis is reported in Figure 1.3.

A funnel plot using the 'trim and fill' method was generated and visually inspected. The funnel plot was deemed to be approximately symmetrical upon visual inspection and estimated no studies missing from the meta-analysis. Kendall's tau was -.21, p=.55, indicating no significant asymmetry.

Figure 1.3

Study	Correlation Coefficient
Bederian-Gardner et al., (2018	0.37 [0.22, 0.50]
Bizzi et al. (2015)	0.06 [-0.42, 0.51]
Bosquet-Enlow et al., (2014)	0.17 [-0.03, 0.36]
Feldman & Vengrober (2011)	0.34 [0.22, 0.45]
Levendosky et al. (2002)	0.35 [0.18, 0.50]
McGinnis (2017)	0.28 [0.14, 0.41]
Punamaki et al., (2015)	0.07 [-0.06, 0.19]
RE Model	0.26 [0.16, 0.35]
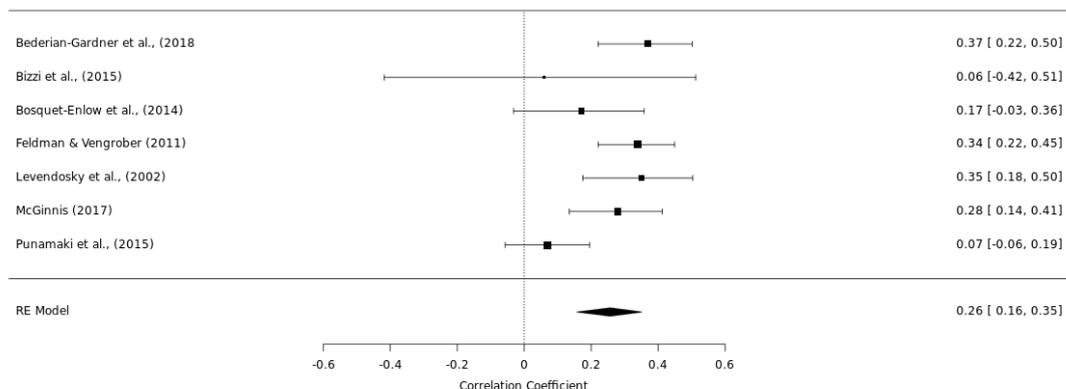
Figure 1.3. Forest plot of studies reporting the relationship between insecure attachment and PTSS with overall effect size and confidence intervals for each study

2.4.5.1 Sensitivity analyses of the relationship between insecure attachment and PTSS. Sensitivity analyses were conducted to assess whether exposure to maltreatment strengthened the relationship between insecure attachment and PTSS compared to other types of trauma. Studies reporting effect sizes based on other types of trauma were removed from the analysis. A random effects model based on three studies estimated an overall effect size of $r = .33$ (95% CI=.24-.41, z=7.00, $p<.0001$). Heterogeneity estimates indicated no significant variability in effect size variance ($Q = .86$, $df = 2$, $p=.6504$). A second sensitivity analysis was conducted to assess whether the removal of studies reporting a non-standardized measure of attachment and studies reporting Odds Ratio statistics had an effect on the overall effect size estimates. One study used a proxy measure of attachment (Feldman & Vengrober, 2011) and was removed for the sensitivity analysis. A random effects model based on five studies estimated an overall effect size of $r = .24$ (95% CI = .14-.33, z=4.60, $p<.0001$). Heterogeneity estimates indicated significant variability in effect size variance ($Q = 12.98$, $df = 6$, $p=.0433$). A third sensitivity analysis was conducted to determine the overall effect size when studies reporting Odds Ratio statistics were removed. A random effects model based on six studies estimated an overall effect size of $r=.32$ (95% CI = .25=.38, z=9.06, $p<.0001$). Heterogeneity estimates indicated that the variance of effect sizes was no longer significant ($Q=2.68$, $df=5$, $p=.7488$). These findings indicate that when effect sizes which have been estimated from Odds Ratio are removed, there is a more robust effect than the initial meta-analysis suggests with improved homogeneity in the variance of effect sizes.

2.4.6 Meta-Analysis of Avoidant Attachment and PTSS

Five studies reported an effect size of the relationship between an avoidant attachment style and PTSS with an overall sample size of 825. The random effects model estimated an overall effect size of $r=.26$ (95% CI=.14-.36, $z=4.21$, $p<.0001$). Heterogeneity estimates indicated significant variability between effect sizes (Q=11.81, $df=4$, $p=.0188$). I^2 was 66.1%, demonstrating a degree of variance between study effect sizes.

Funnel plots were generated using the 'trim and fill' method and were approximately asymmetrical upon visual inspection. The funnel plots indicated that there were no missing studies from the meta-analysis. Kendall's tau = .2000, p = .8167, indicating no significant asymmetry.
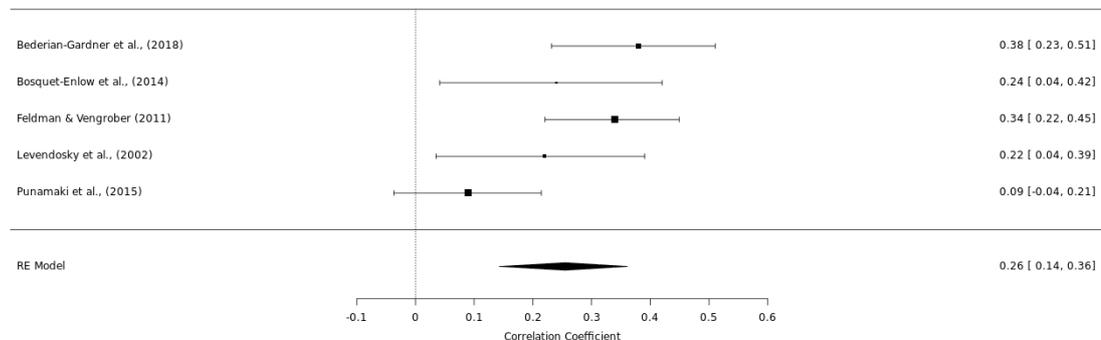
Figure 1.4 illustrates the forest plot the meta-analysis of studies of effect sizes of avoidant attachment and PTSS with the confidence intervals for each study

2.4.6.1 Sensitivity analyses of the relationship between avoidant attachment and PTSS. A sensitivity analysis was conducted to assess whether exposure to maltreatment strengthened the relationship between avoidant attachment and PTSS compared to other types of trauma. Studies reporting effect sizes based on other types of trauma were removed from the analysis. A random effects model

based on two studies estimated an overall effect size of $r = .31$ (95% CI=.20-.42, $z=3.62$, $p=.0003$). Heterogeneity estimates indicated no significant variability in effect size variance ($Q = 1.91$, $df = 1$, $p=.1664$). A second sensitivity analysis was conducted to examine whether the removal of Odds Ratio statistics and studies which used a non-standardized measure of attachment changed the overall effect size. One study used a proxy measure of attachment (Feldman & Vengrober, 2011) and was removed from the sensitivity analysis. A random effects model estimated an overall effect size of $r=.22$ (95% CI=.14-.29, $z=2.86$, $p=.0042$). Heterogeneity estimates indicated significant heterogeneity ($Q=11.88$, $df=3$, $p=.0078$). A third sensitivity analysis was conducted to examine whether removal of studies reporting Odds Ratio statistics changed the overall results. Two studies reported Odds Ratio statistics (Bosquet-Enlow et al., 2014; Punamaki et al., 2015) and were consequently removed for a sensitivity analysis. A random effects model estimated an overall effect size of $r=.35$ (95% CI=.27-.43, $z=8.04$, $p<.0001$). There was no significant heterogeneity between effect sizes ($Q=.10$, $df=2$, $p=.9493$). As with overall insecure attachment, these results indicate that the effect size for insecure attachment is stronger when Odds Ratio statistics are removed from the meta-analysis.

2.4.7 Meta-Analysis of Disorganised Attachment and PTSS

Four studies reported an effect size of the relationship between disorganised attachment (as assessed by the Child Attachment Interview and Strange Situation Procedure) and PTSS, with an overall sample size of 214. The random effects model estimated an overall effect size of $r = .17$ (95% CI = .0336 - .2999, $z = 2.44$, $p=.0148$). Heterogeneity estimates indicated that there was no significant variability between effect sizes ($Q = 2.27$, $df = 3$, $p=.5175$). I^2 was 0%, demonstrating little variance between study effect sizes.

Funnel plots were generated using the 'trim and fill' method and were approximately symmetrical upon visual inspection. A funnel plot estimated that there was one missing study from the meta-analysis. Kendall's tau = .1826, p = .7180, indicating no significant asymmetry.
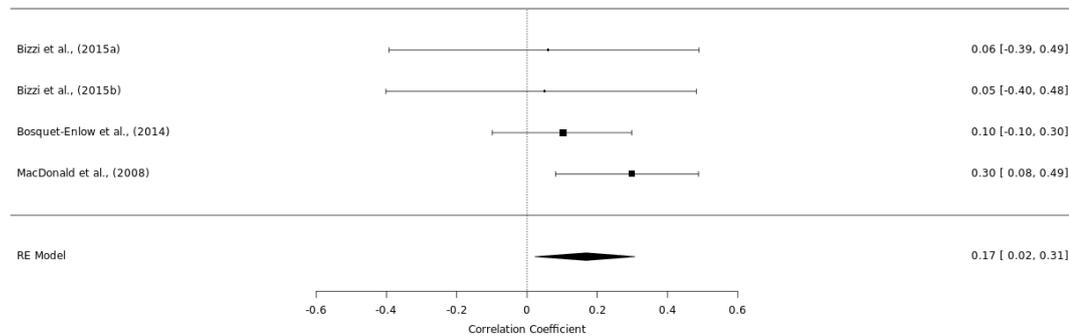

Figure 1.5 illustrates the forest plot of the meta-analysis of studies of effect sizes of disorganized attachment and PTSS with the confidence intervals for each study.

2.4.7.1 Sensitivity analyses of the relationship between disorganised attachment and PTSS. A sensitivity analysis was conducted to examine whether the removal of studies based on samples exposed to maltreatment changed the overall effect size of the relationship between disorganized attachment and PTSS. One study reported experiences of maltreatment within the sample (MacDonald et al., 2008) and was removed for the sensitivity analysis. A random effects model estimated an overall effect size of r=.09 (95% CI=-.08-.26, z=1.03, p=.3050). There was no significant heterogeneity within the sample (Q=.06, df=2, p=.9700). One study reported Odds Ratio statistics (Bosquet-Enlow et al., 2014) and was removed from the analysis. This led to an estimated effect size of r=.22 (95% CI=.04-.39, z=2.39, p=.0169). There was no significant heterogeneity within the sample (Q=1.49, df=2, p=.4738). It was not possible to undertake a sensitivity analysis for

studies using a non-standardized measure of attachment because no studies within the disorganized attachment meta-analysis used non-standardized measures.

2.5 Discussion

2.5.1 Summary of Findings

Sixteen articles were included in this review, each with an independent sample. Results of the four meta-analyses demonstrate: 1) a negative correlation between secure attachment and PTSS ($r = -.16$), 2) a positive correlation between insecure attachment and PTSS ($r = .26$), 3) a positive correlation between avoidant attachment and PTSS ($r = .26$), and 4) a positive correlation between disorganised attachment and PTSS ($r = .17$). All correlations were statistically significant, but also involved significant heterogeneity.

The findings of the current review extend previous meta-analytic findings that secure attachment is associated with decreased PTSS and insecure attachment is associated with increased PTSS (Woodhouse et al., 2015) in that they are consistent in child and adolescent samples. The overall effect size estimate for the relationship between avoidant attachment and PTSS was comparable to findings by a previous meta-analytic review (Woodhouse et al., 2015). It is acknowledged that previous research examining this relationship has revealed somewhat mixed findings (Fraley, Fazzari, Bonanno, & Dekel, 2006), however, the current findings indicate the strength of this relationship in child and adolescent populations. The current review was not able to compare the relationship between avoidant attachment and PTSS with anxious attachment and PTSS because not enough studies reported an effect size in order to run a meta-analysis; indeed, it was only reported by one study within the current review. This highlights that when reporting on associations between

attachment classification and PTSS within the child literature, studies do not consistently assess the full range of attachment classifications.

Moderator and sensitivity analyses examining whether exposure to maltreatment strengthened the relationship between attachment and PTSS indicated somewhat inconsistent results. Findings indicate that exposure to maltreatment did not moderate the relationship between secure attachment and PTSS, which was contrary to our hypotheses. However, sensitivity analyses indicated that exposure to maltreatment did strengthen the relationship between insecure attachment and PTSS, avoidant attachment and PTSS, and disorganised attachment and PTSS. It is important to acknowledge that the current meta-analysis had a small sample size. Whilst this finding does suggest that insecure attachment may be a stronger risk factor in children and adolescents exposed to maltreatment compared to children and adolescents who have not experienced maltreatment, it is important to recognise that children exposed to maltreatment could also have been exposed to other traumatic events, and vice versa. Exposure to multiple traumatic events was not controlled for in individual studies.

A consistent finding in meta-analyses examining insecure attachment and avoidant attachment was that when studies reporting Odds Ratio statistics were removed, the strength of the relationship between insecure attachment and insecure attachment subtypes was stronger than initially indicated by the main analyses.

The current findings indicate that the relationship between disorganised attachment and PTSS was significant but small, indeed smaller than other insecure attachment subtypes. This somewhat opposes findings reported in similar reviews (Woodhouse et al., 2015; Barrazone et al., 2019). It is possible that this could be explained by different ways of measuring disorganised attachment in childhood and

fearful attachment in adulthood. Two of the effect sizes included in this meta-analysis were obtained from a study by Bizzi et al. (2015). The sample size of this particular study was small, therefore may have had limited statistical power. Previous findings that fearful attachment in adults can lead to increased PTSS does have important clinical implications, though more research is required before conclusions can be drawn in relation to the child and adolescent population.

Overall effect size estimates of the relationship between secure attachment and PTSS were smaller in the child population in comparison to the adult population, with reported effect sizes being $r = -.16$ in the child and adolescent population and $\hat{\rho} = -.27$ in the adult population. This finding indicates that a secure attachment orientation may be less protective for children in the development of PTSS in comparison to adults. This could, in part, explained by a smaller number of studies within the child meta-analysis. When studies using proxy measures were removed, the relationship between secure attachment and PTSS was less strong and became non-significant. Nonetheless, the reduction was small and non-significance may be due to reduced statistical power.

2.5.2 Implications for Clinical Practice and Research

The findings of this review can offer some assistance to clinicians in the formulation and intervention with children and adolescents experiencing PTSS. Based on recommendations by Funder and Ozer (2019), results demonstrate a medium effect size in the relation between insecure attachment and PTSS and a small effect size in the relation between secure attachment and PTSS. This indicates that attachment security could be viewed as a protective factor, though the effect is small. Furthermore, insecure attachment can be seen as a risk factor. Models of PTSD which consider the role of attachment security have been proposed (Sharp et

al., 2012; Woodhouse et al., 2018) and have received some empirical support (Woodhouse et al., 2018; Venta et al., 2017). Notably, Venta et al. (2017) studied PTSD in adolescents, providing empirical support for this model within the adolescent population. Future research should evaluate these models further. Future research may also incorporate the use of attachment theory within assessment, formulation and intervention, to assess whether treatment outcomes are improved following the use of such models.

The current meta-analyses highlight that most studies examining the relationship between attachment and PTSS in children and adolescents use a cross-sectional design with attachment orientation and PTSS being assessed at a single point in time. Two studies conducted a measure of attachment during infancy, prior to the occurrence of a traumatic event. Studies assessing attachment prior to the exposure to a traumatic event are necessary because previous research indicates that exposure to a traumatic even can have an impact on an individual's attachment security (Murphy, Elklit, Hyland, & Shevlin, 2016; Solomon, Dekel, & Mikulincer, 2008), thus making the interpretation of cross-sectional data more difficult.

The current review highlighted that some researchers used proxy measures of attachment with children and adolescents and many adolescents were administered measures of adult attachment. For example, Feldman and Vengrober (2011) made behavioural observations of child participants during the discussion of trauma memories. Behaviour was coded according to the Coding Interactive Behaviour (Feldman, 1998) in order to derive scores of the child's secure base behaviour and child's avoidant behaviour. Boeckel et al. (2015) used the Maternal Bond Inventory (Boeckel et al., 2011) as a proxy measure for the measurement of secure attachment, whereby higher scores indicate attachment security. Whilst sensitivity analyses have

been conducted to account for this, this highlights a need for studies which use direct and well-validated measures of attachment within child and adolescent populations.

2.5.3 Strengths and Limitations

This meta-analysis has several important strengths. Studies were selected following a comprehensive literature review which included grey literature to reduce the risk of bias. Study quality was assessed independently by two raters with high inter-rater reliability. The current meta-analysis addressed a gap in the literature by providing a quantitative synthesis of the relationship between attachment and PTSS within the child and adolescent literature.

Despite these strengths, the findings of this meta-analysis should be considered in the context of its limitations. This meta-analysis focused on correlation relationships; therefore, it was not possible to draw conclusions about causality of the relationship between attachment and PTSS. Previous research demonstrates that the relationship between attachment and PTSS is moderated by social cognition (Venta et al., 2017), mentalization (Ferrajo, Badoud, & Oliviera, 2017), social support (Besser & Neria, 2010) and negative view of self (Muller, Sicoli, & Lemieux, 2000), with the majority of these studies being conducted with adult samples. The picture of attachment, trauma exposure and PTSS is a complex one and is in need of closer examination. Future research should examine causality and test hypotheses proposed by models which incorporate attachment security in the development of PTSS. Finally, four studies did not indicate the type of trauma experienced by the sample, thus weakening statistical power when undertaking moderator analyses to identify the moderating effects of interpersonal trauma.

