

Attachment-Based Prevention Interventions: A Meta-Analysis

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Abstract

There is a significant body of research that has focused on the prevention of insecure and disorganized patterns of attachment, as well as the problems associated with attachment insecurity. One goal of the present meta-analysis was to assess if attachment-based preventative interventions are effective at fostering attachment security and preventing problems associated with insecure and disorganized attachment. Another goal was to determine what factors are associated with larger effects. Studies were considered eligible if they were a randomized controlled trial, had an attachment-based preventative intervention for children, and had a measure of attachment security, behaviour problems, language development, or emotional regulation. A random effects model was used and a total of 22 studies were included in the meta-analysis. The results of the meta-analysis indicated that attachment-based prevention interventions produced a reliable small to moderate change ($d = .37$) in children's attachment security and problems associated with insecure and disorganized attachment. Potential moderating variables were also examined. Total number of sessions and the proportion of single caregivers was associated with a larger effect. When total number of sessions, proportion of single caregivers, caregiver mean age, and whether or not video feedback was used were analyzed together in a model, the total number of sessions was no longer a significant predictor of effect size. The proportion of single parents approached significance and not using video feedback and younger caregiver mean age were reliable predictors of the effect size.

Keywords: attachment, prevention, meta-analysis, children

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Attachment-Based Prevention Interventions: A Meta-Analysis

Insecure and disorganized attachments are associated with a host of problems throughout the lifespan, such as externalizing behaviour problems, the development of anxiety and depression, as well as impaired socioemotional and language development (Belsky & Fearon, 2002; Fearon, Bakermans-Kranenburg, Van IJzendoorn, Lapsley, & Roisman, 2010; Jinyao et al., 2012). For this reason, it is crucial to understand if preventative interventions are effective in preventing insecure and disorganized attachments and the many problems that are associated with them.

Attachment refers to the emotional relationship between a child and their caregiver. John Bowlby is considered the founder of attachment theory (Bowlby, 1958, 1969, 1973). Bowlby proposed that infants are evolutionarily predisposed to attach to their caregivers for safety, security, and care. Another key component of attachment theory is that infants become attached to the adults that respond sensitively to their social interactions, such as crying. The attachment relationship is a reciprocal one; that is, both the child and the caregiver become attached to each other. Attachment between an infant and their caregivers usually starts to form between 6 and 12 months of age. By one year of age, infants are typically clearly attached to at least one of their primary caregivers (Gekoski, Rovee-Collier, & Carulli-Rabinowitz, 1983; Lamb & Malkin, 1986). However, the nature of the infant's attachment to the caregiver does not necessarily have to be secure (Ainsworth, 1967). That is, an infant can be attached to their caregiver, but avoid or resist their caregiver.

Measuring Attachment

In 1978, Ainsworth, Blehar, Waters, and Wall outlined a paradigm called the Strange Situation and the patterns of attachment that were exhibited by the children in this paradigm. In

the Strange Situation Paradigm, a child and their mother are left in a room to play. During the paradigm, the mother leaves her child in the room once with a stranger and once by their self. Based on the child's behaviour during this paradigm, Ainsworth and colleagues developed a classification system. A child with a *secure attachment* is characterized by using their parent as a secure base to explore their environment and to return to when experiencing distress. Furthermore, when their parent leaves the room they experience little distress and when their parent returns they greet them warmly. Children with an *insecure-avoidant attachment* pattern demonstrate minimal distress when their parent leaves the room, but when they return the child avoids them. The *insecure-resistant attachment* pattern is characterized by the child becoming extremely upset when their parent leaves the room. When their parent returns they behave in discordant manners, sometimes they desire contact and at other times they resist contact with their parent. Solomon and George (1999) later defined a fourth type of attachment pattern, which they called *insecure-disorganized attachment*. This type of attachment pattern is exhibited when the child appears disoriented and disorganized when their parent returns to the room (e.g., they appear dazed or confused). Using multiple discriminant function analysis to predict the classification of infants, they were able to predict the correct classification for 92% of the infants with variables from the Strange Situation paradigm. This demonstrates that the infants were classified consistent with the criteria outlined. Also, they found that the behaviours the infants exhibited at home with their primary caregiver as well as the behaviour of their primary caregiver at home differentiated between classifications in the Strange Situation (Ainsworth et al., 1978). Thus, the Strange Situation classification system has real world implications. The Strange Situation was designed for children up to 18 months old.

Since the pioneering research of Bowlby and Ainsworth, many other measures of

attachment have been developed. For example, the Preschool Assessment of Attachment is a modified version of the Strange Situation Paradigm for children ages 2 to 5 years old (Crittenden, 1992). Additionally, there is the Attachment Q-Sort-Version 3 (AQS; Waters, 1995), which involves either an observer or the caregiver sorting statements into categories based on how well they describe the infant. This sort can then be used to derive a continuous attachment security score. Moreover, this measure can be used with a broader age range than the Strange Situation; the Attachment Q-Sort can be used with children that are one to five years of age.

Stability of Attachment

There is evidence that there is continuity in attachment patterns. For example, there is a significant relationship between children's attachment classification at 1 and 6 years of age (Gloger-Tippelt, Gomille, Koenig, & Vetter, 2002). As well, infants with a disorganized pattern of attachment are more likely to have an insecure or unresolved attachment classification in early adulthood (Weinfield, Whaley, & Egeland, 2004). However, this continuity seems to be largely dependent on external factors. To illustrate, increases in maternal sensitivity are associated with an increase in children who are classified as securely attached (Belsky & Fearon, 2002). Sensitive parenting throughout childhood and adolescence has also been found to increase the likelihood of the child having a stable, secure pattern of attachment in childhood and adolescence (Beijersbergen, Juffer, Bakermans-Kranenburg, & Van Ijzendoorn, 2012). In addition, maltreatment and maternal life stress are associated with negative change in attachment classification (Weinfield et al., 2004). Findings from research with children who are adopted in middle childhood into a family with a secure mother have found that it is possible for these children to move from an insecure to a secure pattern of attachment, but for many of these children their insecure or disorganized patterns of attachment continue to persist (Pace, Zavattini,

& Alessio, 2011).

Meta-analytic research indicates that the prototype perspective is currently the best way of understanding the mechanism behind the stability in attachment (Fraley, 2002). From this perspective, a child's relationship with their mother at a young age is a prototype for relationships throughout their life (Freud, 1940). Fraley (2002) defines a prototype as "a system of nonlinguistic representations, procedural 'rules' of information processing, and behavioral strategies... that serves as an adaptation to the individual's early caregiving environment" (p. 126). Prototypes are revised based on experiences in ongoing relationships. Yet, that early prototype does not change and it continues to affect the quality of the individual's relationships. Thus, by this theory, there is the possibility for both change and stability in attachment classification.