2.5.4 Summary and Conclusion

The results of these meta-analyses indicate that attachment orientation during childhood and adolescence has a small but significant association with PTSS. Secure attachment is associated with lower PTSS following a traumatic event and insecure and avoidant attachment is associated with increased PTSS following a traumatic event. This indicates that the role of attachment in the development of PTSS is relevant during childhood and adolescence.

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Chapter 3. Bridging Chapter

The meta-analytic review outlined in Chapter 2 highlighted important findings within the child and adolescent literature examining the relation between attachment style and Posttraumatic Stress Symptoms (PTSS), whilst also identifying areas which have received little empirical attention to date. For example, of the 16 studies that were included in the review, four used a prospective design and only two conducted assessments of attachment style during infancy within a prospective design. Both of these studies focused exclusively on disorganised attachment behaviour. Four studies recruited their samples from children and adolescents who had experienced war trauma, five studies recruited their samples from children and adolescents who had experienced maltreatment, and four studies did not report the type of trauma exposure within the sample. One study examined moderating effects of attachment on the relation between exposure to community violence and PTSS (London, Lilly, & Pittman, 2015). The authors reported that the relation was significant, but only for adolescents with a history of maltreatment. In summary, this indicates that we still have much to examine regarding attachment during infancy, and how this interacts with adverse experiences.

Chapter 4. Attachment as a Moderator of Adverse Childhood Experiences and Adolescent Mental Health Outcomes: Findings from the NICHD Study of Early Child Care and Youth Development

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4.1 Abstract

Objective: The role of attachment security as a moderator of the relationship between childhood maltreatment and adult mental health outcomes has been explored with mixed results. Yet the role of peer victimisation has not yet been examined within this literature, nor have child and adolescent populations been studied to the same extent. The aim of this study was to examine moderating effects of infant attachment security on the relationship between childhood adversity during sixth grade (aged approximately 11-12 years) and mental health outcomes at 15 years using data from the Study of Early Child Care and Youth Development (SECCYD) by the National Institute of Child Health and Human Development (NICHD). **Method:** Infant attachment was assessed by the Strange Situation Procedure at 15 months, peer victimisation and parental hostility was measured during sixth grade and adolescent mental health outcomes were measured at 15 years using Achenbach's System for Empirically Based Assessment. Data were analysed for interaction effects of infant attachment and adverse relational experiences. **Results:** Participants who reported exposure to peer victimisation and parental hostility during sixth grade showed increased internalising and externalising problems, as well as posttraumatic stress symptoms at the age of 15 years. Attachment security did not account for any additional variance in symptom-reporting. Infant attachment security did not moderate the relationship between adverse relational experiences during sixth grade and mental health outcomes at 15 years. **Conclusions:** Infant attachment security may not be a great risk factor for adolescent mental health outcomes.

Keywords: Attachment; Child; Adolescent; Strange situation; Longitudinal

4.2 Introduction

4.2.1 Adverse Relational Experiences

Childhood maltreatment refers to physical, emotional, and sexual abuse and neglect (Radford et al., 2011). Meta-analytic estimates indicate that 24% children experience physical abuse and 36.5% children experience emotional abuse in the United States (Stoltenborgh, Bakermans-Kranenburg, Alink, & van IJzendoorn, 2014). Exposure to childhood maltreatment has well-documented consequences on mental health outcomes later in life. For example, a meta-analytic review demonstrated that maltreatment during childhood was associated with depression, anxiety disorders, and Post-Traumatic Stress Symptoms (PTSS; Gardner, Thomas, & Erskine, 2019). Consequently, it is common for individuals using mental health services to have experienced maltreatment during childhood in the form of abuse, neglect, or exposure to family violence (Mueser et al., 1998; McFarlance, Bookless, & Air, 2001). Parental hostility refers to the verbally and physically aggressive behaviour of a parent towards a child (Simons, Simons, Lei, Hancock, & Fincham, 2012) and is associated with low self-esteem and emotional instability in children (Khaleque, 2017). Parental hostility can be seen as an index of maltreatment in that physical and verbal aggression can overlap with physical abuse.

Peer bullying or victimisation is characterised by repetitive aggressive behaviour resulting from an imbalance of power (Smith, 2016). Peer victimisation during childhood was reported in one study to have worse long-term consequences on the mental health of adults than maltreatment by parents during childhood (Lereya, Copeland, Costello, & Wolke, 2015).

4.2.2 Attachment Theory and Mental Health Outcomes

Attachment theory (Bowlby, 1969) highlights the importance of the provision of a safe haven in the socioemotional development of children by their caregivers. Several studies have reported that secure attachment serves as a protective factor in the development of many disorders in adult participants who report childhood maltreatment, such as PTSS (Aspelmeier, Elliot, & Smith, 2007; Muller, Thornback, & Bedi, 2012; Lowell, Renk, & Adgate, 2014), psychosis (Sitko et al., 2014), and depression (Suzuki & Tomoda, 2015). Additionally, attachment security has been reported to improve general wellbeing (Corcoran & McNutty, 2018). Meta-analyses have documented effect sizes of $d = .15$ in the relation between attachment insecurity and internalising problems (Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012) and $d = .31$ in the relation between attachment insecurity and externalising problems (Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010).

Although this research indicates a consistent association between attachment security and improved mental health outcomes, research examining moderating effects of attachment has had less consistent findings. Busuito, Huth-Bocks, and Puro (2014) examined romantic attachment as a moderator of PTSS in pregnant women. The authors reported evidence of attachment avoidance moderating the relationship between childhood abuse and PTSS. Similarly, Aspelmeier, Elliot, and Smith (2007) reported moderating effects of attachment security on the relation between childhood sexual abuse and PTSS. The authors concluded that the protective effects of attachment security differed according to the nature of the relationship of the attachment figure, with protective effects being stronger for peer and parent relationships and less strong for other close adult relationships. Whiffen, Judd, and Aube (1999) reported moderating effects of intimate relationships on the

relationship between childhood sexual abuse and depression. Scott and Babcock (2010) reported that attachment anxiety was a moderator of the relationship between interpersonal trauma and PTSS, though attachment closeness (an index of security) was not. On the contrary, Elwood and Williams (2007) did not report moderating effects of attachment security on the relationship between intimate partner violence and PTSS.

Each of these studies used a cross-sectional design and there are several shortfalls of this approach. The first is that when researchers are investigating the effects of childhood maltreatment within adult samples, they rely on retrospective accounts which may be vulnerable to depressive re-interpretive bias (Lewinsohn & Rosenbaum, 1987) and traumatic amnesia (Freyd, 1994). The second is that self-report adult attachment assessments may focus on a range of close relationships whereas assessments conducted during infancy are designed to capture attachment orientation with the primary caregiver. Finally, a number of studies have demonstrated that continuity of attachment can change in response to stressful life experiences (Hamilton, 2000; Weinfield, Sroufe, & Egeland, 2000), and traumatic life events (Murphy, Elklit, Hyland, & Shevlin, 2016; Solomon, Dekel, & Mikulincer, 2008), therefore an individual's adult attachment style may not reflect their attachment style during infancy.

Some studies have used a prospective design to address the shortfalls of a cross-sectional design. Charest et al. (2019) investigated the mediating effects of attachment on the relation between childhood sexual abuse and behaviour problems in children aged three to six years. The authors reported that attachment disorganisation partially mediated the relationship between childhood sexual abuse and internalising and externalising problems. Murphy et al. (2016) assessed

attachment avoidance, attachment anxiety, and PTSS over a period of 12 months in adult females who experienced sexual abuse as children in a cross-lagged panel design. The authors reported that PTSS predicted attachment anxiety and avoidance to a larger extent than attachment avoidance predicted PTSS. Two studies have used a prospective study whereby attachment was measured during infancy, prior to the traumatic event (MacDonald et al., 2008; Bosquet-Enlow, Egeland, Carlson, Blood, & Wright, 2014). However, the authors did not specify the nature of trauma exposure within the sample. It is difficult to conduct prospective research with children who experience maltreatment and parental hostility for ethical reasons because researchers should report suspected maltreatment to the appropriate safeguarding teams for the purposes of child protection (Longden, Madill, & Waterman, 2012; Widom, Czaja, Kozakowski, & Chauha, 2018).

4.2.3. The NICHD Study of Early Child Care and Youth Development

Due to the ethical and logistical difficulties and the resources required of conducting prospective research which examines childhood maltreatment and parental hostility, many researchers make use of existing data to test hypotheses. The National Institute of Child Health and Human Development (NICHD) conducted the Study of Early Child Care and Youth Development (SECCYD), a prospective study which ran over a period of 16 years with the aim of identifying how differences in the type of child care experiences contributed to child development (NICHD Early Child Care Research Network, 2005). The NICHD SECCYD was a four phase, multi-site study conducted in the United States. Infant attachment security and mental health outcomes were studied within this sample. For example, Brumariu and Kerns (2013) reported that infant attachment history and temperament were related to pre-adolescent anxiety as reported by participants' mothers. Milan, Zona, and

Snow (2013) highlighted a pathway by which attachment history indirectly contributed to internalising symptoms in adolescence by the adolescent's increased preoccupation with their parent. The NICHD Early Child Care Research Network (2006) reported that avoidant attachment predicted teacher-reported externalising problems during early school years. O'Connor, Scott, McCormick, and Weinberg (2014) reported that attachment security was negatively related to internalising and externalising behaviours whilst attachment insecurity was positively related to internalising behaviours in middle childhood.

These studies have made progress in examining pathways of infant attachment security and mental health outcomes in childhood and adolescence. However, the role of adverse relational experiences, and how attachment security interacts with such experiences, has yet to be examined in this sample.

4.2.4. Rationale

Prospective research examining the moderating effects of infant attachment security on the relation between adverse relational experiences and adolescent mental health outcomes is important for several reasons. Firstly, individuals who have experienced adverse relational experiences are over-represented in mental health services (Mueser et al., 1998; McFarlane, Bookless, & Air, 2001). Therefore, prospective research is needed to determine the role of infant attachment security in the role of mental health outcomes, thus being able to inform the assessment, formulation and intervention for people who have experienced polyvictimisation. Secondly, whilst existing prospective research has examined the role of infant attachment security in later mental health outcomes (MacDonald et al., 2008; Bosquet-Enlow et al., 2014), these studies did not report the nature of the adverse experiences reported by the sample. Furthermore, research examining the

moderating effects of attachment security tends to be conducted within the adult population, rather than child and adolescent populations. Such research has clinical implications for children and adolescents using mental health services.

4.2.5. Aims

The present study will report on an analysis of data from the NICHD SECCYD. The aim of the analysis is to examine the moderating effects of infant attachment security on the relation between adverse relational experiences during childhood, specifically parental hostility and peer victimisation, and mental health outcomes during adolescence. Research questions are outlined below.

1) Is the relation between childhood parental hostility and adolescent mental health moderated by security of attachment during infancy?

2) Is the relation between childhood peer victimisation and adolescent mental health moderated by security of attachment during infancy?

Based on previous findings, it was hypothesised that participants who experienced parental hostility and peer victimisation during childhood would have increased internalising problems, externalising problems and PTSS during adolescence. Hypotheses as to whether infant attachment security would moderate this relationship remained two-tailed due to mixed findings from previous studies examining moderation effects.

4.3 Method

4.3.1 Participants

The initial study sample comprised of 1,364 participants in 1991 and ended with 1,009 participants in 2007. Participants were recruited from 10 locations across the United States (Little Rock, AR; Orange County, CA; Lawrence, KS; Boston, MA; Philadelphia, PA; Pittsburgh, PA; Charlottesville, VA; Morganton, NC; Seattle,

WA; Madison, WI). A conditionally random sampling plan was used to ensure participants were recruited from a diverse range of backgrounds, including single and two-parent families. The following exclusion criteria were applied: mothers younger than the age of 18 when their child was born, families who did not expect to remain within the catchment area of the study for at least three years, children with disabilities at birth or who remained in hospital for more than seven days after birth, and mothers who were not able to speak English to a conversant level. Further details of recruitment and demographic information of the main sample are reported in previous publications (NICHD Early Child Care Research Network, 1997; NICHD Early Child Care Research Network, 2004).

4.3.1.1 Analytic sample. The present analysis used a subset of the main sample which comprised of 1,149 participants. The purpose of the analysis was to examine moderation effects of attachment security; therefore, this subset of participants was selected because they had completed the Strange Situation Procedure at 15 months and received an attachment classification. Five-hundred-and-eight-one (50.6%) participants within the analytic sample were male and 568 (49.4%) were female. Demographic information of participant ethnicity within the analytic sample were as follows: 838 (81.6%) participants were White, 135 (11.7%) were Black or Afro-American, 19 (1.7%) were Asian or Pacific Islander, four (.3%) were American Indian, Eskimo, or Aleutian, and 53 (4.6%) were recorded as 'Other'. Nine-hundred-and-ninety-four (86.5%) were rated as 'not poor' and 144 (12.5%) were rated as 'poor' according to the income-to-needs ratio of the family when participants were aged 15 months. Income-to-needs ratio was not provided for 11 (1%) participants at the age of 15 months.

4.3.2 Measures

4.3.2.1 Infant attachment security. Attachment security was assessed at 15 months using the Strange Situation Procedure (SSP; Ainsworth, Blehar, Waters, & Wall, 1987). The SSP is an observation-based assessment lasting 25 minutes and is designed to assess attachment-related behaviour during a novel situation with brief episodes of increasing stress, including separation from and reunion with the caregiver. The child's attachment and exploratory behaviours, particularly during the reunion episodes, were rated and classified in accordance with the major classification systems: secure (B), insecure-avoidant (A), insecure-resistant (C), disorganised (D), or unclassified (U). Administration of the SSP adhered to the standard protocol and videotaped SSPs were coded by a team of three coders who were blind to the participants' childcare status. Inter-coder reliability was reported as 83% within the sample (kappa = .69). A total of 1,149 participants completed the SSP at 15 months. Of these participants, 710 were rated as securely attached (61.8%), 160 were rated as insecure-avoidant (13.9%), 102 were rated as insecure-resistant (8.9%), and 177 were rated as showing disorganised attachment behaviours (15.4%). Thirty-five participants (3.8%) were rated as unclassified (U) and thus excluded from all analyses. For analytic purposes, a dummy variable of secure-versus-insecure (i.e. insecure-avoidant, insecure-resistant, and disorganised) was created.

4.3.2.2 Parental hostility. Parental warmth, support, and hostility was assessed using a 17-item self-report questionnaire with a four-point Likert scale with answers ranging from 'Never' to 'Always'. Eight items pertain to parental hostility and nine items pertain to parental warmth and support. Items pertaining to parental hostility assessed for the presence of possible maltreatment from parents. Example items include 'How often does your parent push, grab, hit, or shove you?' and 'How

often does your parent insult or swear at you?'. This measure was designed by the NICHD study team. The NICHD SECCYD had no direct measure of parental maltreatment. Seven-hundred-and-sixty-six participants completed this measure when they were in sixth grade (aged approximately 11-12 years) and one questionnaire was completed for each parent living in the household. For analytic purposes, the eight items pertaining to parental hostility were selected for each parent and summed to create a score of total parental hostility. Internal consistency for the parental hostility scale was within the current sample was acceptable (Cronbach's α =.79).

4.3.2.3 Peer victimisation. Peer social support, bullying, and victimisation was assessed using an 18-item self-report questionnaire comprised of three subscales measuring peer social support, engagement in bullying behaviour and perceived victimisation from peers. Nine-hundred-and-one participants completed the measure in sixth grade (aged approximately 11-12 years). The measure was based on scales developed by Kochenderfer and Ladd (1997) and were adapted by the NICHD study team. Four items pertain to perceived victimisation from peers and answers are reported on a five-point Likert scale ranging from 'Never' to 'Always', enquiring as to whether the participant is verbally or physically abused by peers. Example items include 'Do any of the kids at school say mean things to you?' and 'Do any of the kids at school hit you?'. For analytic purposes, the four items pertaining to perceived victimisation were summed to provide a score of peer victimisation. Internal consistency for the perceived victimisation scale within the current sample was good (Cronbach's α = .85).

4.3.2.4 Internalising problems. Internalising problems were assessed using the Youth Self Report (YSR; Achenbach, 1991a). The YSR is a 112 item self-report

questionnaire with a three-point Likert scale ranging from 0 to 2. The YSR forms part of Achenbach's System of Empirically Based Assessment (ASEBA) which is commonly used for the screening of emotional and behavioural problems in children and adolescents. The YSR comprises of eight subscales: attention problems, aggressive behaviour, anxious/depressed, delinquent behaviour, somatic complaints, social problems, thought problems, and withdrawn/depressed. These form two broadband scales summarised as internalising and externalising problems. Eight-hundred-and-seventy-four participants completed the YSR at the age of 15 years. For analytic purposes, T-scores were selected from the internalising broadband scale because there was a normal distribution of T-scores in comparison to raw scores. Internalising problems were used from the YSR as it was hypothesised that study participants would provide a more accurate account of their internalising problems than their parents (Meiser-Stedman, Smith, Glucksman, Yule, & Dagleish, 2007). Internal consistency with the sample was good (Cronbach's α = .89).

4.3.2.5 Externalising problems. Externalising problems were assessed using the Child Behaviour Checklist (CBCL; Achenbach, 1991b), which also forms part of the ASEBA. Several forms were developed due to the acknowledgement that information from multiple sources is important when assessing emotional and behaviour problems in children (Achenbach, McConaughy, & Howell, 1987). The CBCL is a 112-item caregiver-report questionnaire. Items were rated on a three-point Likert-scale ranging from 0 (not true of the child) to 2 (very true of the child). Seven-hundred-and-thirty-three caregivers completed the CBCL when participants were aged 15 years. As with the YSR, the CBCL comprises of the same eight subscales and two broadband scales. For analytic purposes, mother-report questionnaires were selected from when participants were 15 years of age. T-scores

were selected from the broadband externalising scale as they had a normal distribution in comparison to raw scores. Externalising problems were selected from the CBCL rather than the YSR because it was hypothesised that caregiver report of externalising behaviour would be more accurate than child-report as they pertain to observable behaviour. Internal consistency with the sample was excellent (Cronbach's α = .91).

4.3.2.6 Posttraumatic stress symptoms. PTSS were assessed using 15 items derived from the CBCL proposed by Dehon and Scheeringa (2006). The internal consistency of the PTSS scale within this sample was adequate (Cronbach's α = .79). For analytic purposes, mother-report questionnaires were selected when participants were 15 years of age. Items pertaining to PTSS were summed to form a total PTSS score. A list of the 15 items used to form the PTSS measure can be found in Table 2.1.

Table 2.1.

CBCL Items Used to Form the PTSS Scale as Recommended by Dehon and Scheeringa (2006).

Item number	Item
3	Argues a lot
8	Cannot concentrate or pay attention for long
11	Clings to adults or too dependent
29	Fears certain animals, situations, places other than school
45	Nervous, high strung or tense
47	Nightmares
50	Too fearful or anxious
56c	Nausea or feeling sick

56f	Stomach aches or cramps
56g	Vomiting or throwing up
86	Stubborn, sullen or irritable
87	Sudden changes in mood
100	Trouble sleeping
103	Unhappy, sad or depressed
111	Withdrawn, does not get involved with others

4.3.3 Procedure

Mothers were approached for recruitment during the third trimester of pregnancy and written informed consent was obtained at the time of recruitment. The NICHD SECCYD was conducted in four stages during which there were major assessment points to collect data. Data were collected in the family home, in childcare, and at school. Data were also collected via telephone calls every three months between major assessment points (NICHD Early Child Care Research Network, 2005). The present analysis received ethical clearance from the Faculty of Medical and Health Sciences within University of East Anglia (Appendix C).

4.3.4 Analytic Strategy

All data were analysed using Statistical Package for the Social Sciences Version 25 (IBM SPSS). Descriptive statistics of study variables and demographic characteristics of the analytic sample were derived. Data were screened to assess their conformity to the assumptions of hierarchical multiple regression analyses and transformations were made where necessary. Square root transformations were applied to the PTSS variable as the data were positively skewed. Sensitivity analyses were conducted to examine whether this had an effect on the overall findings of the

moderator analyses. Log10 transformations were applied to the externalising problems variable as the data were positively skewed. The transformed version of the externalising problems variable was entered to both regression models because this improved the normality of the distribution and homoscedasticity. Moderator variables were produced by creating interaction terms consisting of infant attachment security multiplied by peer victimisation and parental hostility respectively. A series of hierarchical multiple regression analyses were conducted to examine moderating effects of attachment security on the relation between peer victimisation and parental hostility during sixth grade and mental health outcomes at 15 years, specifically internalising problems, externalising problems, and PTSS. Background variables, specifically gender, socioeconomic status, and ethnicity, were added as a first step to control for these variables. Background variables were entered as a first step to ensure clarity as to whether the proposed predictor variables were having an effect over and above the background variables. A dummy variable was created for ethnicity and entered as ethnic minority groups vs other. Parental hostility and peer victimisation were examined in separate models. The moderation model examined is demonstrated in Figure 1.6.

A multiple imputation procedure (Sterne et al., 2009) was used to account for missing data on the assumption that data were missing at random. Missing data were due to participant drop-out and participants missing assessment points. Five imputations were conducted using all study variables (summarised in Table 2.2) with the exception of the interaction terms. Results were reported based on pooled regression estimates. Pooled F statistic estimates were computed using Rubin's Rules (Rubin, 1987) in 'Miceadds' package in R (Robitzsch, Grund, & Henke, 2020). Mean R^2 was calculated for each of the imputations and reported in the main

results. Percentages of missing data are reported in Appendix D. Holm-Bonferroni sequential corrections (Holm, 1979) were computed in post-hoc analyses using R in order to control for multiple comparisons. These corrections did not result in any changes to the statistical significance of the results. Adjusted α values are reported in Appendix E.
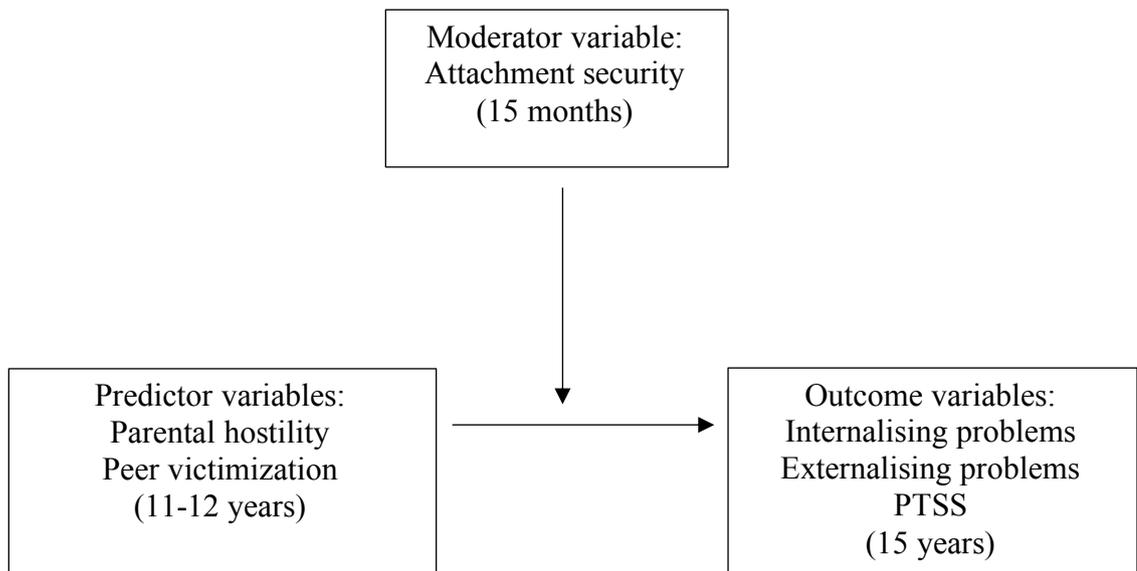
Figure 1.6. Moderation model being tested using a model proposed by Baron and Kenny (1986).

4.4 Results

4.4.1 Descriptive Statistics

Descriptive statistics and correlation coefficients of main study variables are reported in Table 2.2.

Table 2.2.

Correlation Coefficients of Main Study Variables

	Mean (SD)	Gender	Ethnicity	Socioeconomic status	Attachment security	Peer victimisation	Parental hostility	Internalising problems	Externalising problems	PTSS
Gender		-								
Ethnicity		-.017	-							
Socioeconomic status		.035	-.263**	-						
Attachment security		.025	.039	-.053	-					
Peer victimisation	7.1 (2.9)	.018	-.001	.040	-.071*	-				
Parental hostility	22.4 (4.7)	-.034	-.045	.091*	.012	.346**	-			
Internalising problems	47.3 (10.2)	.095**	-.020	.076	-.045	.238**	.243**	-		
Externalising problems	47.3 (9.9)	.065	-.050	.150**	-.026	.136**	.208**	.141**	-	
PTSS	3.1 (3.2)	.106**	-.046	.145**	.002	.131**	.198**	.270**	.746**	-

Note. *p<.05. **p<.01. *r* estimated from pooled imputations.

4.4.2 Internalising Problems

A hierarchical multiple regression analysis was run to assess the increase in variance explained by the addition of an interaction term of infant attachment security and peer victimisation to a main effects model. Participant gender, ethnicity and socioeconomic status were entered to the first step to control for background variables which accounted for 1.4% of variance in internalising problems which was statistically significant $F(3, 888) = 3.886$, $p=.008$. The entry of peer victimisation and attachment security accounted for 6.8% of the variance in internalising problems, which was statistically significant $F(2, 886) = 11.0444$, $p<.0001$, though only peer victimisation accounted for unique variance. Attachment security did not moderate the relationship between peer victimisation and internalising problems, as evidenced by an increase in total variance explained by .2% which was not statistically significant $F(1, 885) = 8.813$, $p = .162$.

A further hierarchical multiple regression was run to assess the increase in variation explained by the interaction effects of infant attachment security and parental hostility. Participant gender, ethnicity and socioeconomic status were entered to the first step to control for background variables which accounted for 1.2% of variance in internalising problems, which was statistically significant $F(3, 753) = 2.871$, $p = .037$. The entry of parental hostility and attachment security accounted for 8.0% of the variance in internalising problems which was statistically significant $F(2, 751) = 11.196$, $p<.0001$, though only parental hostility accounted for unique variance. Attachment security did not moderate the effect of parental hostility internalising problems, as evidenced by an increase of total variance explained by .2%, which was not statistically significant $F(2, 750) = 10.124$, $p = .187$. Regression coefficients for both models are reported in Table 2.3.

Table 2.3.

Prediction of Self-Reported Internalising Problems from Attachment, Peer

Victimisation and Parental Hostility

Predictors		Internalising problems		
	R^2	B	SE	p
Peer victimisation (PV) model				
Step 1	.014			
Gender		1.915	.686	.005
Ethnicity		.252	.759	.740
Socioeconomic status		2.261	1.172	.056
Step 2	.068			
Attachment		-.440	.785	.577
PV		.823	.130	<.0001
Step 3	.070			
PV x attachment		.339	.242	.162
Parental hostility (PH) model				
Step 1	.012			
Gender		1.970	.754	.009
Ethnicity		-.033	.851	.969
Socioeconomic status		1.761	1.298	.176
Step 2	.080			
Attachment		-.801	.804	.320
PH		.573	.085	<.0001
Step 2	.082			
PH x attachment		.196	.184	.287

4.4.3 Externalising Problems

A hierarchical multiple regression was run to examine the variance explained
by the inclusion of the interaction term infant attachment security and peer
victimisation to a main effects model. Participant gender, ethnicity and
socioeconomic status were entered to the first step to control for background
variables which accounted for 2.2% for variance in externalising problems which
was statistically significant $F(3, 829) = 6.075$, $p< .0001$. The entry of peer
victimisation and attachment security accounted for 4.0% of the variance in

externalising problems, which was statistically significant $F(2, 827) = 6.981$, $p<.0001$, though only peer victimisation accounted for unique variance. Attachment security did not moderate the relationship between peer victimisation and externalising problems, as evidenced by an increase in total variance explained by .1%, which was not statistically significant $F(1, 826) = 6.165$, $p = .405$.

A further hierarchical multiple regression was run to examine the variance explained by the inclusion of the interaction term of infant attachment security and parental hostility to a main effects model. Participant gender, ethnicity and socioeconomic status were entered to the first step to control for background variables which accounted for 1.9% of the variance in externalising problems which was statistically significant $F(3, 701) = 5.506$, $p = .001$. The entry of parental hostility and attachment security accounted for 5.8% of the variance in externalising problems which was statistically significant $F(2, 701) = 9.756$, $p<.0001$, though only parental hostility accounted for unique variance. Attachment security did not moderate the relationship between parental hostility and externalising problems, as evidenced by an increase in total variance explained of 0%, which was not statistically significant $F(1, 700) = 8.171$, $p = .585$. Regression coefficients for both models are reported in Table 2.4.

Table 2.4.

Prediction of Caregiver-Reported Externalising Problems from Attachment, Peer Victimisation and Parental Hostility

| | | Externalising problems | | |
Predictors	R^2	B	SE	p
Peer victimisation (PV) model				
Step 1	.022			
Gender		.010	.007	.121
Ethnicity		.014	.007	.045
Socioeconomic status		.041	.011	<.0001
Step 2	.040			
Attachment		-.004	.007	.602
PV		.005	.001	<.0001
Step 3	.041			
PV x attachment		.002	.002	.405
Parental hostility (PH) model				
Step 1	.019			
Gender		.008	.007	.262
Ethnicity		.013	.008	.128
Socioeconomic status		.047	.012	<.0001
Step 2	.058			
Attachment		-.007	.007	.367
PH		.004	.001	<.0001
Step 3	.057			
PH x attachment		-.001	.002	.585

4.4.4 Posttraumatic Stress

A hierarchical multiple regression analysis was run to examine the variance explained by the inclusion of the interaction term of infant attachment security and peer victimisation to a main effects model. Participant gender, ethnicity and socioeconomic status were entered to the first step to control for background variables which accounted for 3% of variance in PTSS which was statistically significant $F(3, 888) = 7.52$, p<.0001. The entry of peer victimisation and attachment security accounted for 4.8% of variance in PTSS, which was statistically significant $F(2, 886) = 7.122$, $p = .001$, though only peer victimisation accounted for unique variance. Attachment security did not moderate the relationship between peer victimisation and PTSS, as evidenced by an increase in total variance explained of .9%, which was not statistically significant $F(1, 885) = 6.209$, $p = .501$. Sensitivity analyses in which square root transformations were applied to the PTSS variable did

not change the significance of the addition of the interaction term to the model $F(1, 816) = 5.015$, $p = .520$.

A further hierarchical multiple regression was run to examine the variance explained by the inclusion of the interaction term of infant attachment security and parental hostility to a main effects model. Participant gender, ethnicity and socioeconomic status were entered to the first step to control for background variables which accounted for 2.8% of variance in PTSS which was statistically significant $F(3, 753) = 6.207$, $p<.0001$. The entry of parental hostility accounted and attachment security accounted for 6.6% of the variance in PTSS, which was statistically significant $F(2, 751) = 10.508$, $p<.0001$, though only parental hostility accounted for unique variance. Attachment security did not moderate the relationship between parental hostility and PTSS, as evidenced by an increase in total variance explained of 0, which was not statistically significant $F(1, 750) = 8.800$, $p = .656$. Sensitivity analyses in which square root transformations were applied to the PTSS variable did not change the significance of the addition of the interaction term to the model $F(1, 690) = 7.631$, $p = .915$. Regression coefficients for both models are reported in Table 2.5.

Table 2.5.

Prediction of Caregiver-Reported PTSS from Attachment, Peer Victimisation and Parental Hostility

Predictors		PTSS		
	R^2	B	SE	p
Peer victimisation (PV) model				
Step 1	.030			
Gender		.667	.220	.002
Ethnicity		.449	.238	.060
Socioeconomic status		1.365	.366	<.0001
Step 2	.048			
Attachment		.102	.224	.648
PV		.149	.040	<.0001
Step 3	.057			
PV x attachment		.052	.077	.501
Parental hostility (PH) model				
Step 1	.028			
Gender		.655	.248	.008
Ethnicity		.408	.273	.135
Socioeconomic status		1.428	.433	.001
Step 2	.066			
Attachment		.079	.249	.752
PH		.136	.026	<.0001
Step 3	.066			
PH x attachment		-.026	.058	.656

4.5 Discussion

4.5.1 Summary of Findings

The aim of this study was to examine the moderation effects of infant attachment security on the relation between adverse relational experiences and adolescent mental health outcomes. The findings of this study demonstrate that infant attachment security did not moderate the effect of childhood parental hostility or peer victimisation on adolescent internalising problems, externalising problems, or PTSS. Furthermore, exposure to peer victimisation and parental hostility during sixth grade predicted adolescent mental health outcomes at 15 years, though infant attachment security did not account for any unique variance. Correlation coefficients indicate a positive association between peer victimisation and internalising problems (r = .238), externalising problems (r = .136) and PTSS (r = .131), as well as a positive association between parental hostility and internalising problems (r = .243),

externalising problems ($r = .208$) and PTSS ($r = .198$). The results regarding parental

hostility and peer victimisation are in keeping with previous findings that

maltreatment and bullying have adverse consequences on mental health outcomes,

though there is also a possibility that youth with internalising and externalising

problems are more vulnerable to peer victimisation and parental hostility.

Correlation coefficients also indicate that girls reported more internalising problems

($r = .095$) and PTSS ($r = .106$) than boys; these effects sizes are small according to

Funder and Ozer's (2019) criteria. A further noteworthy finding is that peer

victimisation and parental hostility had a positive association ($r = .346$).

A previous meta-analysis indicated that bullying from peers predicted worse

mental health outcomes than parental maltreatment (Lereya et al., 2015). The

findings of this study were not consistent with this; however, it is important to

highlight that parental hostility pertains to physical and verbal aggression, therefore

may not encompass the range of abusive experiences of maltreatment. Correlation

coefficients within this study demonstrated a larger association between parental

hostility and externalising problems than the association for peer victimisation.

Nevertheless, both associations were significant and therefore important in

understanding risk factors for internalising and externalising problems adolescents.

The results of this study are comparable to findings reported by Elwood and

Williams (2007) who reported that attachment security did not moderate the

relationship between interpersonal trauma and PTSS. Similarly, Scott and Babcock

(2010) reported that attachment security was not a moderator of the relationship

between intimate partner violence and PTSS, though attachment insecurity was.