Furthermore, there is evidence that there is some level of transmission of attachment across generations. For instance, over 75% of mother-infant dyads have been found to have corresponding secure attachment classifications and there is 95% correspondence for insecure attachment (Gloger-Tippel et al., 2002). The overall correspondence between the parental attachment classification from the Adult Attachment Interview and the child's attachment classification from the Strange Situation Paradigm is 75% (Van Ijzendoorn, 1995). Likewise, the agreement of attachment classification for sets of grandmother, mother, and infant triads is 47% (Hautamaki, Hautamaki, Neuvonen, & Maliniemi-Piispanen, 2010).

Risk Factors for Insecure and Disorganized Attachment

There have been a number of different variables that have been found to be associated with insecure and disorganized patterns of attachment. Maltreatment is a substantial risk factor for disorganized attachment. This effect is similar for children who suffer from physical abuse

and those that suffer from neglect (Cyr, Euser, Bakermans-Kranenburg, & Van Ijzendoorn, 2010). Moreover, infants are more at risk of having a stable insecure attachment with their mother, if their mother has alcoholism, depression, or displays antisocial behaviours (Edwards, Eiden, & Leonard, 2004). For infants without Fetal Alcohol Spectrum disorder but whose parents both have problems with alcohol, they are significantly more likely to have an insecure attachment classification with both of their parents (Eiden, Edwards, & Leonard, 2002). Additionally, infants with high-risk perinatal medical problems are more likely to be insecurely attached (Udry-Jorgensen et al., 2011). Separation of the child and caregiver is another risk factor for insecure and disorganized attachment. Separation in the form of parental incarceration, in particular maternal incarceration, seems to have a particularly strong association with insecure and disorganized attachment (Poehlmann, 2005). Furthermore, other risk factors include low income, substance abuse, adolescent mother, ethnic minority, low education, and single mother. Children who are subject to more than one of these risk factors are as at risk as maltreated children of having an insecure or disorganized attachment classification (Cyr et al., 2010).

Importance of Attachment

Insecure and disorganized attachment patterns during early childhood have been linked with a variety of problems throughout the lifespan. Infants who are securely attached to their mother and whose mother provides them with sensitive care, tend to be more cooperative, have superior language abilities, are more ready for school, and have fewer externalizing and internalizing behaviour problems than their peers as preschoolers (Belsky & Fearon, 2002; Van Ijzendoorn, Dijkstra, & Bus, 1995; O'Conner, Bureau, McCartney, & Lyons-Ruth, 2011). Although, overall, attachment insecurity is associated with non-compliant externalizing and internalizing behaviour problems, children with a disorganized attachment classification are at

the greatest risk of developing these problems (Fearon, Bakermans-Kranenburg, Van IJzendoorn, Lapsley, & Roisman, 2010; O'Connor et al., 2011). Moreover, an insecure pattern of attachment is predictive of anxious and depressive symptoms in adolescents (Hankin, Kassel, & Adela, 2005; Lee & Hankin, 2009).

A secure pattern of attachment seems to be able to also work as a protective factor for at-risk children. For instance, children of alcoholic fathers are significantly more likely to have internalizing and externalizing behaviour problems. However, those children with a secure attachment to their mother were found to have lower levels of these problem behaviours (Edwards et al., 2004). As well, children who have experienced deprivation and physical abuse in early childhood and then experience quality caregiving and a secure attachment have reduced levels of psychopathology and impairment (McGoron et al., 2012; McLewin & Muller, 2006).

In adulthood, attachment insecurity has been linked to criminal behaviour, substance abuse, and psychopathology (Allen, Hauser, & Borman-Spurrell, 1996). Moreover, insecure patterns of attachment have been found to predict psychopathology in both adults who experienced physical abuse and those who did not (McLewin & Muller, 2006). Additionally, attachment insecurity has also been found to help predict self-harm in young adults (Gratz, Conrad, & Roemer, 2002).

Psychotherapeutic Attachment Interventions

There have been many interventions designed to alter children's insecure and disorganized attachment patterns. For instance, the Circle of Security program aims at increasing parental sensitivity and empathy, as well as educating parents about attachment and the cues their child gives (Marvin, Cooper, Hoffman, & Powell, 2002). This group intervention consists of 20 sessions over 20 weeks and involves education and reviewing videotapes of parents

interacting with their children. This intervention has been found to decrease the number of children with an insecure attachment classification (Marvin et al. 2002; Hoffman, Marvin, Cooper, & Powell, 2006). Another attachment intervention that has also been found to reduce the number of children with an insecure attachment classification is Watch, Wait, and Wonder (Cohen et al., 1999). Watch, Wait and Wonder is a psychotherapeutic intervention, where in the first half of the session, the child leads and the goal is for the mother to follow the child's lead. The second half of the session is comprised of discussion between the mother and the therapist.

Attachment Prevention Interventions

Attachment-based psychotherapies such as Watch, Wait and Wonder have been used for prevention purposes, as well. Prevention means to prevent a disorder before it can occur.

Universal prevention refers to an intervention or services that target the general population.

Selective prevention targets groups who are at risk. Finally, indicated prevention is when the intervention targets individuals who have started to show signs or symptoms of a disorder but do not yet meet the diagnostic criteria (O'Connell, Boat, & Warner, 2009).

There have been numerous studies that have examined prevention interventions for children that are based in attachment theory. For instance, a randomized control trial of a short-term, attachment-based intervention for maltreated children lasted for 8 weeks. Following the intervention, children had improved attachment security and lower levels of disorganization (Moss et al., 2011). In addition, an attachment prevention intervention that was customized based on level of risk used reflective video feedback. The children in the intervention group were significantly more likely to have a secure attachment classification than the control group after the intervention (Svanberg, Mennet, & Spieker, 2010). Also, another attachment-based prevention intervention that used video-feedback for mothers with low levels of sensitivity to

their infants significantly increased attachment security (Kalinauskiene et al., 2009).

Several studies have looked at the efficacy of these attachment interventions at preventing problems associated with insecure and disorganized attachment. For example, Velderman and colleagues (2006) implemented a video-feedback intervention that promoted sensitive parenting and positive discipline when the infants were age 7 to 10 months. When the children reached preschool age, the intervention group had significantly less externalizing behaviour problems than the control group. Another study that looked at the efficacy of an attachment-based video-feedback intervention for 1 to 3 year old children found it decreased the overactive behaviours of at-risk children (Van Zeijl et al., 2006). Moreover, a home-based Early Head Start intervention with a focus on promoting positive parenting practices that was implemented when the children were infants was found to not only improve infant attachment security, but it was also found to significantly contribute to improved cognitive scores at 36 months of age (Roggman, Boyce, & Cook, 2009). Therefore, it appears that interventions that improve attachment security may also improve or offset the problems associated with insecure and disorganized attachment.