These findings are not consistent with studies which have reported moderating

effects of attachment security (Aspelmeier et al., 2007). One of the key differences

between the current study and past research is that the current study measured attachment during infancy rather than adulthood. Another key difference is that the present study examined verbal and physical aggression rather than intimate partner violence and sexual abuse. The results of this study somewhat oppose findings reported in Chapter 2, the findings of which reported a relationship between secure attachment and lower PTSS, and insecure attachment and increased PTSS. In considering potential reasons for this, it is important to consider the validity of measures used within the current study. The measure of PTSS within the current study was a proxy measure of PTSS developed from the CBCL and was not a well-validated specific measure of PTSS. This may serve as one potential reason for the difference in findings between the two studies.

Previous research within the sample identified an indirect effect of attachment security on adolescent internalising problems (Milan et al., 2013) and a direct association between infant attachment and internalising and externalising problems during childhood (Brumariu & Kerns, 2013; O'Connor, 2014). These studies used measures of internalising problems based on parent-report forms and were conducted during middle childhood rather than adolescence. This indicates that the causal mechanisms require closer examination and that the influence of attachment is just one part of a complex picture. Future research should examine indirect pathways of attachment and should test theoretical models in order to examine the role of attachment further.

4.5.2 Implications for Clinical Practice

The findings of this study have important implications for clinical practice. The current findings suggest that infant attachment security may not be such a great risk factor for adolescent mental health outcomes as there was no unique variance

explained by attachment, nor were there any moderation effects. This somewhat opposes previous findings from the NICHD SECCYD sample whereby attachment security was negatively related to internalising and externalising behaviours whilst attachment insecurity was positively related to internalising behaviours in middle childhood (O'Connor, Scott, McCormick, & Weinberg, 2014). The finding that peer victimisation and parental hostility during sixth grade increases the likelihood of experiencing internalising and externalising problems at 15 years is important because it assists clinicians in identifying those at risk of developing mental health difficulties. The longitudinal nature of this study has enabled the results to demonstrate that the effects of parental hostility and peer victimisation on mental health are apparent three to four years after exposure. This may indicate a need for additional support for adolescents who experienced peer victimisation and parental hostility when they were children.

4.5.3 Strengths and Limitations

The present study has several strengths which should be acknowledged. Firstly, this study had a large sample size and therefore had increased statistical power during the analysis. Second, the study had a prospective design which is beneficial because this allowed moderation effects to be analysed over a longer period of time rather than a single point in time, thus addressing the shortfalls of a cross-sectional design. The prospective design was also beneficial in that attachment was measured during infancy, therefore attachment orientation is less likely to have changed as a result of adverse life experiences (Murphy, Elklit, Hyland, & Shevlin, 2016; Solomon, Dekel, & Mikulincer, 2008). Furthermore, the study considered two types of adverse relational experiences: peer victimisation and parental hostility. The inclusion of peer victimisation and parental hostility enabled a widening of the

research literature examining the role of attachment in the effects of adverse relational experiences, as they are studied less than maltreatment.

Despite these strengths, the findings of this study should be considered within the context of its limitations. The study did not use a validated measure of PTSS, therefore the conclusions drawn in relation to PTSS should be considered with caution. It is recommended that future research uses well-validated assessments based on DSM criteria when measuring PTSS. Conclusions regarding specific mental health diagnoses such as depression and anxiety are limited due to the broad nature of the dependent variables, specifically internalising and externalising problems. The measure of parental hostility does not assess the full range of abuse experiences because it does not contain items which ask explicit questions about the occurrence of neglect or sexual abuse. Therefore, the study is unable to draw conclusions about those who experience sexual abuse or neglect. Similarly, the measure does not enquire about the experience of maltreatment from adults in a caregiving position who are not parents. Despite this, the present findings are still relevant to research concerning parental maltreatment in the form of physical abuse. Additionally, there was no way to account for exposure to other traumatic experiences of participants, which could have been a confounding variable. It was not possible to account for this statistically because exposure to traumatic experiences were not measured within the sample. With reference to the generalisability of results, it is important to note that children with disabilities were excluded during participant recruitment, and so these findings may not be applicable to children with disabilities. Furthermore, the SECCYD sample was relatively low-risk, as evidenced by the majority of children living in two-parent families (85%) and the majority of families rated as 'not poor' according to their income-to-needs

ratio (78.6%). This indicates that the current findings may not be applicable to high-risk populations.

4.5.4 Conclusion

In summary, the findings of this study demonstrate a consistent pattern of results whereby adverse relational experiences such as parental hostility and peer victimisation during sixth grade increase the likelihood of poor mental health outcomes at 15 years, specifically internalising and externalising problems and PTSS. These relationships did not change according to infant attachment security and attachment security did not account for any additional variance in symptoms. These findings suggest that infant attachment security may not be a pertinent risk factor in adolescent mental health.

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Chapter 5. Additional Methodology

5.1. Additional Methodology for the Meta-Analysis

    5.1.1. Quality appraisal and assessment of bias tool. The quality appraisal and risk of bias tool was developed based on the quality assessment tool for observational cohort and cross-sectional studies (National Heart, Lung and Blood Institute, 2014). Items were taken from this assessment tool and adapted to ensure relevance to the studies included in the review. The tool was adapted to include the assessment of the quality of the measures used to assess attachment and Posttraumatic Stress Symptoms (PTSS).

    Studies were given points on a three-point Likert-scale for each item based on the degree to which the study met each of the criteria. The quality assessment tool is reported in Table 3.1. As discussed in Chapter 2, each study included in the meta-analysis was rated twice and inter-rater reliability was calculated.

Table 3.1.

Quality Assessment and Risk of Bias Tool for Studies Included in the Meta-Analysis

Item number	Item	Score
1.0	**Study information**	
1.1	Initials of first coder:	
1.2	Date of first coding:	
1.3	Initials of second coder:	
1.4	Date of second coding:	
1.5	Name of first author:	
1.6	Study title:	
1.7	Year of publication:	
1.8	Journal title:	
2.0	**Quality Appraisal and Assessment of Bias**	
2.1	**Were research questions and objectives clearly stated?**	
	Explicitly defined research questions or aims and hypotheses (whether one-tailed or two-tailed) are present	2

	Some description of study aims, without the presence of hypotheses or research questions	1
	No clear statement of study aims or objectives, research questions or hypotheses	0
2.2	**Was the study sample clearly specified and defined?**	
	Descriptive statistics were reported on participant demographics (including age range and mean, gender split, ethnicity) and trauma exposure (type of traumatic event the study sample was exposed to)	2
	Some description provided about the sample but some missing information (e.g. authors did not report nature of traumatic event or provide enough information about demographic variables)	1
	No clear description of sample demographics and trauma characteristics	0
2.3	**Was the sampling method clearly stated?**	
	Clear statement of sampling method	2
	Sampling method stated but may not have been appropriate for the study	1
	Sampling method is either not stated or inappropriate for the study	0
2.4	**Were participants recruited from the same (or similar) population and inclusion/exclusion criteria stated and consistently applied?**	
	Clear reporting of inclusion and exclusion criteria; sample recruited from the same or similar study population (e.g. for participants exposed to war trauma, were they exposed to the same war? If maltreatment, was it the same type of abuse?)	2
	Some indication of inclusion or exclusion criteria; unclear whether sample were recruited from the same population	1
	Inclusion and exclusion criteria not stated or applied inconsistently; sample recruited from different study population	0
2.5	**Was the participation rate of eligible participants at least 50%?** (If less than 50% of eligible participants consented to take part in the study, the study population may not adequately represent the target population)	
	More than 50% of eligible and approached participants took part	2
	Less than 50% of those approached took part, but there was no significant difference in non-response characteristics (such as age, gender) between those who participated and those who did not	1
	Less than 50% of those approached took part, and differences between those who took	0

	part and those who did not were no reported or highlighted significant differences. Or, response was not reported	
2.6	**Longitudinal studies only: was loss to follow-up after baseline 20% or less?**	
	Participant drop-out or non-response was less than 20%	2
	Loss to follow-up was more than 20% but participants who dropped-out did not differ in key characteristics (e.g. age, gender) from those who completed the full study	1
	Loss to follow-up was more than 20% and was not accounted for.	0
	Not applicable; this was a cross-sectional study	N/A
2.7	**Was the measure of PTSD valid and reliable?**	
	A well-validated interview or self-report measure based on DSM criteria was used and internal consistency reported as at least adequate in the sample	2
	A validated interview or self-report measure was used but it was not based on DSM criteria of PTSD	1
	A poorly validated or unknown measure of PTSD was used	0
2.8	**Was the measure of attachment valid and reliable?** If observation-based, consider if inter-coder reliability is adequate and coders were appropriately trained.	
	A well-validated interview, observation or self-report measure of attachment was used and validity and reliability were reported and deemed at least adequate	2
	Well-validated measure of attachment was used but reliability and validity within the sample not reported	1
	A poorly validated or unknown measure of attachment was used	0
2.9	**Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure and outcome(s)?** Consider presence of other psychiatric diagnoses, substance use, presence of neurodevelopmental disorder, and participant demographic information	
	Key confounding variables were identified and adjusted for during the analysis	2
	Key confounding variables were identified and discussed but not adjusted for statistically	1

No confounding variables identified or discussed	0

Total Quality Assessment Score for First Coding

For longitudinal studies:	For cross-sectional studies:
/18	/16
= %	= %

>70% = high study quality
50-70% = medium quality study
<50% = low quality study

Total Quality Assessment Score for Second Coding

For longitudinal studies:	For cross-sectional studies:
/18	/16
= %	= %

>70% = high study quality
50-70% = medium quality study
<50% = low quality study

5.1.2 Calculation of Pearson's *r* correlation coefficient. Eight studies included in the meta-analysis reported in Chapter 2 reported correlation coefficients (Pearson's *r*). The remaining eight studies reported other statistics from which Pearson's *r* was calculated. Details of how Pearson's *r* was calculated are reported below.

5.1.2.1. Calculating r from standardized regression coefficient (β). Four studies reported standardized regression coefficients, thus reporting a beta (β) coefficient. Pearson's *r* was calculated from the beta coefficient using the formula $r = \beta + .05 \lambda$ (where $\lambda = 1$ when β is nonnegative and 0 when β is negative) as recommended by Peterson and Brown (2005).

5.1.2.2. Calculating r from Cohen's d. Two studies included in the meta-analysis reported Cohen's *d*. Cohen's *d* was used to estimate *r* using the formula recommended by Rosenthal (1994).

$$r = \sqrt{\frac{d^2}{d^2 + 4}}$$

5.1.2.3. Calculating r from Odds Ratio statistic. Two studies reported Odds Ratio (OR) statistics. OR statistics were converted to Cohen's *d* using the formula recommended by Borenstein, Hedges, Higgins, and Rothstein (2009).

$$d = LogOddsRatio \times \frac{\sqrt{3}}{\pi}$$

Where π = approximately 3.14159

Following this, Cohen's *d* was converted to Pearson's *r* using the formula described in 5.1.2.2.

5.2. Additional Methodology for the Empirical Study

5.2.1 Deriving a measure of Posttraumatic stress from the Child Behaviour Checklist. The empirical study outlined in Chapter 4 used items from the Child Behaviour Checklist (CBCL; Achenbach, 1991a) to assess Posttraumatic Stress Symptoms (PTSS). Achenbach and colleagues have developed a series of well-validated DSM oriented subscales to screen for a range of mental health problems in children and adolescents. Although the developers have not created a DSM scale for PTSS, several items on the CBCL relate to trauma symptoms and have subsequently been used and evaluated in empirical studies to assess for the presence of PTSS. The CBCL was used rather than the Youth Self Report (YSR; Achenbach, 1991b) because previous research identifying a PTSS subscale has been validated using the CBCL and not the YSR.

Three subscales have been developed and evaluated within the literature (Wolfe, Gentile, & Wolfe, 1989; Sim et al., 2005; Dehon & Scheeringa; 2006).

Wolfe et al. (1989) identified 20 items within the CBCL which correspond with the DSM criteria of PTSD. The authors reported good internal consistency (Cronbach's α = .89). The psychometric properties of this scale were evaluated by Ruggiero and McLeer (2000) within a sample of 80 children who had experienced sexual abuse. The authors reported good internal consistency (Cronbach's α = .85), however, discriminant validity within the sample was poor, demonstrated by participants who scored higher on the CBCL-PTSD scale also scoring higher on other subscales within the CBCL.

Sim et al. (2005) developed a seven-item CBCL-PTSD scale; the authors reported that the seven-item scale did not significantly correlate with children's self-report symptoms of PTSS and the authors concluded that their scale measured generic rather than trauma-related distress. Furthermore, the authors reported no difference between clinical groups when comparing a sample who had experienced sexual abuse when compared with a sample who had not experienced sexual abuse. Contrary, Milot et al. (2013) evaluated the psychometric properties of this scale within a sample of children and adolescents who had experienced neglect. They reported evidence of validity of this scale, though recommended that the scale is used for research rather than clinical purposes.

Dehon and Scheeringa (2006) developed a 15-item CBCL-PTSD scale in a sample of 62 children aged one to six years who had experienced a traumatic event. The scale demonstrated good internal consistency (Cronbach's α = .87) and explained 43% of the variance in children's PTSD symptoms whereas the internalizing and externalizing broadband scales did not account for any additional variance in PTSS, thus demonstrating discriminant validity above and beyond the internalizing and externalizing scales. The scale accurately identified 75% children

with Posttraumatic Stress Disorder (PTSD) within the sample and incorrectly classified 15% of the sample as having PTSD. Loeb, Stettler, Gavila, Stein, and Chinitz (2011) evaluated the psychometric properties of this scale within a sample of 51 caregivers of children aged two to five years. The CBCL-PTSD scale scores were not significantly greater for children with PTSD diagnoses within their sample. The concluded that the scale was not sensitive or specific enough to be used as a screening tool for young children.

Rosner, Arnold, Groh, and Hagl (2012) evaluated the aforementioned scales in a sample of children living in foster care. The authors reported on their ability to screen for PTSD in comparison to the Clinician Administered PTSD Scale of Children and Adolescents (CAPS-CA; Nader et al., 1996). Both Sim et al. (2005) and Dehon and Scheeringa's (2006) scales demonstrated questionable internal consistency (Cronbach's α = .63 and .67 respectively), though the scale developed by Wolfe et al. (1989) scale demonstrated adequate internal consistency (Cronbach's α = .73). The scales developed by Wolfe et al. (1989) and Dehon and Scheeringa (2006) demonstrated small to moderate correlations with the number of symptoms and symptoms severity identified using the CAPS-CA; notably, the correlations with Dehon and Scheeringa's (2006) scale were slightly larger than Wolfe et al. (1989). Using ROC curves, the scale developed by Dehon and Scheeringa (2006) was the only scale which was deemed to be statistically significant in its ability to predict PTSD. Dehon and Scheeringa's scale demonstrated superior sensitivity when compared to the other scales. These data were based on a small sample and should be considered with caution. These findings, considered with previous psychometric evaluations of these subscale led to the current research using the scale developed by Dehon and Scheeringa (2006). The aforementioned studies indicate that in some

cases, the CBCL-PTSD scale can be used to identify individuals with PTSS but findings should be interpreted with caution as there is between-study variability in the ability of CBCL subscales to predict PTSS.

Chapter 6. Additional Results

**6.1. Further Analyses from the Meta-Analysis**

      6.1.2. Assessment of publication bias. When conducting a meta-analysis of published research, it is possible that the overall effect size can be overestimated due to publication bias, whereby studies reporting a statistically significant result are more likely to be published and therefore more likely to be included in a quantitative synthesis of research. The review described in Chapter 2 did not exclude grey literature (such as masters and doctoral theses) with the aim of reducing publication bias. An estimation of possible publication bias was assessed by generating funnel plots using the 'trim-and-fill' method (Duval & Tweedie, 2000). This method provides an estimation of the number of missing studies that might exist in a meta-analysis. It is proposed that if many studies are estimated as missing, this may indicate possible publication bias. Estimated missing studies are represented by an open circle on the funnel plot.

      In the first meta-analysis which synthesised effect sizes of the relationship between secure attachment and Posttraumatic Stress Symptoms (PTSS), the funnel plot estimated that there were no missing studies, indicating a low level of possible publication bias, as demonstrated in Figure 2.1.
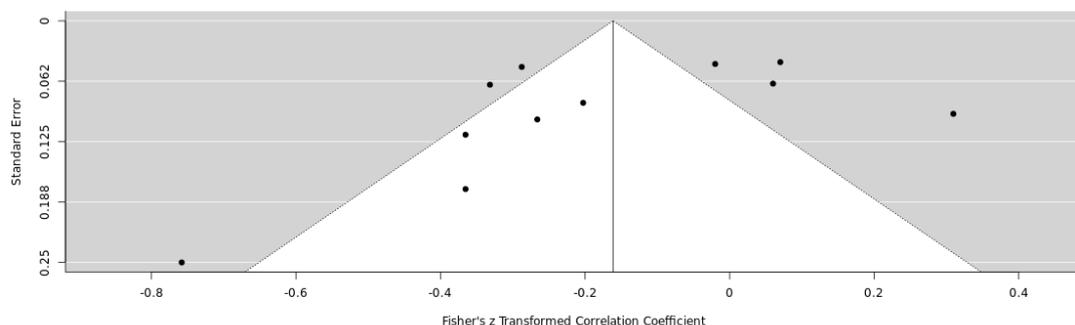
Figure 2.1. Funnel plot produced by meta-analysis of secure attachment and PTSS.

The second meta-analysis synthesised correlation coefficients from studies examining the relationship between insecure attachment and PTSS. The funnel plot demonstrated in Figure 2.2 estimated that there were no studies missing from this meta-analysis, indicating a low level of publication bias.
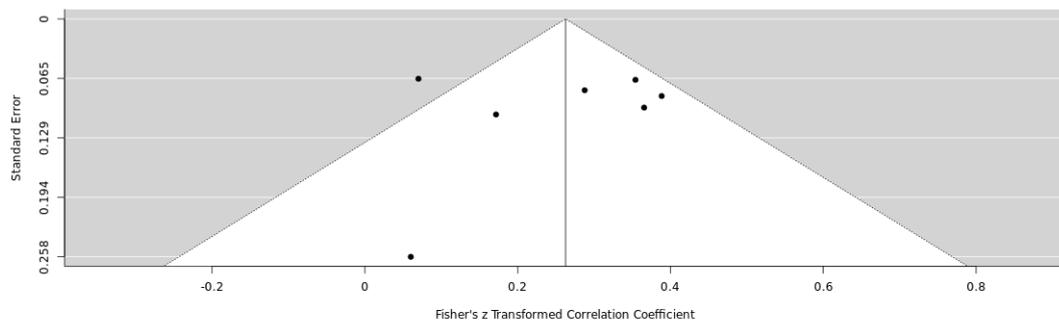
Figure 2.2 Funnel plot produced by the meta-analysis of insecure attachment and PTSS in children and adolescents.

The third meta-analysis synthesised correlation coefficients from studies which examined the relationship between avoidant attachment and PTSS. The funnel plot generated from this meta-analysis, demonstrated in Figure 2.3, estimated that there were no studies missing from this meta-analysis, indicating a low level of publication bias.
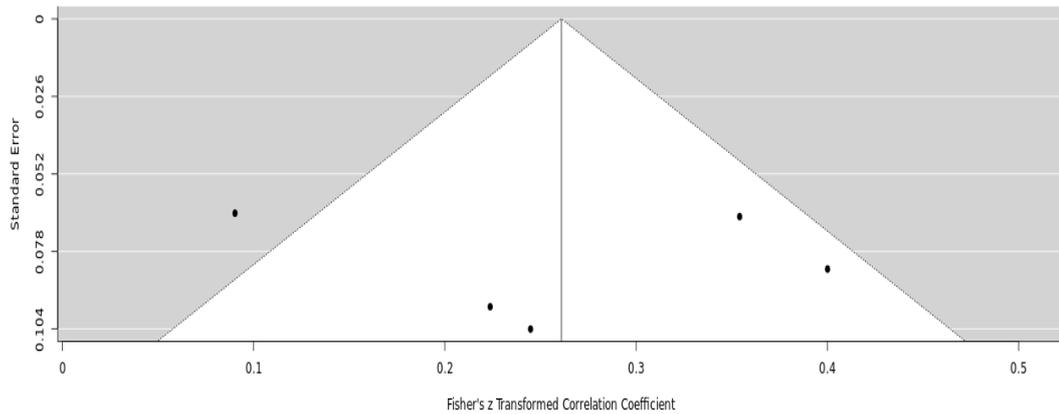
Figure 2.3. Funnel plot produced by the meta-analysis of avoidant attachment style and PTSS in children and adolescents.

The fourth meta-analysis synthesised correlation coefficients from studies which examined the relationship between disorganised attachment and PTSS. The funnel plot generated from this meta-analysis, demonstrated in Figure 2.4, estimated one missing study from this meta-analysis, indicating a low level of publication bias.
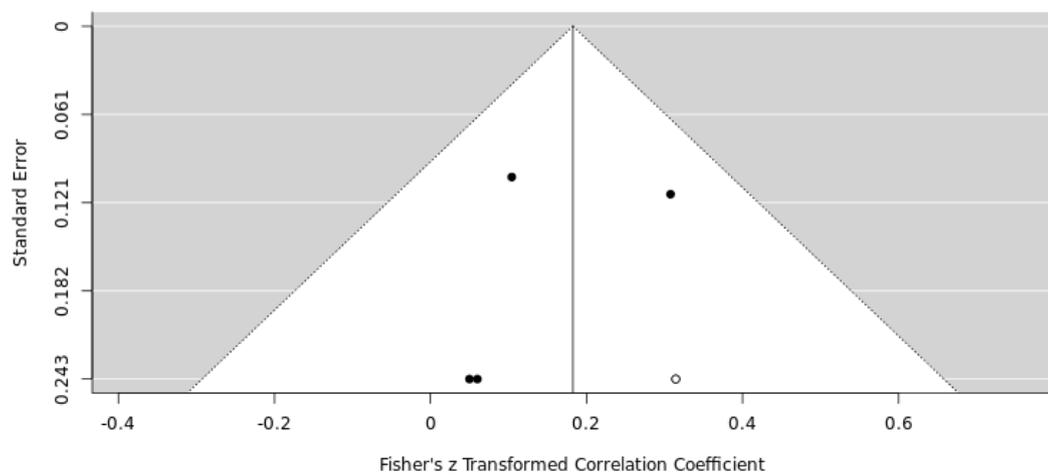
Figure 2.4. Funnel plot produced by the meta-analysis of disorganised attachment style and PTSS in children and adolescents.

Overall, funnel plots estimate that there was little to no publication bias within each of the meta-analyses.

6.2. Further Analyses from the Empirical Study

6.2.1 Pre-analysis data screening. Moderator analyses were undertaken as part of a series of hierarchical multiple regression analyses, therefore the assumptions of a hierarchical multiple regression were adhered to for each of the analyses. The assumptions of a hierarchical multiple regression analysis are as follows: independence of observations; linearity of relationships between predictors and outcome variables; no multicollinearity of predictor variables, and homoscedasticity indicating equal variance of predicted dependent variable. Data were also examined to assess for possible outliers affecting the results and normal distribution of dependent variables.

The assumption of independence of observations was assessed by requesting a Durbin-Watson statistic for each analysis. Durbin-Watson statistics for each of the analyses ranged from 1.988 to 2.071. A value of approximately 2 indicates that there is no correlation between errors, indicating that the data meets the assumption of independence of observations.

Casewise diagnostics were requested throughout analytic procedures in order to highlight possible outliers within the data. Analyses examining the moderating effect of attachment security on the relationship between adverse childhood experiences and internalising and externalising problems highlighted a small number of outliers, ranging from two to four. All leverage points were below one, demonstrating that there were no unusual combinations of independent variables. Additionally, Cook's distance values were below one, demonstrating that none of the cases were influential enough to alter the regression line. Therefore, a decision was

made not to change or remove the outliers identified. Casewise diagnostics highlighted a greater number of outliers when examining the relationship between adverse childhood experiences with PTSS, ranging from 10 to 13. Again, leverage points and Cook's distance values were examined and were deemed to show no unusual combinations of independent variables, nor were they influential enough to influence the regression line. Consequently, a decision was made not to change or remove the outliers.

In examining the data for possible multicollinearity, collinearity statistics were requested and assessed for Tolerance values of greater than .1 and VIF values of less than 10. Multicollinearity was present in each of the analyses between the interaction term and the adverse experiences. It was concluded that these variables correlated with each other, and this is due to the nature of computing the interaction term in that the interaction term was produced by multiplying the adverse experiences by attachment security, therefore no further action was taken.

The normality of the distribution of independent variables was assessed by conducting a visual inspection of a histogram and P-P Plot for each of the analyses. Histograms and P-P Plots for internalising problems as assessed by the Youth Self Report demonstrated a normal distribution. Within these analyses, it was deemed that the assumption of normality had been met. The histogram and P-P Plot for externalising problems as assessed by the Child Behaviour Checklist demonstrated a slight positive skew, therefore the assumption of normality had been violated. Log10 transformations were applied to the externalising problems variable and the transformed variable was entered in to both regression models as the dependent variable. This was not conducted as a sensitivity analysis because the transformed variable also had improved homoscedasticity. The histogram and P-P Plot for the

PTSS variable derived from the CBCL demonstrated a positive skew, indicating that the assumption of normality had been violated. This was addressed by applying square root transformations to the PTSS variable and running a sensitivity analysis to examine whether this had an effect on the overall outcome. A sensitivity test was run rather than entering the transformed PTSS variable to both models in the empirical study chapter because transforming the data had a negative impact on the independence of observations assumption as assessed by Durbin-Watson statistics. Sensitivity analyses demonstrated that square root transformations did not change the overall outcome of the moderation analysis.

In testing the assumption of linearity of relationships between predictors and outcome variables, scatter plots were produced and visually inspected. These are summarised in Figure 6.5 to Figure 6.10. The assumption of linearity was met in each of the analyses. The assumption of homoscedasticity pertains to the variance of residuals remaining constant over the range of the predictor variable. This assumption was checked by visually inspecting a scatterplot of studentized residuals against the predicted values. These are summarised in Figure 2.5 to Figure 2.10.
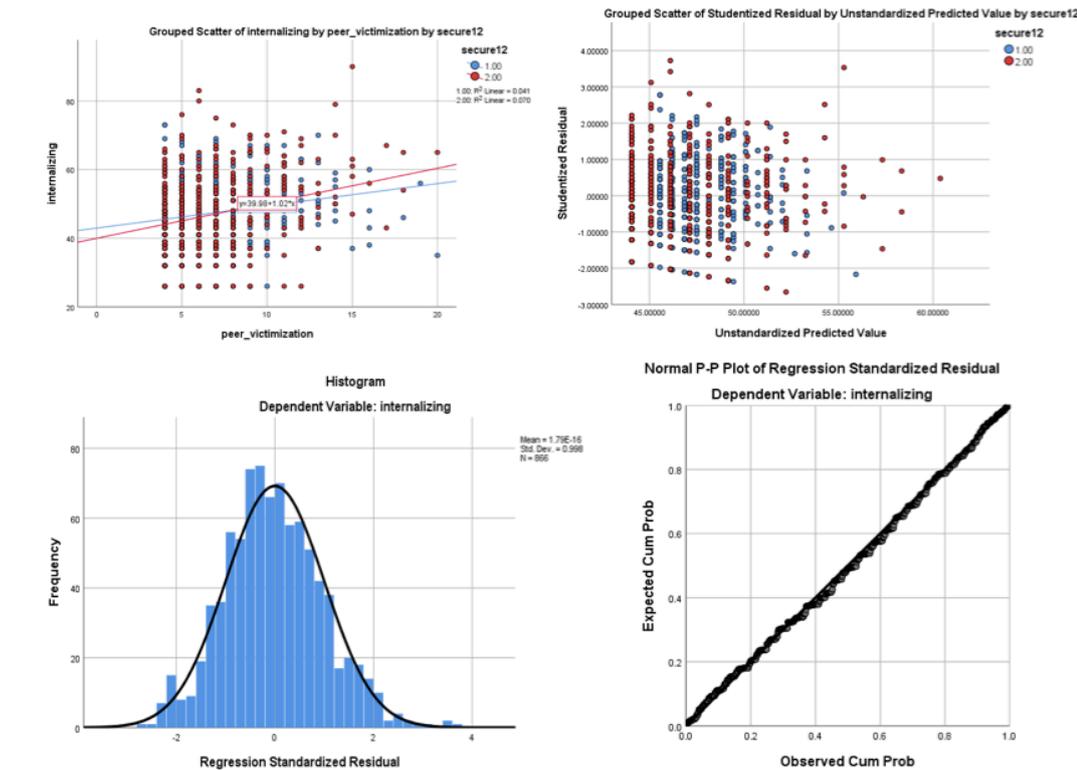
Figure 2.5. Assumption testing for the hierarchical multiple regression analysis examining attachment security as a moderator of the relationship between peer victimisation and internalising problems.

Figure 2.5 demonstrates a normal distribution of the internalising problems scale. The scatterplot of residuals shows homoscedasticity of residuals. A grouped scatter plot demonstrates a linear relationship between peer victimisation and internalising problems for those with secure and insecure attachment.
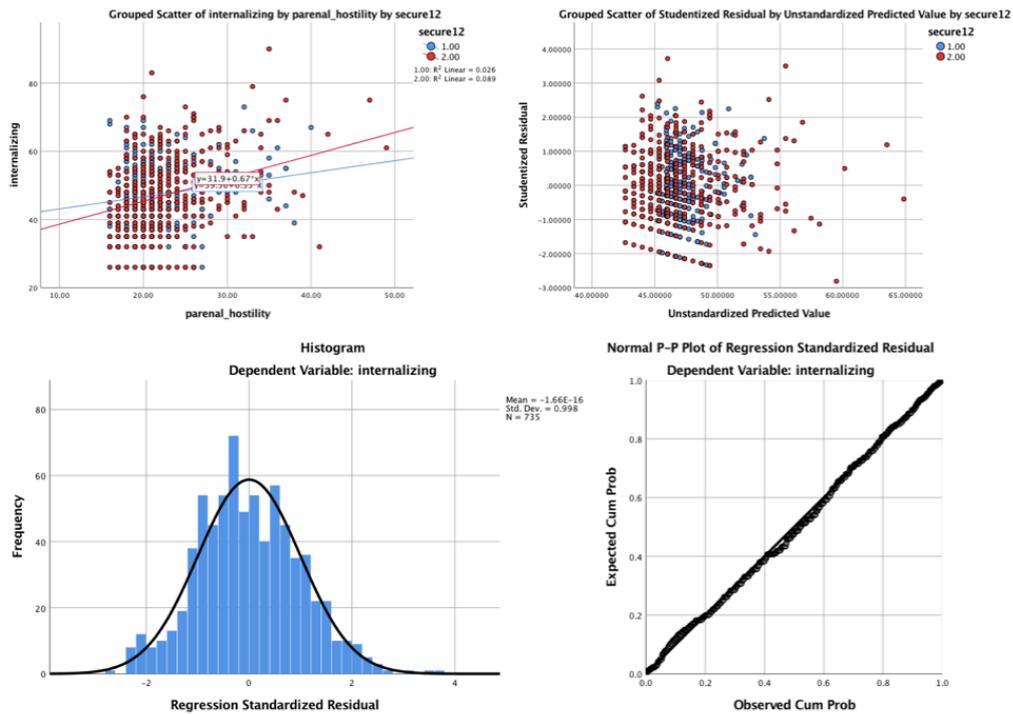
Figure 2.6. Assumption testing for the hierarchical multiple regression analysis

examining attachment security as a moderator of the relationship between parental

hostility and internalising problems.

Figure 2.6 demonstrates a normal distribution of the internalising problems

scale. The scatterplot of residuals shows homoscedasticity of residuals. A grouped

scatter plot demonstrates a linear relationship between parental and internalising

problems for those with secure and insecure attachment.
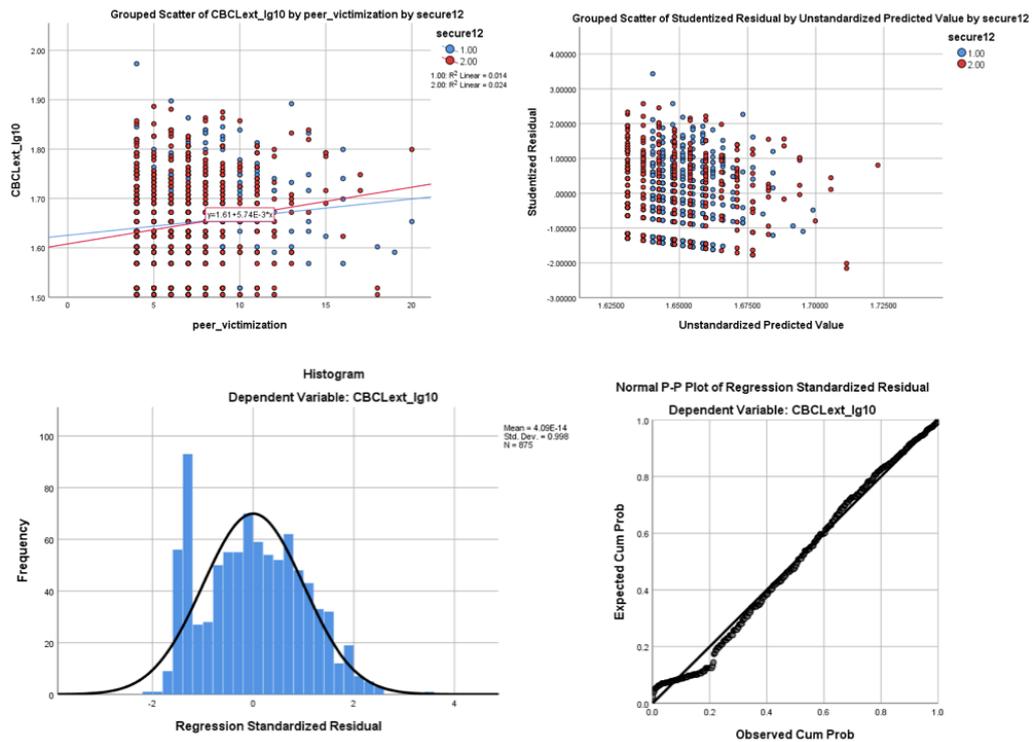
Figure 2.7. Assumption testing for the hierarchical multiple regression analysis examining attachment security as a moderator of the relationship between peer victimisation and externalising problems.