Meta-Analysis

The primary goal of a meta-analysis is to summarize a body of studies by computing an overall effect. There are several advantages to conducting a meta-analysis instead of a narrative review. Narrative reviews tend to rely on the *p*-values of individual studies to determine the overall effect. However, even if 15 out of 20 studies in a body of literature have a non-significant *p*-value that does not mean that this is evidence against the effect. Meta-analysis provides a way to mathematically calculate the overall effect using the effect sizes from each study. Additionally, with meta-analysis you are able to go beyond simply statistical significance and do

further analyses regarding which factors affect the effect size. As well, with narrative reviews there is no method to quantify the size of the effect, whereas meta-analysis allows you to do this. Moreover, narrative reviews tend to rely on *p*-values to determine the consistency of the effect size across studies whereas meta-analysis again uses effect size. The problem with using the *p*-value is that they may be non-significant due to a small sample size or inadequate power, not because the effect is negligible (Borenstein, Hedges, Higgins, & Rothstein, 2009). Finally, a meta-analysis involves a systematic search of the literature and is therefore replicable. This helps to ensure that meta-analyses are reliable and valid. Since a narrative review may not be systematic, it can be subject to the author's biases.

An early meta-analysis done on psychotherapeutic interventions for adults found that overall these interventions are effective. However, there was little difference between different types of psychotherapies (Smith & Glass, 1977). In the case of prevention interventions for children, these interventions do not appear to be equivalent. In 2005, Bakermans-Kranenburg, Van Ijzendoorn, and Juffer conducted a meta-analysis that examined the efficacy of preventative interventions for disorganized attachment. The overall main effect of attachment-based interventions on preventing or decreasing disorganized attachment was not significant. However, they did find that the interventions that focused on increasing only the caregiver's sensitivity did significantly prevent or decrease disorganized attachment, as opposed to interventions that attempted to change the caregiver's mental representation of attachment, the support they provided to the child, or a combination of the three approaches. As well, another meta-analysis done in 2003 by Bakermans-Kranenburg, Van Ijzendoorn, and Juffer likewise found that attachment interventions and prevention programs that are most effective at ameliorating the caregiver's sensitivity show the greatest improvement in infant attachment security. Also, this

study found that of the interventions that focused on sensitivity, those with only a moderate number of sessions and a focused behavioural orientation were the most effective.

It is imperative that we continue to synthesize and summarize previous research in order to improve our interventions. Bakermans-Kranenburg and colleagues' (2005) study was conducted over eight years ago; since then there have been further studies conducted on this topic. For instance, Svanberg et al. (2010) evaluated a primary prevention intervention with the goal of fostering a secure attachment. Furthermore, Bakermans-Kranenburg and colleagues only included studies that had disorganized attachment as an outcome variable. There are several studies that have researched attachment-based interventions, but have used outcome measures associated with insecure and disorganized attachment (e.g., Velderman et al., 2006; Van Zeijl et al., 2006). In addition, currently, out of the main measures of attachment for children, only the ones for infants and young children have strong empirical support (O'Connor & Byrne, 2007). Due to the modest support for attachment measures for older children and adolescents, researchers may consider using other measures related to attachment as outcome measures. For example, they may choose to use externalizing behaviour problems as opposed to insecure or disorganized attachment, as their outcome variable.

Consequently, the present meta-analytic study evaluated the efficacy of prevention interventions for children that are based in attachment theory. This study expanded upon the Bakermans-Kranenburg and colleagues' (2005) meta-analysis by including not only studies that had disorganized attachment as outcome variables, but also studies that had measures of insecure attachment and measures of other outcome variables related to insecure and disorganized attachment, such as behaviour problems. Moreover, since Bakermans-Kranenburg and colleagues' study was published in 2005, this study updates our understanding of what makes

certain attachment prevention interventions more effective than others. Finally, the present study also included unpublished research.

Research Questions

The current study addressed the following research questions: (a) Are prevention interventions based in attachment theory effective?; (b) Are prevention interventions based in attachment theory effective at follow-up?; (c) What bibliographic variables (date of publication, publication type, and continent the study was conducted in) affect the effect size of interventions based in attachment theory?; (d) What methodological characteristics (intervention manualization, the measure used, and treatment fidelity checks) affect the effect size?; (e) What sample characteristics (risk factors, caregiver education, caregiver income, sample attrition, proportion of female and male children and caregivers, age of children and caregivers, and rate of maternal psychopathology) affect the effect size?; (f) What characteristics of the intervention (the focus of the intervention, number of weeks, number of sessions, and total number of hours the intervention lasted, whether or not video feedback was used, and if the intervention was behaviourally based) affect the effect size? See Appendix A for a full list of research questions.

Method

Research Design

The present study was a meta-analysis using the random effects model with efficacy as the main outcome variable. In the fixed effect model it is assumed that there is one true effect size for all of the studies (Borenstein et al., 2009). If there are any discrepancies in the studies' observed effect sizes it is assumed to be because of sampling error (e.g., the sample has a higher level of education than the population), whereas in the random effects model the true effect may differ between studies. This may be due to a variety of reasons, such as variations in how the

intervention was implemented, different participant populations, and so on. In a random effects model, if an infinite number of studies that fit the inclusion criteria of a meta-analysis were conducted then the effect sizes of these different studies would be distributed around a mean. The effect sizes of the studies that have actually been carried out are considered to be a random sample of these effect sizes.

It was decided a priori that this study would use a random effects model as opposed to a fixed effect model because it was assumed that the studies that would be included in the meta-analysis would have heterogeneous effect sizes. In other words, the studies did not possess a common effect size. This was a reasonable assumption, since there was quite a bit of variability across studies in the implementation of the interventions. For instance, in Velderman et al.'s (2006) study, the intervention consisted of 4 sessions that were between 1.5 and 3 hours and in Moss et al.'s (2011) study the intervention consisted of 8 sessions that were 1.5 hours. Additionally, there was variability across the participant populations in the studies. For example, in Cicchetti, Rogosch, and Toth's (2006) study the infants had been maltreated, in Juffer, Hoksbergen, Riksen-Walraven, & Kohnstamm's (1997) study the infants were adopted, and in Brisch, Bechinger, Betzler, and Heinemann's (2003) study the infants were premature. Thus, due to the wide range of studies that were included in the meta-analysis, a random effects model was used.

Moreover, there is no cost to using the random effects model. The Q statistic is a test of homogeneity of variances. However, the Q statistic often has low power. The null hypothesis of this test is that there is zero variance between studies. If a significant p -value is obtained, then this is regarded as evidence that the true effect sizes of the studies differ. However, a non-significant p -value does not necessarily mean that the true effect sizes of the studies do not

differ. If there is truly no heterogeneity, then the random effects model is equivalent to the fixed effect model.

Procedure

The first step in the meta-analysis was to do a systematic review of the literature to find all the studies that have examined prevention interventions based in attachment theory for children. A search was done in the following databases: PsycINFO, Medline, ERIC, Google Scholar, and Dissertation Abstracts International. The search strategy that was used was similar to Bakermans-Kranenburg et al.'s (2005) search strategy to ensure that all the articles they retrieved for their meta-analysis were also retrieved for this meta-analysis. The search terms that were used were: attachment (or related words: sensitivity, support and responsiveness), prevention (or other related words: promotion, foster, therapeutic, preventative, and intervention), and children (or other related words: infants, toddlers, newborns, and preschoolers). Descriptors were also used to search databases when they were available. For PsycInfo's *Thesaurus of Psychological Index terms* the descriptor *prevention* was used. From ERIC's *Thesaurus* the following descriptors were used: *prevention*, *young children*, and *children*. From *Medical Subject Headings (MeSH)* for Medline the descriptors: *child*, *preschool*, *infant*, and *prevention & control* were used.

Furthermore, the reference lists of related review articles and the studies that were included in the meta-analysis were checked in order to locate additional studies. Studies that cited a study that was included in the meta-analysis were also checked. As well, conference programs and proceedings of conferences in the area of attachment were searched to find additional data. The ERIC database search retrieved several conference proceedings, but none were found to be relevant. Also, the programs from past International Attachment Conferences

were searched. Four authors were e-mailed about their presentation. Only two replied and they did not yet have data, so their studies could not be included. Finally, authors who have published several studies that were included in the meta-analysis were contacted by e-mail to see if they had any unpublished studies that would potentially meet the inclusion criteria of the meta-analysis. Five authors were contacted for unpublished data. Only one replied and indicated that they did not have unpublished data.

Studies were included in the meta-analysis if they were a randomized control trial. That is, the participants were randomly assigned to the intervention or control group. Furthermore, studies were included if they had at least one quantitative comparison of an attachment-based prevention intervention for children. That is, each study needed a post-intervention comparison of the intervention and control group. The measure had to be of attachment security or a related measure (behaviour problems, language abilities, socioemotional development or psychopathology). The children in the studies had to be 12 years of age or younger. Although most studies have focused on children under 5 years of age (e.g., Kalinauskiene et al., 2009; Roggman et al., 2009; Svanberg, et al., 2010), this study had a more inclusive age range in order to not prematurely exclude studies. Moreover, with children older than 12 years, attachment measures and interventions may also look at romantic relationships and the goal of the present study was to focus on the child and their caregiver. Therefore, only studies with children 12 years and younger were used. However, there were no studies found that had a mean age of children at the start of the intervention greater than 54 months. Another inclusion criterion was that the attachment-based intervention in the studies must have been a psychotherapeutic intervention. Examples of interventions that would not have been considered psychotherapeutic are infant massage and kangaroo care. Both published and unpublished studies were included in

the meta-analysis to help reduce the effects of publication bias (Dickersin Chan, Chalmers, Sacks, & Smith, 1987; Dickersin, Min, & Meinert, 1992). Meta-analyses can overestimate the true effect size if they are based on a biased sample of studies. Studies with significant results are more likely to be published (Borenstein et al., 2009). Therefore, unpublished studies were also included in this meta-analysis in order to reduce this bias. Studies were only included if they were written in English. Eligibility was determined by reading the title and abstract. If the title was related in any way to the meta-analysis, then the full study was read to determine if it met the eligibility criteria. See Appendix B for the eligibility coding manual, which contains specific definitions. Studies were only included in the meta-analysis if they were published before September 1, 2013. The author, a Master's level graduate student, conducted all the searches and screened the titles and abstracts of the studies.

With a thorough search strategy there is always the risk of obtaining duplicate data. For example, the data may be from the primary author's dissertation, but it is also published in a journal. This is an issue even if the author did different analyses on the same set of data, since the meta-analysis is relying on the assumption that the data from each study is independent. In order to ensure data was not being included more than once in the meta-analysis, all studies in the meta-analysis were checked to see if any studies shared one or more authors. When any of the studies shared authors, these studies were checked to see if they shared similar methodology. Studies that shared similar methodology were compared to see if they had similar sample characteristics (demographics, n , and N ; Wood, 2008). If there were studies that also had similar sample characteristics then they were considered dependent samples. The majority of the studies clearly identified if the sample was the same or overlapped with another study. For dependent studies, the studies were prioritized based on measure. Thus, if one of the studies with

overlapping samples had a proxy measure, this study was prioritized. If one of the studies was a follow-up study, this study was aggregated into the effect size of the primary study. In the instances where the follow-up data was in another article, the data for the moderator variables was taken from the primary study.

If a study met all criteria, but the format that their data was in could not be used in the meta-analysis (e.g., MANOVA), the authors were contacted and asked for means, standard deviations, and sample size of the intervention and control group post-intervention. Only one out of five corresponding authors responded to this request (Spieker, Oxford, Kelly, Nelson, & Flemming, 2012).

A coding manual and form were used to code the studies that met the inclusion criteria (Appendix C). The author, a Master's level graduate student, was the primary coder. The effect of the intervention at post-intervention and follow-up was coded for. As well, bibliographic characteristics were coded for; these included the type of publication, the year of publication, and the continent the study was conducted in. Additionally, the methodological characteristics of the studies that were coded were if the intervention was manualized, the measure used, if there was a measure of treatment fidelity, and the length of follow-up. The following characteristics of the sample were also coded for: caregiver education, caregiver annual income, proportion of male and female caregivers and children, mean age of children and caregivers, sample attrition, parental psychopathology, if children were born premature, if children were born with a low birth weight, if the children were in foster care or were adopted, if the children were subjected to abuse or neglect, if the caregivers were insensitive, if the caregivers were single parents, if the sample was comprised of an ethnic minority, and if the caregivers were adolescents. Finally, the intervention characteristics that were coded for were the focus of the intervention, the duration of

the intervention, who delivered the intervention, the location of the intervention, and whether or not video feedback was used. If a study had an approximate mean for any of the variables, this number was still used. As well, if a study did not give a mean, but gave a range for any variable, the middle of the range was taken (e.g., Lorant et al., 2003; Shadish & Baldwin, 2005; Sharpe & Rossiter, 2002). The reason for this was there were a limited number of studies eligible for the meta-analysis, so being able to extract more data would give the moderator analyses more power.