Figure 2.7 demonstrates an approximately normal distribution of the externalising problems variable, demonstrated by the histogram and P-P Plot. This is following the application of a Log10 transformation to adjust a positive skew. The grouped scatter plot indicates a linear relationship between peer victimisation and externalising problems. The assumption of homoscedasticity is met, as demonstrated by no funnelling on the scatter plot of residuals.
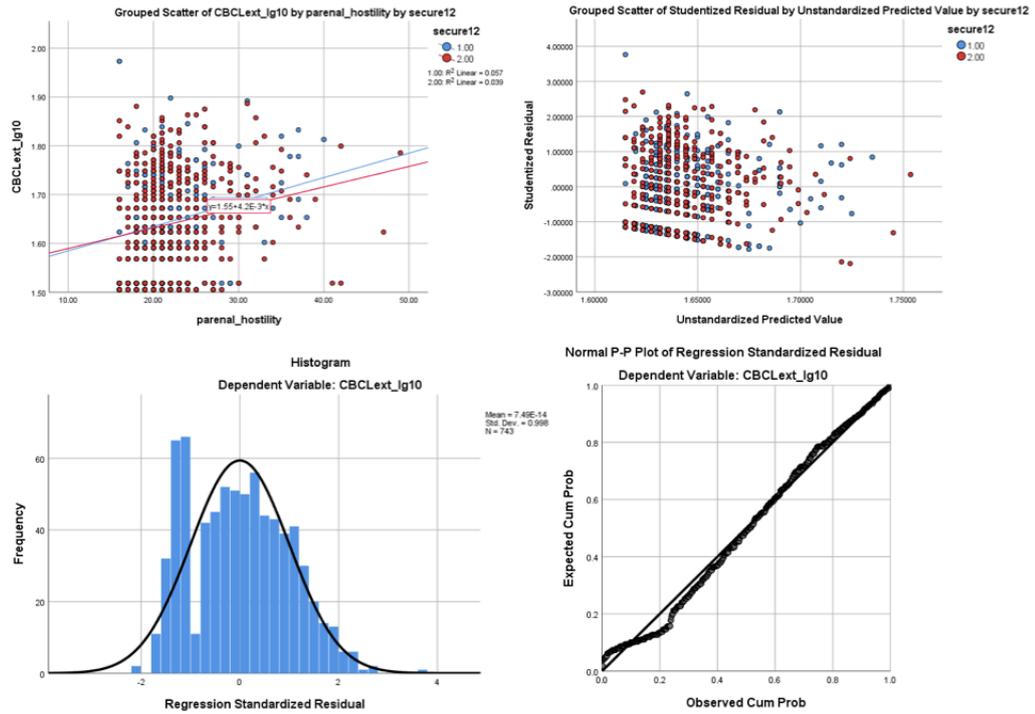
Figure 2.8. Assumption testing for the hierarchical multiple regression analysis

examining the moderation effects of attachment security on the relationship between

parental hostility and externalising problems.

Figure 2.8 demonstrates a normal distribution of the externalising problems

variable, as shown on the histogram and P-P Plot, indicating that the assumption of

normality has been met. This is following the application of a Log10 transformation.

The assumption of linearity has been met, demonstrated by a linear relationship

between parental hostility and externalising problems. The assumption of

homoscedasticity was met, as demonstrated by the scatterplot of residuals.
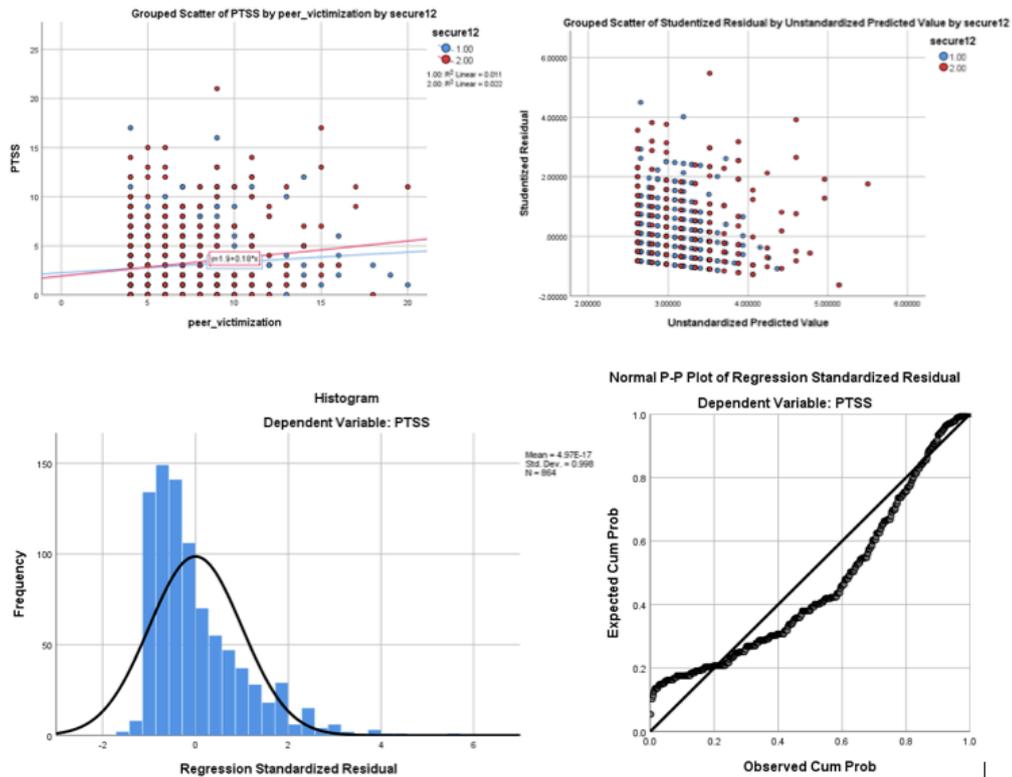
Figure 2.9. Assumption testing for the hierarchical multiple regression analysis examining attachment security as a moderator of the relationship between peer victimisation and PTSS.

Figure 2.9 demonstrates that the histogram of the PTSS variable had a positive skew prior to the application of square root transformations. There is a linear relationship between peer victimisation and PTSS. The assumption of homoscedasticity has been met, demonstrated by no funnelling in the scatterplot of residuals.
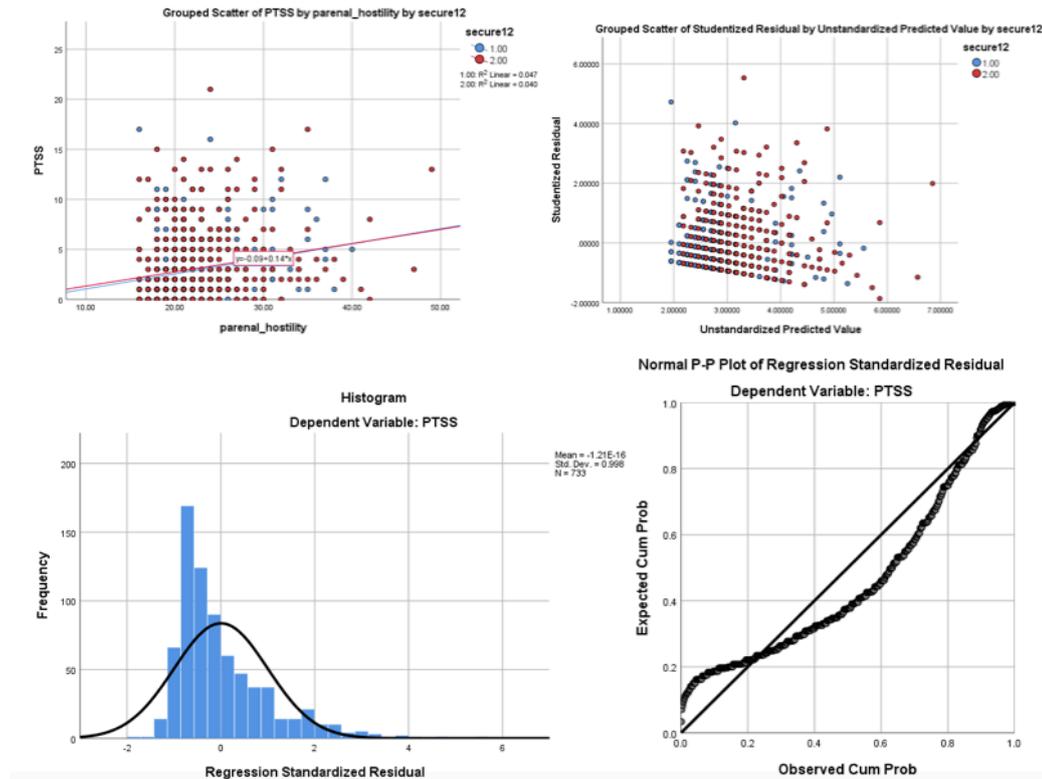
*Figure 2.10.* Assumption testing for the hierarchical multiple regression analysis examining attachment security as a moderator of the relationship between parental hostility and PTSS.

The histogram and P-P Plot in Figure 2.10 demonstrate a positive skew in the distribution of the PTSS measure prior to the application of square root transformations. There is a linear relationship between parental hostility and PTSS, therefore the assumption of linearity has been met. The assumption of homoscedasticity has been met, demonstrated by no funnelling in the scatterplot of residuals.
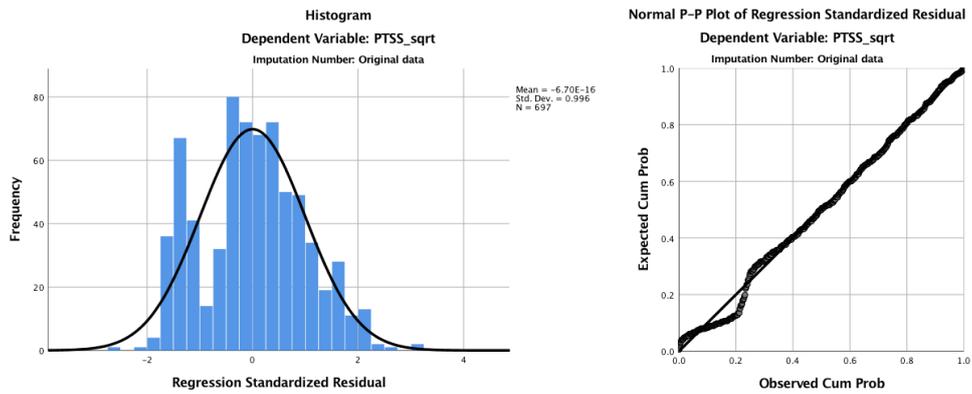
*Figure 2.11*. Histogram and P-P Plot for PTSS variable following square root transformations.

Figure 2.11 shows the histogram and P-P Plot of the PTSS variable following square root transformations. Both demonstrate an approximately normal distribution.

6.2.2. Moderator analyses incorporating disorganised attachment. In addition to the analyses outlined in the empirical study, a series of hierarchical multiple regression analyses were conducted to examine moderating effects of disorganised attachment on the relationship between adverse relational experiences (specifically parental hostility and peer victimisation) and mental health outcomes (specifically self-reported internalising problems and parent-reported externalising problems and PTSS). As with the main analyses, attachment was assessed by the Strange Situation Procedure at 15 months. The assumption checks outlined in 6.2.1 were adhered to in these analyses. Post-hoc Bonferroni-Holm sequential corrections were conducted to control for multiple comparisons (Holm, 1979). A dummy variable was created which is outlined as disorganised attachment versus other attachment classifications, (i.e. insecure-avoidant, insecure-resistant, and secure). An interaction term was then created by multiplying the dummy variable with peer victimisation and with parental hostility separately. As with the primary analyses,

Log10 transformations were applied to the externalising problems variable. Table

4.1 demonstrates a correlation matrix of the variables included in this analysis.

Disorganised attachment did not significantly correlate with adolescent internalising

and externalising problems or PTSS.

Table 4.1.

Correlation Coefficients of Study Variables for Supplementary Analyses.

	Mean (SD)	Gender	Ethnicity	Socioeconomic status	Disorganised attachment	Peer victimisation	Parental hostility	Internalising problems	Externalising problems	PTSS
Gender		-								
Ethnicity		-.017	-							
Socioeconomic status		.035	-.263**	-						
Disorganised attachment		.051	-.040	.070*	-					
Peer victimisation	7.1 (2.9)	.018	-.001	.040	.063*	-				
Parental hostility	22.4 (4.7)	-.034	-.045	.091*	-.058	.346**	-			
Internalising problems	47.3 (10.2)	.095**	-.020	.076	.038	.238**	.243**	-		
Externalising problems	47.3 (9.9)	.065	-.050	.150**	-.027	.136**	.208**	.141**	-	
PTSS	3.1 (3.2)	.106**	-.046	.145**	-.028	.131**	.198**	.270**	.746**	-

Note. *p*<.05. **p<.01. *r* estimated from pooled imputations.

6.2.2.1 Internalising problems. A hierarchical multiple regression was run to assess

the increase in variance explained by the addition of an interaction term of infant

attachment disorganisation and peer victimisation to a main effects model.

Background variables were entered in the first step in order to control for these,

which accounted for 1.4% of variance in internalising problems, which was

statistically significant $F(3, 888) = 3.614$, $p=.008$. The entry of peer victimisation

and disorganised attachment accounted for 6.9% of variation in internalising

problems, which was statistically significant $F(2, 886) = 11.06$, $p<.0001$, though

only peer victimisation accounted for unique variance. Attachment disorganisation

moderated the effect of peer victimisation on internalising problems, as evidenced by

a statistically significant increase in total variation explained of .8%, which was

statistically significant $F(1, 885) = 10.832$, $p=.011$ Simple regression lines are

reported in Figure 2.12.
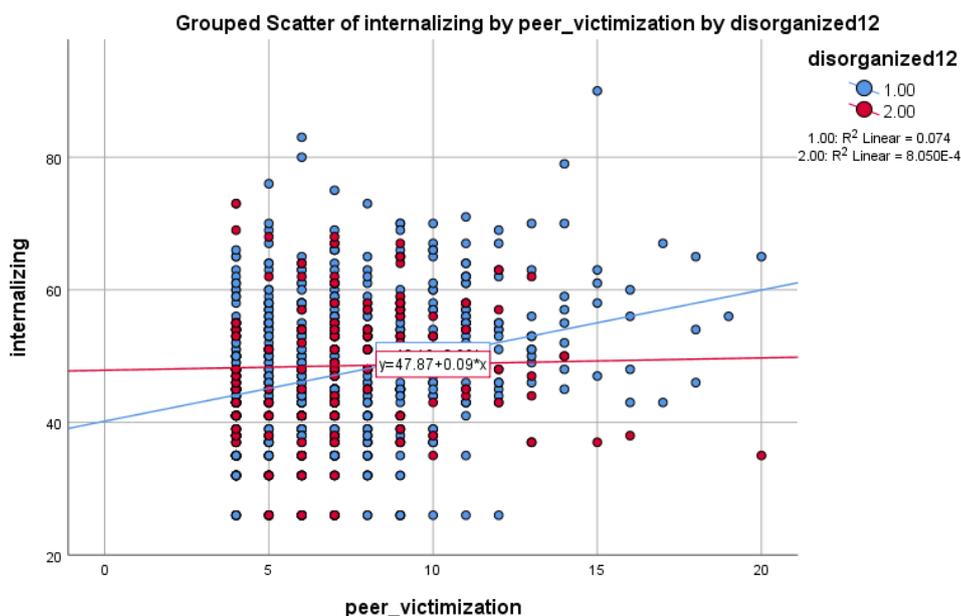
Figure 2.12. Regression lines demonstrating relationship between peer victimisation

and internalising problems by disorganised attachment status.

A further hierarchical multiple regression was run to assess the increase in variation explained by the addition of an interaction term of infant attachment disorganisation and parental hostility to a main effects model. Background variables were entered in the first step in order to control for these, which accounted for 1.2% of variance in internalising problems, which was statistically significant $F(3, 753) = 2.871, p=.037$. The entry of parental hostility and disorganised attachment accounted for 8.1% of the variance in internalising problems, which was statistically significant $F(2, 751) = 11.313, p<.0001$, though only parental hostility accounted for unique variance. Attachment disorganisation did not moderate the effect of parental hostility on internalising problems, as evidenced by an increase in total variation explained of .3%, which was not statistically significant $F(1, 750) = 10.307, p=.172$. Regression coefficients for both models are reported in Table 4.2.

Table 4.2.

Prediction of Self-Reported Internalising Problems from Disorganised Attachment, Peer Victimisation and Parental Hostility

Predictors		Internalising problems		
	R^2	B	SE	p
Peer victimisation (PV) model				
Step 1	.014			
Socioeconomic status		2.261	1.172	.056
Gender		1.915	.686	.005
Ethnicity		.252	.759	.740
Step 2	.069			
Attachment		.775	1.059	.467
PV		.822	.130	<.0001
Step 3	.077			
PV x attachment		-.882	.341	.011
Parental hostility (PH) model				
Step 1	.012			
Socioeconomic status		1.761	1.298	.176
Gender		1.970	.754	.009
Ethnicity		-.033	.851	.969
Step 2	.081			
Attachment		1.280	1.233	.303
PH		.577	.085	<.0001
Step 3	.084			
PH x attachment		-.401	.291	.172

6.2.2.2. Externalising problems. A hierarchical multiple regression was run to assess the increase in variation explained by the addition of an interaction term of infant attachment disorganisation and peer victimisation to a main effects model. Background variables were entered in the first step in order to control for these, which accounted for 2.2% of variance in internalising problems, which was statistically significant $F(3, 829) = 6.075$, $p<.0001$. The entry of peer victimisation and disorganised attachment accounted for 4.3% of variance in externalising problems which was statistically significant $F(2, 827) = 7.496$, $p<.0001$, although attachment disorganisation did not account for any unique variance. Attachment disorganisation did not moderate the effect of peer victimisation on externalising problems, as evidenced by no increase in total variation explained, which was not statistically significant $F(1, 826) = 6.242$, $p=.889$.