The data that was collected was entered into Comprehensive Meta-Analysis Version 3.0 (CMA; Borenstein, Hedges, Higgins, & Rothstein, 2014) for analysis. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA; Moher, Liberati, Tetzlaff, & Altman, 2009) standards were followed to ensure the meta-analysis was comprehensively and transparently reported.

Interrater Reliability

To collect interrater reliability for the eligibility, a second coder who was an undergraduate student, coded articles for eligibility. Namely, after the initial search was done and studies were selected based on their titles and abstracts, the second coder also went through all these selected studies to determine whether or not the study was eligible for the meta-analysis. The second coder was trained on the inclusion and exclusion criteria of the meta-analysis and had the opportunity to practice and was given feedback. Disagreements were resolved through discussion between the two coders.

For coding the data in studies that were included in the meta-analysis, the same second coder was trained in order to be able to collect data on interrater reliability. This coder was taught basic information about meta-analysis and the purpose of the present meta-analysis. Furthermore, this individual was taught about the different elements of the coding form and was

given the coding manual. Next, this second coder was given sample studies to code. The second coder was trained until her agreement with the primary coder was .9 or greater for continuous variables using the intraclass correlation coefficient or .7 or greater for categorical variables using Cohen's kappa. The second coder was given feedback and disagreements were discussed until the primary and secondary coder reached an agreement. These sample studies that the second coder was trained on were not included in the interrater reliability calculation. Interrater reliability was obtained for 50% of the studies that were included in the meta-analysis. Interrater reliability was calculated for each variable in the coding system, using Cohen's kappa for the categorical variables and the intra class correlation coefficient for continuous variables. Agreement was 100% for categorical variables, except for one variable. The agreement for whether or not the comparison group received services or nothing is considered to be almost perfect, Cohen's kappa = .825 (Landis & Koch, 1977). For the continuous variables, agreement was 100% for 19 out of 26 of the variables. For continuous variables that did not have perfect agreement, the agreement was still considered excellent agreement, $M = .969$, range .931 to .998 (Fleiss, 1986). Discrepancies were resolved through coder discussion and by consulting the original article.

Data Analysis

To address the first research question regarding the overall efficacy of prevention interventions based in attachment theory post-intervention, 1 to 6 months post-intervention, 7 to 12 months post-intervention, and more than 12 months post-intervention, the results of all the studies were combined to obtain an overall mean effect size using Cohen's d . In order to obtain the overall effect size, individual effect sizes from each study were first calculated. For each study, the effect size (Cohen's d) was calculated using post-intervention scores of the control and

intervention groups in CMA. The CMA software was then used to calculate the weighted mean effect size of the studies. Since a random effects model was used, the range of the weights assigned to all the studies was smaller than in a fixed effect model. The null hypothesis for testing the significance of the mean effect size was that the mean effect size was zero. If a given study offered more than one effect size, effects sizes derived from a proxy measure (behaviour problems, language development, emotional regulation, and psychopathology) were given priority over measures of attachment. If these prevention interventions can demonstrate that they cannot only prevent insecure and disorganized attachment, but the problems associated with it as well, this will better demonstrate the range of benefits of these interventions. If there was more than one effect size derived from a proxy measure, the mean of these effect sizes was taken. If there were multiple measures of attachment and no proxy measures, then again the mean of the effect sizes was taken. For studies that repeated measures at more than one point in time or had multiple comparison groups, the effect sizes were aggregated.

To address the remaining research questions, moderator analyses were performed. Moderator analyses were used to determine if a variable affects the effect size. In other words, moderator analyses helped to determine which variables were associated with a greater effect size. To perform these moderator analyses, meta-regression was used. For meta-regression, the unit of analysis is an individual study as opposed to an individual participant. Only variables that had data from four or more studies were analyzed.

With multiple analyses, there is an elevated risk of making a type I error. Currently, many meta-analyses hold α at .10 and the two previous meta-analyses in this area held α at .05, but they did one-tailed tests (Bakermans-Kranenburg et al., 2003, 2005; Kibby, Tyc, & Mulhern, 1998; Loth, Dabrick, Leibenluft, & Hulvershorn, 2014; Seo & Sa, 2008; Wittwer & Renkl,

2010). In order to help counteract the problem of an inflated type I error rate, α was set at .05 in this study and all analyses were two-tailed. This meta-analysis thus used a more conservative alpha to control for type I error.

A forest plot was created to display the results of the meta-analysis visually. In the forest plot, the overall effect of all the studies is displayed, along with the individual effect of each study and its confidence interval. The purpose of the forest plot is to assist in seeing how many studies the overall effect is based on and to give context to the statistics (Borenstein et al., 2009). Additionally, the forest plot was the first step in helping to assess if there is publication bias. In the forest plot, if the studies with lower weights have higher effect sizes than the studies with higher weights, then this would suggest that bias is present.

Results

Main Results

Table 1 displays information about the characteristics of the studies included in the meta-analysis. For information on the category of measures used, sample size, and effect size of the 22 studies included in the meta-analysis, see Table 2. Two of the included studies were follow-up studies, so their data was aggregated with the corresponding primary study. There was a large amount of variability between the effect sizes of the different studies. The effect sizes ranged from -.48 to 1.64. Figure 2 displays a cumulative forest plot of the studies sorted from oldest to most recent publication date.

Overall, the attachment-based prevention interventions showed a reliable small to medium effect. The attachment-based prevention interventions showed a reliable, medium effect one to six months post-intervention. The effect was no longer reliable for 6 to 12 months post-intervention, see Table 3. There were only two studies, Cheng et al. (2007) and Velderman et al.

(2006) that had follow-up measures that were administered 13 months or longer post-intervention. The combined effect of these two studies was $d = 0.11$, 95% CI = -0.22-0.45, $p = .500$.

Moderator Analyses

Moderator analyses were only conducted for variables that had four or more studies that provided data on that variable. There were 25 moderator analyses conducted in total. See Table 4 for the statistics for all of the moderator analyses and Table 5 for the studies that were included in each moderator analysis. The graphs of the moderator analyses were visually examined to assess if there were outliers or if a curvilinear line may better explain the data. Two of the moderator analyses were statistically significant. A greater percentage of single parents in the study was reliably associated with a larger effect. Also, the average total number of sessions in the intervention was associated with a larger effect. However, visual examination of the graph for this moderator analysis revealed that most of the studies ranged from 3 to 21 sessions and that there were two outliers. Heinicke, Fineman, Ponce, & Guthrie (2001) had an average of approximately 71 sessions and Cicchetti, Rogosch, & Toth (2000) had an average of 45.6 sessions. The moderator analysis was rerun without these two studies. When these two studies were removed, the association was no longer reliable, $Q = 1.17$, $R^2 = 0.00\%$, $p = .279$. There were three moderator variables that approached the significance cut off. A younger caregiver mean age (range 18 to 36 years) was associated with a larger effect ($p = .052$). Using video feedback was associated with a smaller effect compared to not using video feedback ($p = .08$). Finally, studies that used a measure of attachment as opposed to a measure of a proxy variable (i.e., behaviour problems, language development, or emotional regulation) tended to have a larger effect ($p = .086$). There were several non-significant findings that were inconsistent with

the previous meta-analyses done by Bakermans-Kranenburg et al. (2003, 2005). In the present meta-analysis, there was not a significant relationship between sensitivity-focused interventions ($p = .627$), behavioural interventions ($p = .405$), and the mean age of the children ($p = .726$) with the effect of these interventions. These three moderator analyses all had large ks (19 or 20), so the non-significant finding is likely not a result of lack of power.

Meta-Regression Models

Two different models were tested. Only studies that had data for all the variables included in the model were used in the analyses. First, although the video feedback moderator analysis was not statistically significant, the trend for interventions that did not use video feedback to be more effective than those that did was contradictory to previous meta-analyses (Bakermans-Kranenburg et al., 2003, 2005). Many of the studies that used video feedback tended to be shorter interventions. Thus, the effect of using video feedback and the number of sessions were tested together in a model. There were 16 studies included in this analysis. The model was reliable, $Q = 8.88$, $R^2 = 39.97\%$, $p = .011$. In this model, the coefficient for if the study used video feedback was not significant, $\beta = -.27$, $p = .270$ and the coefficient for total number of sessions was not significant either, $\beta = .01$, $p = .085$. This model included the two studies that were outliers (Cicchetti et al., 2000; Heinicke et al., 2001). The correlation between total number of sessions and whether or not video feedback was used was large ($r = .545$). It appears the two variables co-vary, longer studies tended not to use video feedback and that was why they were no longer significant when they were analyzed together in the model.

Next, the two other significant moderators with the lowest p -values were added to this model and tested. That is, using video feedback, total number of sessions, caregiver mean age, and the percentage of single parents were tested together in a model. There were 11 studies

included in this analysis. The model was reliable, $Q = 22.36$, $R^2 = 86.14\%$, $p < .001$. In this model, total number of sessions was no longer a reliable predictor of effect size, $\beta = .00$, $p = .698$. The coefficient for the percentage of single parents approached significance, $\beta = .01$, $p = .052$. The coefficients for video feedback and caregiver mean were significant predictors of effect size, $\beta = -.61$ $p = .012$ and $\beta = -.06$ $p = .012$, respectively. This indicated that a younger caregiver mean age and not using video feedback were associated with a larger effect. Out of the variables included in the model, video feedback and caregiver mean age had a large positive correlation, total number of sessions and the percentage of single parents had a large negative correlation, and total number of sessions and video feedback had a large positive correlation. See Table 6 for the correlation matrix for this model. These large correlations between the variables in the model indicate that their covariance may be the reason why some of the variables went from being significant individual predictors of effect size to non-significant and vice versa. Moreover, it should be noted that the number of studies included in the present model was fewer than when these moderators were analyzed individually. This change may have affected the results of the moderators. The moderator analyses were rerun for the four variables included in the model, for only the studies that were part of the model. Caregiver mean age and whether or not video feedback was used were not reliable predictors of effect size, $Q = 1.10$, $R^2 = 0.00\%$, $p = .294$ and $Q = 2.65$, $R^2 = 16.35\%$, $p = .104$ respectively. The percentage of single parents and total number of sessions were reliable predictors of effect size, $Q = 6.14$, $R^2 = 40.27\%$, $p = .013$ and $Q = 5.04$, $R^2 = 33.88\%$, $p = .025$ respectively. The moderator analyses are fairly consistent with the results from moderator analyses done with all the studies that had data. Therefore, it appears that the covariance between the variables is a more likely explanation for the change in significance. The studies that were included in this model were Cassidy, Woodhouse, Sherman,

Stupica, and Lejuez (2011), Cheng et al. (2011), Cicchetti et al. (2000), Cicchetti et al. (2006) and Stronach (2012), Franz, Weihrauch, and Schafer (2011), Heinicke et al. (2001), Kalinauskiene et al. (2009), Krupka (1996), Moss et al. (2011), Van Den Boom (1994, 1995), and Van Doesum, Riksen-Walraven, Hosman, and Hoesfnagels (2008). The decision was made to not add any more variables to the model since there were only 11 studies that had data for all four of these variables. Adding more studies would have reduced the power and may have limited even further the number of studies that could have been included in the analysis.

Publication Bias

Based on visual examination of the funnel plot and forest plot (See Figures 3 and 4), there appears to be some asymmetry. In the funnel plot the studies with higher standard errors tended to have larger effect sizes (standard difference in means) than the mean, instead of grouping around the mean. In the forest plot, the studies with lower weights showed a slight trend for having larger effect sizes. Standard errors and weights are affected by sample size. Studies with higher standard errors have smaller sample sizes and studies with smaller weights have smaller sample sizes (Borenstein et al., 2009). As well, studies with smaller sample sizes are more likely to lack enough power to find a statistically significant effect. Since studies with significant results are more likely to be published, this may bias the meta-analysis if these unpublished studies are not found. Therefore, the pattern of data in the funnel plot and forest plot may indicate that there are unpublished studies that were not found (Borenstein et al., 2009). Furthermore, in the cumulative forest plot, where studies were added one at a time from the largest weighted to the smallest weighted and the overall effect was calculated as each study was added (Figure 5), as the smaller weighted studies were added, there was a slight shift to the left, or larger overall effect. There were two non-peer reviewed studies included in the meta-analysis,

one dissertation (Krupka, 1996) and a book chapter (Egeland & Erickson, 1993). The effect sizes of these two studies do not appear to be outliers in regards to size of their effect (Table 2 and Figure 3). To further test the presences of publication bias, a moderator analysis was done to analyze peer reviewed versus non-peer reviewed studies. The result of the moderator analysis on publication type was not significant, $Q = 0.00$, $p = .98$, $R^2 = 0.00\%$. It should also be noted that there was little variation between the weights of the studies (range 3.31 to 6.18). Another piece of information to take into account is that 11 out of 20 of the computed effect sizes for the individual studies were not significant (Table 1). This indicates that if publication bias is based on statistical significance, it does not seem to be a powerful bias in this body of research. Therefore, overall, it appears unlikely that publication bias affected the results, but there is still a possibility that publication bias influenced the results.