A further hierarchical multiple regression was run to assess the increase in variation explained by the addition of an interaction term of infant disorganised attachment and parental hostility to a main effects model. Background variables were entered in the first step in order to control for these, which accounted for 2.3% of variance in internalising problems, which was statistically significant $F(3, 703) = 5.506$, $p=.001$. The entry of parental hostility and disorganised attachment accounted for 6.7% of the total variance in externalising problems, which was statistically significant $F(2, 701) = 10.025$, $p<.0001$, although attachment disorganisation did not account for any unique variance. Attachment disorganisation did not moderate the effect of parental hostility on externalising problems, as evidenced by no change in total variation explained $F(1, 700) = 8.364$, $p<.727$. Regression coefficients for both models are reported in Table 4.3.

Table 4.3.

Prediction of Caregiver-Reported Externalising Problems from Disorganised Attachment, Peer Victimisation and Parental Hostility

Predictors		Externalising problems		
	R^2	B	SE	p
Peer victimisation (PV) model				
Step 1	.022			
Socioeconomic status		.041	.011	<.0001
Gender		.010	.007	.121
Ethnicity		.014	.007	.045
Step 2	.043			
Attachment		-.016	.009	.098
PV		.005	.001	<.0001
Step 3	.043			
PV x attachment		.000	.003	.889
Parental hostility (PH) model				
Step 1	.023			
Socioeconomic status		.047	.012	<.0001
Gender		.008	.007	.262
Ethnicity		.013	.008	.128
Step 2	.067			
Attachment		-.015	.011	.150
PH		.004	.001	<.0001
Step 3	.067			
PH x attachment		-.001	.003	.727

6.2.2.3. Posttraumatic stress. A hierarchical multiple regression was run to assess the increase in variation explained by the addition of an interaction term of infant attachment disorganisation and peer victimisation to a main effects model. Background variables were entered in the first step in order to control for these, which accounted for 3.1% of variance in internalising problems, which was statistically significant $F(3, 888) = 7.52$, $p=<.0001$. The entry of peer victimisation and disorganised attachment accounted for 5.1% of the total variance in PTSS, which was statistically significant $F(2, 886) = 7.311$, $p<.0001$. Attachment disorganisation did not account for any unique variance. Attachment disorganisation did not moderate the effect of peer victimisation on posttraumatic stress, as evidenced by an increase in total variation explained of .2%, which was not statistically significant $F(1, 885) = 6.67$, $p=.215$.

A further hierarchical multiple regression was run to assess the increase in variation explained by the addition of an interaction term of infant attachment disorganisation and parental hostility to a main effects model. Background variables were entered in the first step in order to control for these, which accounted for 2.8% of variance in internalising problems, which was statistically significant $F(3, 753) = 6.207$, $p=.001$. The entry of attachment disorganisation and parental hostility accounted for 6.8% of total variance in PTSS which was statistically significant $F(2, 751) = 10.883$, p<.0001. Attachment disorganisation did not account for unique variance. Attachment disorganisation did not moderate the effect of parental hostility on posttraumatic stress, as evidenced by no increase of total variation explained, which was not statistically significant $F(1, 750) = 9.126$, $p=.950$. Regression coefficients for both models are presented in Table 4.4.

Table 4.4.

Prediction of Caregiver-Reported PTSS from Disorganised Attachment, Peer

Victimisation and Parental Hostility

Predictors	R^2	B	SE	p
		PTSS		
Peer victimisation (PV) model				
Step 1	.031			
Socioeconomic status		1.365	.366	<.0001
Gender		.667	.220	.002
Ethnicity		.449	.238	.060
Step 2	.051			
Attachment		-.528	.323	.104
PV		.152	.040	<.0001
Step 3	.053			
PV x attachment		-.129	.104	.215
Parental hostility (PH) model				
Step 1	.028			
Socioeconomic status		1.428	.433	.001
Gender		.655	.248	.008
Ethnicity		.408	.273	.135
Step 2	.068			
Attachment		-.499	.384	.197
PH		.134	.026	<.0001
Step 3	.069			
PH x attachment		.006	.096	.950

Chapter 7. Discussion and Critical Evaluation

7.1. Overall Findings

The review and empirical study within this thesis produced important results for the child and adolescent literature regarding the role of attachment in mental health outcomes. The findings and interpretation of the review and empirical study complement each other, though the findings of both papers should be carefully considered within the context of their unique methodological limitations.

7.1.1. Summary of review findings. The findings of the review outlined in Chapter 2 demonstrate a significant negative correlation between secure attachment and Posttraumatic Stress Symptoms (PTSS) (r = -.16) within child and adolescent populations, though this correlation was non-significant when sensitivity analyses removed studies which reported effect sizes based on proxy measures of attachment. Positive correlations were reported between insecure attachment (r = .26), avoidant attachment (r = .26), and disorganized attachment and PTSS (r = .17). These relationships were stronger when studies reporting Odds Ratio statistics were removed from meta-analyses, indicating that the relation was stronger than the main meta-analyses suggested. All correlations reported in the main meta-analyses were significant, however, they involved significant heterogeneity, indicating a high degree of variance between effect sizes reported in individual studies. Moderator and sensitivity analyses indicated that experiences of maltreatment strengthened the relationship between insecure attachment and PTSS, though this finding was not found in studies reporting a relationship between secure attachment and PTSS. The positive relation between insecure attachment and PTSS was larger than the negative relation between secure attachment and PTSS, though it is important to note that the

effect sizes were still regarded as small to moderate in accordance with Funder and Ozer's (2019) recommended interpretation.

7.1.2. Summary of empirical study findings. The findings of the empirical study described in Chapter 4 demonstrate that infant attachment security did not moderate the relation between childhood exposure to peer victimisation and adolescent mental health outcomes, nor did infant attachment security moderate the relation between childhood exposure to parental hostility and adolescent mental health outcomes. The adolescent mental health outcomes considered were self-reported internalising problems, caregiver-reported externalising problems, and caregiver-reported PTSS. In addition, hierarchical multiple regression analyses indicated that infant attachment security did not account for any unique variance in any of these outcomes. Correlation coefficients indicated that there was no relationship between infant attachment security and adolescent mental health outcomes. Correlation coefficients indicate a positive association between peer victimisation and internalising problems ($r = .238$), externalising problems ($r = .136$) and PTSS ($r = .131$), as well as a positive association between parental hostility and internalising problems ($r = .243$), externalising problems ($r = .208$) and PTSS ($r = .198$). Correlation coefficients also indicate that girls reported more internalising problems ($r = .095$) and PTSS ($r = .106$) than boys; these effects sizes are small according to Funder and Ozer's (2019) recommendations for interpretation.

7.1.3. Summary of supplementary analyses. The supplementary analyses reported in section 6.2.2 of Chapter 6 examined moderating effects of infant disorganised attachment on the relation between parental hostility and peer victimisation and adolescent mental health outcomes. The results demonstrated that in all but one of the analyses, infant disorganised attachment did not moderate the

relation between relationship between childhood exposure to peer victimisation and adolescent mental health outcomes, nor did infant attachment disorganisation moderate the relationship between childhood exposure to parental hostility and adolescent mental health outcomes. There is one exception to this in that disorganised attachment did have a moderating effect on the relation between peer victimisation and internalising problems. The results indicated that infant disorganised attachment *reduced* the relationship between childhood peer victimisation and self-reported internalising problems during adolescence. Closer examination of the results shows that the overall change in variance explained by the addition of the interaction term of peer victimisation and disorganised attachment is .8%, which is very small. Possible interpretations of this finding point to the likelihood of the occurrence of a type one error. Another possible interpretation is that children who had a disorganised attachment style during infancy may be less concerned about exposure to peer victimisation. In considering both hypotheses, it was concluded that this result occurred as a result of a type one error, as statistical significance was lost when Holm-Bonferroni corrections were applied. It is therefore advised that this finding is considered with caution in clinical practice.

Infant disorganised attachment was not associated with mental health outcomes and disorganised attachment during infancy did not account for unique variance in adolescent internalising and externalising problems. It is important to highlight that only 15.4% (n = 177) of the sample were classified as having a disorganised attachment, therefore there may have been reduced statistical power within these supplementary analyses.

7.1.4. Synthesis of overall findings. The overall findings of this thesis indicate that when measured during infancy, attachment does not predict adolescent

internalising and externalising problems, though as a whole, the literature indicates that when specifically measuring PTSS, secure attachment is associated with reduced PTSS and insecure attachment is associated with increased PTSS. The finding in the empirical study that infant attachment security and disorganisation was not associated with mental health outcomes somewhat opposes the findings reported in the review chapter.

7.2. Critical Evaluation of the Thesis Research

7.2.1. Critical evaluation of the empirical study.
The empirical study described in Chapter 4 produced important findings for the child and adolescent literature. Whilst the strengths of this study have previously been discussed within Chapter 4, it is important to highlight the unique opportunity of analysing the NICHD SECCYD dataset. This analysis enabled a longitudinal examination of attachment, adverse relational experiences, and mental health outcomes, which can be difficult to conduct for ethical, logistical, and practical reasons. This has offered a unique opportunity to investigate the moderating effects of infant attachment security on adverse relational experiences.

The finding that infant secure and disorganised attachment was not associated with adolescent internalising and externalising problems within the NICHD SECCYD sample was surprising. Previous analyses using the NICHD SECCYD data have reported associations between infant attachment and mental health outcomes during childhood (NICHD Early Child Care Research Network, 2006; Brumariu & Kerns, 2013; O'Connor, Scott, McCormick, & Weinberg, 2014), the findings of which are described in more depth in section 4.2.3 of Chapter 4. Milan, Zona, and Snow (2013) reported an indirect pathway of attachment and adolescent internalising problems in which mothers' negative emotions during the

transition to adolescence predicted less availability during parent-child interactions. This in turn led to increased preoccupation with the parent. This indicates that the relation between infant attachment and adolescent internalising is complex and further investigation is required of indirect pathways. The finding that infant disorganised attachment was *not* associated with mental health outcomes differs from previous findings studies which used a similar design (MacDonald et al., 2008; Bosquet-Enlow, Egeland, Carlson, Blood, & Wright, 2014). For example, Bosquet-Enlow et al. (2014) reported that whilst a history of disorganised attachment did not increase the likelihood of being diagnosed with Posttraumatic Stress Disorder (PTSD) at 17 years, a history of disorganised attachment was associated with increased PTSD symptom severity. The sample was recruited from low-income families initially recruited for the Minnesota Longitudinal Study of Risk and Adaption. MacDonald et al. (2008) reported that disorganised attachment at 12 months was significantly associated with PTSD symptoms at 8 years. Again, the sample were initially recruited from a separate study examining the effect of intra-uterine cocaine exposure on child development and the sample consisted of low-income families. When interpreting this finding in relation to other studies, it is important to consider differences in the sample. Whilst careful consideration was made during recruitment of the NICHD SECCYD study sample to ensure the sample was diverse, the sample was not necessarily a high-risk sample, as participants were recruited from a range of backgrounds and children with disabilities were excluded. Demographic information of the overall sample indicates that the majority of children were living in two-parent families (85%) and the majority of families were rated as 'not poor' according to their income-to-needs ratio (78.6%). Therefore, one must consider whether consistent child or parental stress plays a role in the

relationship. When considering this finding in conjunction with the review outlined in Chapter 2, it is important to highlight that effect size estimates reported in the review for the relation between attachment and PTSS were $r = -.16$ and $r = .26$ for secure and insecure attachment respectively. The results of the empirical study were inconsistent with the meta-analytic findings reported in Chapter 4, and with previous meta-analytic findings (Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010; Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012). This discrepancy could be explained by differences in the risk of the sample, as explained above.

As previously discussed in Chapter 4, NICHD SECCYD did not directly measure exposure to maltreatment within the sample. However, the measure of parental hostility does allow some inferences to be drawn about the experience of physical abuse. There were items on the measure of parental hostility which overlap with items measuring maltreatment, such as the Conflict Tactics Scale (Straus & Hamby, 1997). Examples of items on the measure of parental hostility within the NICHD study sample include "How often does your parent threaten to hurt you physically?", "How often does your parent strike or hit you with their hands or an object?", "How often does your parent insult or swear at you?" and "How often does your parent shout or yell at you?". These items do overlap with items on measures of maltreatment developed by Straus and Hamby (1997), specifically the subscales of 'psychological aggression' and 'physical assault'. This means that it may be possible to consider the current findings in the context of physical and emotional abuse.

It was not possible to statistically control for the role of other traumatic events within the sample because these were not measured. For example, participants may have experienced maltreatment other than parental hostility, though

maltreatment was not formally measured within the sample. Furthermore, participants within the study may have been exposed to other traumatic events, though such exposure was not formally measured. Given the prevalence of children's exposure to traumatic events (Costello, Erkanli, Fairbank, & Angold, 2002; Finkelhor, Turner, Shattuck, & Hamby, 2015), it is realistic to expect that many participants within the sample will have been exposed to at least one traumatic event by the age of 15 years. Such events may serve as confounding variables as it was not possible to control for these statistically.

Another possible confounding variable in the empirical study was that infant attachment was measured with the mother. Measures of father-child attachment were not included in the NICHD SECCYD, which is important to consider in the interpretation of the findings. Children who were observed as showing insecure attachment behaviours during the Strange Situation Procedure may have demonstrated secure attachment behaviour had the procedure been conducted with a different parent or significant caregiver.

The measure of PTSS derived from the Child Behaviour Checklist was a proxy measure, therefore was not a validated or frequently-used measure of PTSS. Previous research recommends that PTSS scales derived from the CBCL can be used for research purposes but should not be used in clinical settings to screen for PTSS (Milot et al., 2013). Care was taken to ensure that an existing scale was used that had been evaluated for psychometric properties in previous research, which is summarised in section 5.2.1 of Chapter 5. When examining the individual items in more depth, it is likely that the items on the scale overlap with disorders other than PTSS. For example, item eight "Cannot concentrate or pay attention for long" could also indicate Attention Deficit Hyperactivity Disorder (ADHD). Item 29 "Fears

certain animals, situations, places other than school" could pertain to specific phobias. Items 56c, 56f and 56g "Nausea or feeling sick", "Stomach aches or cramps" and "Vomiting or throwing up" could relate to physical illnesses. This indicates that the construct validity of the CBCL-derived PTSS scale is lower than validated and frequently-used self-report measures of PTSS. It is recommended that conclusions drawn in relation to PTSS from the empirical study are considered with caution.

7.2.2. Critical evaluation of the meta-analytic review. The strengths and weaknesses of the review were discussed in Chapter 2, however, there are further evaluations to be made. As demonstrated by the funnel plots outlined in Chapter 6, it was estimated that there were no missing studies from the meta-analyses, with the exception of one missing study from the meta-analysis reporting the relationship between disorganised attachment and PTSS. Furthermore, two unpublished studies were included within the review. Whilst these steps aim to reduce the risk of publication bias within the review, it is important to acknowledge that there were six studies missing from the review. Authors were contacted to obtain papers which could not be accessed via online databases, but this did not return any additional papers. This indicates that publication bias may be slightly higher than funnel plots estimate.

Whilst the majority of papers included in the review were rated as being high in quality, it is important to highlight that it was common for papers not to conduct statistical analyses to control for confounding variables, specifically exposure to other traumatic events which could have influenced symptom-reporting and consequently could have influenced the results. This does remain a potential source

of bias because there are many possible confounding variables which have not been accounted for.

A noteworthy finding of the review was that there was heterogeneity in each of the meta-analyses. I^2 was used to interpret the extent of heterogeneity, and this was reported as high within each of the meta-analyses in accordance with Higgins and Thompson's (2002) proposed interpretation. In short, this means that the reported effect size varied between individual studies. There are many contributors to high heterogeneity, such as sample characteristics, variation in how participants are treated, and differences in study design (Huedo-Medina, Sanchez-Meca, Marin-Martinez, & Botella 2006). Heterogeneity improved when sensitivity analyses and moderator analyses were conducted, which means the high heterogeneity in the current analyses could be explained by differing types of trauma exposure, the types of attachment measures used, and the estimation of effect size from different types of effect sizes.

A further discussion point was that there was variation in how attachment was assessed in the review. This was likely a reflection of the age range of participants included in the review, whereby the attachment of infant participants was often assessed using observation-based methods, and older participants completed self-report and interview-based measures of attachment. Self-report measures of attachment tend to adopt continuous measures of attachment, whereas observation-based methods may use four major categories. It is possible that this limits the extent to which individual studies can be compared.

As discussed in Chapter 2, the meta-analysis was unable to determine causality because the focus was on correlations. In reporting the clinical implications, care was taken to avoid overstating the results. That being said, four

studies included in the review used a prospective design, two of which measured attachment prior to trauma exposure. This means there was sufficient time for one variable to have an impact on another.

7.3. Reflections on the Process of Completing the Thesis Portfolio

In order to gain access to the NICHD SECCYD dataset, an application was made to the International Consortium for Political and Social Research (ICPSR), an organisation which currently stores the data. A robust and comprehensive data security plan was required as part of the application process which was developed to meet various data security requirements. For example, it was essential that the data were stored on a standalone computer which had a high level of encryption and did not have access to the internet or the wider area network. It was also essential that this computer was stored within a locked office and that the dataset was accessed only by researchers listed on the application. The development of the data security plan required involvement from the Business Relationships Department and the IT department within UEA. The development of this plan was a valuable learning experience in understanding the procedures that are required when ensuring the safe storage of data and the role of university departments in this process.