Discussion

The results of the meta-analysis indicated that attachment-based prevention interventions produce a reliable small to moderate change compared to the control group. Measures that were taken between 1 to 6 months post-intervention demonstrated a reliable moderate change compared to the control group. Measures that were taken between 7 to 12 months post-intervention had a small to moderate change compared to the control group. This finding was not significant. The effect sizes were fairly similar across these three analyses. They were all within the range .37 to .48. This may indicate that attachment-based preventative interventions maintain their effect throughout the first year post-intervention. There is little data on the effect of these interventions over one year post-intervention.

The majority of the moderator variables were not significant. Moderator variables related to study quality, including treatment manualization, if the study monitored treatment fidelity, the

percent of attrition, if the comparison group received services or nothing, and observational measures (as opposed to self-report measures) were not related to effect size. This suggests that variables related to study quality were not biasing the efficacy of these interventions. The continent the study was conducted in was also not significant. Furthermore, the two moderator variables that examined the percentage of female children in the sample and the mean age of children in the sample were not significant. Therefore, these interventions do not seem to be more effective for either female or male children. In addition, there does not seem to be a significant impact of when the intervention is implemented within the range of prenatally to preschool.

The total number of sessions (range 3 to 71) and proportion of single caregivers in the sample was associated with a larger effect. There were three moderator analyses that approached significance. Caregiver mean age (range 18 to 36 years) had an inverse relationship with effect size and using video feedback was associated with a lower effect size. Measures of attachment were associated with a larger effect than proxy measures (i.e., measures of behaviour problems, language development, and emotional regulation), but this relationship was not significant. When total number of sessions, proportion of single caregivers, caregiver mean age, and whether or not video feedback was used were analyzed together in a model, the total number of sessions was no longer a significant predictor of effect size. The proportion of single parents approached significance and using video feedback and caregiver mean age were reliable predictors of the effect size. The majority of the variables included in the model were strongly related to each other. This appears to likely be the reason for the change in significance for a couple of the moderator variables from when they were analyzed individually versus together in the model. In

summary, based on the model, it appears that not using video feedback and a younger caregiver mean age significantly affect the effect size of the interventions in the present meta-analysis.

The study done by Brisch et al. (2003) was an outlier compared to the other studies in the meta-analysis due to its medium negative effect, $d = -0.48$. The effect size for this study was calculated using the number of securely attached infants in the intervention and control group post-intervention as classified by the Strange Situation Paradigm. This study targeted premature infants. The intervention consisted of a parent group, individual psychotherapy sessions, a home visit, and sensitivity training. Despite the infants being randomly assigned to the control and intervention group in this study there was a significant difference between the number of infants who had impaired neurological development; in the control group 46% of the infants were neurologically-impaired, compared to 76% of the infants in the intervention group. Additionally, the authors found a significant correspondence, where infants with a secure attachment were more likely to be neurologically healthy compared to insecurely attached infants. In summary, it appears likely that the negative effect of this study did not result from the intervention, but from the greater proportion of neurologically-impaired infants in the intervention group.

A limitation of this meta-analysis is that there is a chance there may be some publication bias present. Therefore, the results should be interpreted with caution. However, there was a significant effort made to retrieve unpublished data and approximately half of the studies included in the meta-analysis did not have significant individual effect sizes. Another limitation of the meta-analysis was that there were only 22 studies eligible for the meta-analysis. It could be the case that some of the moderator analyses lacked sufficient power to detect an effect.

Another limitation of the present meta-analysis is that not all studies provided data on every moderator variable analyzed. This may have affected some of the moderator analyses

because some of the variables may have lacked sufficient power. The percent of maternal psychopathology only had four studies that provided data and the mean years of caregiver education only had five studies that provided data for the analysis. Furthermore, to test different models, only studies that have data on all the variables in the model could be included in the analysis. Thus, the missing data limited the ability to test different models.

Additionally, there were a variety of at-risk groups across the studies included in the meta-analysis and many studies had multi-risk samples. For example, Bernard et al.'s (2012) sample was maltreated children and the majority was ethnic minorities, Franz et al.'s (2011) intervention targeted single mothers, Moran, Pederson, and Krupka's (2005) sample was of adolescent mothers, the majority single, and the majority had a low income, and Velderman et al.'s (2006) sample was of mothers with insecure attachment classifications. This is a tremendous strength of the body of research on attachment-based preventative interventions, that they have been able to effectively apply these interventions to a variety of populations. This diversity of sample risk factors did limit the number of risk factors that had a sufficient number of studies to analyze as a moderator variable. As well, some risk factors did not have enough variability to analyze, such as the proportion of adolescent mothers, which only had studies where the whole sample was adolescent mothers and then the rest of the studies did not report if there were adolescent mothers in the sample. Thus, the effect of different sample risk factors is an important issue to address meta-analytically as the body of research grows larger.

A strength of the present meta-analysis was that it was limited to randomized controlled trials, which helps to reduce bias. Randomized controlled trials are the gold standard of research. Furthermore, they often yield smaller effect effects than other designs, such as pre-post comparisons and nonrandomized designs (Oakley, 2004). Having a control group helps to

control for changes due to maturation. That is, systematic changes over time are controlled for (Kirk, 2004). Randomized controlled trials also help to control for selection bias. That is, participants in the different groups may systematically vary on important variables, which confound the results of the study (Higgins & Green, 2011). Thus, even using randomized controlled trials, which are the gold standard of research, preventative interventions based in attachment theory still had a significant small to medium effect.

Another strength of the present meta-analysis was that it updates our information and will help to refine future prevention interventions that are based in attachment theory. There were two meta-analyses conducted in this area by Bakermans-Kranenburg and colleagues in 2003 and 2005. Given the number of years it has been since these meta-analyses were conducted, it was worthwhile to re-synthesize the literature on this topic. The present meta-analysis also expanded upon these previous meta-analyses. Specifically, the present meta-analysis also looked at the effect of attachment-based preventative interventions on problems associated with insecure and disorganized attachment. Insecure and disorganized patterns of attachment are associated with a host of problems throughout the lifespan (Belsky & Fearon, 2002; Van Ijzendoorn et al., 1995; O’Conner et al., 2011). It is therefore important to ensure that attachment-based preventative interventions are not only able to improve attachment security, but are also able to offset the problems associated with insecure and disorganized attachment.