There are many benefits and drawbacks to undertaking an analysis of existing data. A key benefit is that we were able to access a large dataset which had been collected using a prospective design. Collecting such data is usually beyond the remit of a ClinPsyD thesis, therefore having access to a large and rich dataset was a unique opportunity for the thesis project. A further benefit of analysing an existing dataset is that many measures had been collected, therefore there were many possible hypotheses to test using the data. For example, an alternative analytic plan involved using Growth Mixture Modelling (GMM; Muthen & Muthen, 2000) to identify

subgroups within the data in relation to trajectories of PTSS. Such analyses would have been valuable in identifying temporal relationships of PTSS in relation to attachment orientation, however, PTSS would have been only available by parent report, and it would have been difficult to ascertain how adverse experiences interact with attachment using this type of analyses. Moderator analyses were selected over a GMM approach because we were interested in the interaction of attachment security and adverse experiences, as such experiences are common within clinical settings. Furthermore, GMM analyses would have relied entirely on parent-report symptoms, in which it can be difficult to ascertain experience of internalizing problems accurately (Meiser-Stedman, Smith, Glucksman, Yule, & Dalgleish, 2007). Furthermore, PTSS would have been derived from the CBCL, which would have been subject to the criticisms discussed in section 7.2.1, meaning conclusions drawn would have been limited. GMM would not have been possible for YSR data because this was only administered once. The drawbacks of conducting a secondary analysis were two-fold. Firstly, we had no control over the design of the study or the measures which were administered at different time points. It would have been useful to have repeated administration of the YSR in addition to the CBCL, along with other measures of mental health outcomes. Secondly, very thorough literature searches were required to ensure that the hypotheses had not already been tested within the dataset in previous research.

7.4 Implications of Current Findings

7.4.1. Implications for clinical practice. The current findings allow conclusions to be drawn about the interaction of attachment and adverse relational experiences, but not the interaction of attachment and traumatic experiences; there is an important distinction between the two and this must be considered when applying

findings to clinical practice. The current findings indicate that the relation between adverse relational experiences and mental health outcomes does not differ according to whether children show infant attachment security or disorganisation during infancy. Infant attachment orientation may not be such a great risk factor for adolescent mental health outcomes as it did not account for any unique variance in symptom-reporting and within the meta-analysis, associations were small to moderate and not present in all studies. Clinicians should carefully consider the rationale of attachment-based interventions with children and adolescents when it is hypothesised that the child had early attachment disruption or insecurity, as infant attachment does not necessarily lead to variation in symptom-reporting.

Adverse relational experiences such as peer victimisation and parental hostility do increase the likelihood of experiencing internalising and externalising problems during adolescence, so this is an important risk factor. This adds to the existing literature in terms of the longitudinal aspect (i.e. it remains a relevant risk factor over time) and in respect to lower-level adverse experiences in comparison to traumatic experiences such as maltreatment. This indicates that there may be a need for continued support for children who are known to have had such experiences.

7.4.2. Theoretical implications. Attachment theory proposes the concept of internal working models, in which individuals develop attachment representations based on their caregiving experiences during infancy which inform expectations of future relationships. When interpreting the findings that infant attachment security did not moderate the relation between adverse relational experiences and adolescent mental health, it is possible to consider this finding in the context of previous research which has been carried out within the same sample. The administration of the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1985) with NICHD

SECCYD participants when they were aged 17-18 has been a major contribution to the field. This allowed researchers to examine the extent of infant attachment continuity and discontinuity within the sample and explore possible reasons for this. The authors reported significant stability in attachment security within the SECCYD study sample, though the effect size was modest ($r = .12$) (Groh et al., 2014). Participants who were rated as having a secure attachment in infancy and an insecure attachment during late adolescence had lower levels and a greater decline in maternal sensitivity, were less likely to be living with their father, and mothers reported a greater number of negative life events (Booth-LaForce et al., 2014). In considering infant attachment and adolescent mental health outcomes, it is important to consider that when outcomes were measured at 15 years, attachment security may have changed from the initial point at which it was measured. Part of the rationale of studying infant attachment security was to examine the effects of infant attachment security before it had changed in response to stressful and traumatic life events. Whilst research findings do indicate the relevance of attachment in the development of mental health difficulties, the current findings indicate that attachment style during infancy does not affect symptom-reporting.

7.5 Areas for Future Development

Previous research examining the relationship between attachment and responses to traumatic events has indicated that there are several other factors which mediate this relationship such as social support (Besser & Neria, 2010), negative view of self (Muller, Sicoli, & Lemieux, 2000), mentalization (Ferrajo, Badoud, & Oliviera, 2017), and emotion-focused coping (Anderson & Kosloff, 2020). This tells us that the relationship between attachment and mental health is complex and requires closer examination. Research evaluating existing theoretical models is still

in its infancy but has shown support so far (Venta, Hatkevich, Mellick, Vanwoerden, & Sharp, 2017; Woodhouse, Brown, & Ayers, 2018). Further research could also examine indirect pathways of infant attachment and child and adolescent mental health outcomes.

As previously acknowledged, the meta-analyses had limited statistical power due to the small number of studies included. Studies included in the review did not consistently report effect sizes for each type of attachment classification. This is in part due to the measures used by studies to measure attachment orientation as some measures do not assess all types of attachment. Consequently, it was not possible to synthesise data related to attachment anxiety as this was not frequently reported. It is recommended that future research reports effect sizes for different types of insecure attachment, where possible.

7.6 Overall Conclusions

Overall, studies evaluating the role of attachment in the development of PTSS in children and adolescents has been explored to a lesser extent when compared to similar studies in adults. It can be concluded that the relationship between adverse relational experiences during childhood and mental health outcomes in adolescence do not differ according to whether the person had an insecure attachment orientation during infancy, though for children and adolescents specifically experiencing PTSS following trauma exposure, there is a positive association between insecure attachment and PTSS and a negative association between secure attachment and PTSS.

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Appendix A: Author Guidelines for Development and Psychopathology

<u>Manuscript Preparation and Style</u>

General. All manuscripts must be provided in MSWord format in 12-point type with 1-in. margins on all sides. The entire manuscript must be double-spaced and numbered consecutively. The language of publication is English.

Style and Manuscript Order. Follow the general style guidelines set forth in the *Publication Manual of the American Psychological Association* (6th ed.). The Editor may find it necessary to return manuscripts for reworking or retyping that do not conform to requirements. Do not use embedded references, end notes, or bookmarks. Manuscripts must be arranged in the following order:

Title Page. **To facilitate blind review, all indication of authorship must be limited to this page, which should be submitted as a separate file. Other pages must only show the short title plus page number at the top right.** The title page should include the (a) full article title; (b) name and affiliations of all authors; (c) acknowledgments; (d) mailing address and telephone number of the corresponding author; (e) address of where to send offprints, if different from the corresponding author; and (f) a short title of less than 50 characters.

Acknowledgments. These should be placed below the affiliations. Use this section to indicate grant support, substantial assistance in the preparation of the article, or other author notes.

Abstract Page. Include (a) a full article title, (b) an abstract of no more than 200 words, and (c) up to five keywords for indexing and information retrieval.

Text. Use a standard paragraph indent. Do not hyphenate words at the ends of lines or justify right margins.

References. Bibliographic citations in the text must include the author's last name and date of publication and may include page references. Examples of in-text citation style are Cicchetti (2002), Durston (2008, pp. 1133–1135), Hunt and Thomas (2008), (Hunt & Thomas, 2008), (Posner, Rothbart, Sheese, & Tang, 2007), and subsequently (Posner et al., 2007). If more than one, citations must be in *alphabetical* order. Every in-text citation must be included in the reference section; every reference must be cited in the text. Examples of reference styles:

Journal Article
Haltigan, J. D., Roisman, G. I., & Fraley, R. C. (2013). The predictive significance of early caregiving experiences for symptoms of

psychopathology through midadolescence: Enduring or transient effects? *Development and Psychopathology, 25,* 209–221.

Book
Buss, A., & Plomin, R. (1984). *Temperament: Early developing personality traits*. Hillsdale, NJ: Erlbaum.

Chapter in an Edited Book
Gottlieb, G., & Willoughby, M. T. (2006). Probabilistic epigenesis of psychopathology. In D. Cicchetti & D. Cohen (Eds.), *Developmental psychopathology* (Vol. 1, 2nd ed., pp. 673–700). Hoboken, NJ: Wiley.

An Endnote style that reflects the *Publication Manual of the American Psychological Association* (6th ed.) is available for download here.

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Figures. Figures must also be submitted as separate files, in either .TIFF or .JPG format. Each figure must be numbered consecutively with an Arabic numeral and a descriptive legend. Legends must be provided separately from the artwork (e.g., Figure 3. The progress in language development). Figures, which are normally in black and white, should be no larger than 6 × 9 in. If authors request color figures in the printed version, they will be contacted by CCC-Rightslink who are acting on our behalf to collect Author Charges. Please follow their instructions in order to avoid any delay in the publication of your article. Online-only color is provided free of cost. Diagrams must be computer generated. All labels and details must be clearly presented and large enough to remain legible at a 50% reduction. Artwork should be identified by figure number and short title. All figures must be cited in the text, and their location labeled in the same manner as Tables.

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Preparing Your Paper

Regular Articles, Brief Reports, Future Directions

- Should be written with the following elements in the following order: title page; abstract; main text; references; appendices (as appropriate); table(s) with caption(s) (on individual pages); figures; figure captions (as a list)
- Should contain a structured abstract of 250 words.
- Read making your article more discoverable, including information on choosing a title and search engine optimization.

A Regular Article may not exceed 11,000 words (i.e., 35 pages), including references, footnotes, figures, and tables. Brief Reports include empirical research that is soundly designed, but may be of specialized interest or narrow focus. Brief Reports may not be submitted in part or whole to another journal of general circulation. Brief Reports may not exceed 4,500 words for text and references. These limits do not include the title page, abstract, author note, footnotes, tables, and figures. Manuscripts that exceed these page limits and that are not prepared according to the guidelines in the Manual will be returned to authors without review. Future Directions submissions are written by leading scholars within the field. These articles provide a brief summary of important advances that are needed within a specific research or practice area pertinent to clinical child and adolescent psychology. Future Directions submissions are by invitation only and undergo peer review.

All Regular Article and Brief Report submissions must include a title of 15 words or less that identifies the developmental level of the study participants (e.g., children, adolescents, etc.). JCCAP uses an unstructured abstract format. For studies that report randomized clinical trials or meta-analyses, the abstract also must be consistent with the guidelines set forth by CONSORT or MARS, respectively. The Abstract should include up to 250 words, presented in paragraph form. The Abstract should be typed on a separate page (page 2 of the manuscript), and must include each of the following label sections: 1) Objective (i.e., a brief statement of the purpose of the study); 2) Method (i.e., a detailed summary of the participants, N, age, gender, ethnicity, as well as a summary of the study design, measures, and procedures; 3) Results (i.e., a detailed summary of the primary findings that clearly articulate comparison groups (if relevant); 4) Conclusions (i.e., a description of the research and clinical implications of the findings). Avoid abbreviations, diagrams, and reference to the text in the abstract. JCCAP will scrutinize manuscripts for a clear theoretical framework that supports central study hypotheses.

In addition, a clear developmental rationale is required for the selection of participants at a specific age. The Journal is making diligent efforts to insure that there is an appropriately detailed description of the sample, including a) the population from which the sample was drawn; b) the number of participants; c) age, gender, ethnicity, and SES of participants; d) location of sample, including country and community type (rural/urban), e) sample identification/selection; f) how participants were contacted; g) incentives/rewards; h) parent consent/child assent procedures and rates; i) inclusion and exclusion criteria; j) attrition rate. The Discussion section should include a comment regarding the diversity and generality (or lack thereof) of the sample. The Measures section should include details regarding item content and scoring as well as evidence of reliability and validity in similar populations.

All manuscripts must include a discussion of the clinical significance of findings, both in terms of statistical reporting and in the discussion of the meaningfulness and clinical relevance of results. Manuscripts should a) report means and standard deviations for all variables, b) report effect sizes for analyses, and c) provide confidence intervals wherever appropriate (e.g., on figures, in tables), particularly for effect sizes on primary study findings. In addition, when reporting the results of interventions, authors should include indicators of clinically significant change. Authors may use one of several approaches that have been recommended for capturing clinical significance, including (but not limited to) the reliable change index (i.e., whether the amount of change displayed by a treated individual is large enough to be meaningful, the extent to which dysfunctional individuals show movement to the functional distribution).

All manuscripts should conform to the criteria listed in Table 1 of the 2008 APA Publications and Communications Board Working Group on Journal Article Reporting Standards (published in American Psychologist). These reporting standards apply to all empirical papers. In addition, JCCAP requires that reports of randomized clinical trials conform to CONSORT reporting standards (http://www.consort-statement.org/index.aspx?o=2965), including the submission of a flow diagram and checklist. Nonrandomized clinical trials must conform to TREND criteria (see http://www.cdc.gov/trendstatement/docs/AJPH_Mar2004_Trendstatement.pdf) and meta-analyses should conform to MARS standards (see Table 4 in 2008 American Psychologist article).

Style Guidelines

Please refer to these quick style guidelines when preparing your paper, rather than any published articles or a sample copy.

Please use American spelling style consistently throughout your manuscript.

Please use double quotation marks, except where "a quotation is 'within' a quotation". Please note that long quotations should be indented without quotation marks.

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Checklist: What to Include

1. **Author details.** All authors of a manuscript should include their full name and affiliation on the cover page of the manuscript. Where available, please also include ORCiDs and social media handles (Facebook, Twitter or LinkedIn). One author will need to be identified as the corresponding author, with their email address normally displayed in the article PDF (depending on the journal) and the online article. Authors' affiliations are the affiliations where the research was conducted. If any of the named co-authors moves affiliation during the peer-review process, the new affiliation can be given as a footnote. Please note that no changes to affiliation can be made after your paper is accepted. Read more on authorship.
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3. **Funding details.** Please supply all details required by your funding and grant-awarding bodies as follows:
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   This work was supported by the [Funding Agency] under Grant [number xxxx].
   For multiple agency grants

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8. **Figures.** Figures should be high quality (1200 dpi for line art, 600 dpi for grayscale and 300 dpi for color, at the correct size). Figures should be supplied in one of our preferred file formats: EPS, PDF, PS, JPEG, TIFF, or Microsoft Word (DOC or DOCX) files are acceptable for figures that have been drawn in Word. For information relating to other file types, please consult our Submission of electronic artwork document.

9. **Tables.** Tables should present new information rather than duplicating what is in the text. Readers should be able to interpret the table without reference to the text. Please supply editable files.

10. **Equations.** If you are submitting your manuscript as a Word document, please ensure that equations are editable. More information about mathematical symbols and equations.

11. **Units.** Please use SI units (non-italicized).

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Appendix C: Confirmation of FMH Ethical Clearance

Faculty of Medicine and Health Sciences Research Ethics Committee

UEA
University of East Anglia

Toby Cushing
MED

Research & Innovation Services
Floor 1, The Registry
University of East Anglia
Norwich Research Park
Norwich, NR4 7TJ

Email: fmh.ethics@uea.ac.uk

Web: www.uea.ac.uk/researchandenterprise

26 October 2018

Dear Toby

Project title: Attachment orientation as a mediator and moderator of posttraumatic stress symptoms during childhood and adolescence

Reference: 201819 - 007

Your submission (above) was considered by the Faculty Research Ethics Committee at their meeting on 25 October 2018, and I confirm that your proposal has been approved.

Please could you ensure that any further amendments to either the protocol or documents submitted are notified to us in advance and also that any adverse events which occur during your project are reported to the Committee. Please could you also arrange to send us a report once your project is completed.

Approval by the FMH Research Committee should not be taken as evidence that your study is compliant with GDPR and the Data Protection Act 2018. If you need guidance on how to make your study GDPR compliant, please contact your institution's Data Protection Officer.

Yours sincerely,

Professor M J Wilkinson
Chair
FMH Research Ethics Committee

CC Richard Meiser-Stedman

Appendix D: Summary of Missing Data from NICHD Study of Early Child Care and Youth Development Variables

Table 5.1.

Summary of Number of Participants who had Completed Self-Report Measures with Number of Imputations for Each Variable

Variable	Completed	Imputed
Peer social support, bullying, and victimisation	901	248
Parental warmth, support, and hostility	766	383
Youth Self Report	874	275
Child Behaviour Checklist	733	416

Note. n=1,149

Appendix E: Summary of Adjusted Alpha Values Following Bonferroni-Holm Sequential Corrections

Table 5.2.

Summary of Adjusted Alpha Values Following Post-Hoc Bonferroni-Holm

Sequential Corrections in the Moderation Analyses Outlined in Chapter 4

	Model	*p*	Conventional α	Adjusted α
Peer victimisation and internalising problems	Background variables	.008	.05	.025
	Predictor variables	<.0001	.05	.0083
	Moderator variable	.162	.05	.0083
Parental hostility and internalising problems	Background variables	.037	.05	.05
	Predictor variables	<.0001	.05	.01
	Moderator variable	.187	.05	.0083
Peer victimisation and externalising problems	Background variables	<.0001	.05	.0083
	Predictor variables	<.0001	.05	.0125
	Moderator variable	.405	.05	.0083
Parental hostility and externalising problems	Background variables	.001	.05	.0167
	Predictor variables	<.0001	.05	.0167
	Moderator variable	.585	.05	.0083
Peer victimisation and PTSS	Background variables	<.0001	.05	.01
	Predictor variables	.001	.05	.025
	Moderator variable	.501	.05	.0083
Parental hostility and PTSS	Background variables	<.0001	.05	.0125
	Predictor variables	<.0001	.05	.05
	Moderator variable	.656	.05	.0083

Note. PTSS = Posttraumatic Stress Symptoms.