Based upon the research findings in the previous meta-analyses, the “dodo bird effect” does not seem to apply to attachment interventions for children as it does for psychotherapies. That is, unlike in psychotherapies for adults, different attachment interventions for children do not seem to produce relatively equivalent outcomes. Previous meta-analyses have found that attachment prevention interventions for children that focus on improving parental sensitivity are

more effective, as well as those that only have a moderate number of sessions with a clear behavioural basis (Bakermans-Kranenburg et al., 2003, 2005). As well, they found that these interventions were more effective if they had fewer sessions, started after 6 months of age, and used video feedback. These findings have had strong implications in guiding research in this field and seem to have restricted the variability in these areas of studies that have come after. The present meta-analysis was not able to replicate these findings. There was not a significant relationship between sensitivity focused interventions, behavioural interventions, and age of the children with the effect of these interventions. However, this result should be interpreted with caution because the majority of the studies had a strong behavioural focus and at least a part of their intervention focused on the caregiver's sensitivity to their child's cues. Contradictory to Bakermans-Kranenburg et al.'s (2003, 2005) findings, a greater number of sessions was associated with a larger effect; however, when the total number of sessions was examined with other variables in multiple-meta-regression models, it was no longer significant. In addition, interventions that used video feedback were reliably associated with a smaller effect in a multiple-meta-regression model.

Reasons for these discrepancies may be that the present study was limited to randomized controlled trials and had more stringent inclusion criteria. In particular, in the present meta-analysis the interventions had to be based in attachment theory and explicitly talk about attachment in the manuscript. Also, the present meta-analysis included different measures than the previous meta-analyses. Moreover, there was little overlap between the studies used in the present meta-analysis and the meta-analyses done by Bakermans-Kranenburg et al. (2003, 2005). In their 2005 meta-analysis, out of the 10 studies they included, Egeland and Erickson (1993) and Van Den Boom (1994) were the only studies that were also used in the present meta-

analysis. There were only two studies in the 2005 meta-analysis that had overlapping samples with two of the studies included in the present meta-analysis (Heinicke et al., 2001; Juffer et al., 1997). Furthermore, the moderator analyses done in the previous meta-analyses were all categorical, whereas in the present meta-analysis, continuous moderator variables were analyzed continuously. It should also be noted that Bakermans-Kranenburg and colleagues' (2005) meta-analysis used both pre- versus post-intervention and intervention versus control group comparisons when calculating the effect sizes because not all studies included in their meta-analysis had a control group and not all studies that had a control group used random assignment. Randomized control trials control for changes due to maturation. Therefore, it is possible that using both pre- versus post-intervention and intervention versus control group data could have biased the previous meta-analyses' moderator analyses.

Bakermans-Kranenburg et al.'s (2003, 2005) meta-analyses have played a tremendous role in shaping research in attachment-based interventions. Out of the studies that came after Bakermans-Kranenburg et al.'s (2003, 2005) meta-analyses, almost all cite one or both of these previous meta-analyses as having shaped their research in some way (Bernard et al., 2012; Cassidy et al., 2011; Cheng et al., 2007; Cicchetti et al., 2006; Kalinauskiene et al., 2009; Moran et al., 2005; Moss et al., 2011; Spieker et al., 2012; Van Doesum et al., 2008; and Velderman et al., 2006). It was anticipated that these previous meta-analyses would help to improve the efficacy of these attachment-based interventions, but the reverse pattern was seen (Figure 2). The cumulative effect of these studies on children's attachment security and problems associated with insecure and disorganized attachment shifted from a medium to large effect to a small to medium effect over time. It should be remembered that the moderator analyses done in meta-analyses are associations and that the results of meta-analyses need to be validated by experimental

manipulations. Very few studies have tried to experimentally replicate the significant associations from these previous meta-analyses. One example is Cicchetti et al. (2006); they sought to test the finding from Bakermans-Kranenburg et al.'s (2003, 2005) meta-analyses that interventions that focused on the caregiver's behaviours were more effective. Cicchetti et al. (2006) compared Infant Parent Psychotherapy (IPP), which had a stronger focus on maternal representations and the mother-child attachment to a more Psychoeducational Parenting Intervention (PPI), which was more skills and behaviourally focused. The findings from Bakermans-Kranenburg et al. (2003, 2005) meta-analyses would predict that PPI would be more effective than IPP. However, the proportion of children with secure attachment classifications was very similar in the IPP and PPI groups. Moreover, both the IPP and PPI groups had significantly higher rates of children with a secure attachment classification than the community standard group. Clearly, future research needs to have a greater emphasis on experimentally validating the findings from moderator analyses in meta-analyses, since these findings are only associations.

A possible reason for the relationship between not using video feedback and effect size could be that caregivers may find video feedback to be an aversive experience. Measures of treatment acceptability were not present in any of the studies included in the meta-analysis. One study outside the area of attachment that compared in vivo self-monitoring to video feedback for social skills training in an adolescents with Aspergers syndrome found that the in vivo self-monitoring produced larger reductions in inappropriate behaviour and was rated as more preferred (State & Kern, 2012). It would be useful for future research to directly compare within the same study the effectiveness and acceptability of video feedback and in vivo feedback or using videos of other dyads.

The present meta-analysis has several practical implications. First, video feedback is commonly used by clinicians and in research studies in this area. Out of the interventions included in the meta-analysis, 10 out of 20 used video feedback (see Table 1). However, there does not appear to be any benefit to using this approach over other approaches and it may actually be less effective than other approaches. In addition, it appears that attachment-based preventative interventions may be more effective for at-risk groups, such as low income or young mothers. In other words, it appears that these preventative efforts likely have more of an impact at the level of selective prevention as opposed to universal prevention. As well, it seems that the duration of the intervention is not an important predictor of its effectiveness. That is, even in circumstances where there is limited funding available, a few sessions may be enough to make substantial changes. Finally, the effect these interventions are having is small to medium. This indicates that these interventions should continue to be refined and improved upon.

From this meta-analysis, it is apparent that there are a few areas still lacking research in this field. First, all but two of the studies had follow-up measures that were taken within a year of when the study was completed. At this time, most of the children would still be preschoolers, which is still very young. In one of the previous meta-analyses in this area, the effect size was larger for the change in maternal sensitivity than it was for the children's attachment security (Bakermans-Kranenburg et al., 2003). It is possible that it may take some time for the effects of these interventions on the children to emerge if the increased caregiver sensitivity is maintained as the child develops. Thus, it would be important for future research in this area to include long-term follow-ups. Furthermore, most of the interventions in the meta-analysis were home-visiting interventions and all of the interventions but one had a home visiting component. There is evidence that group-based programs are superior at fostering social support (O'Connor et al.,

2005). It would be beneficial to explore in future research if administering these interventions in a group format would have any added benefit. Finally, most of the studies included in the meta-analysis only included the mother in the intervention. The amount of time mothers and fathers spend caring for their children is converging. The number of fathers deciding to stay at home and care for their children instead of working full time outside the home is on the rise and the number of single fathers is increasing (Doucet, 2006). Despite the growing role that fathers have in their children's lives, they have been grossly neglected from many of these intervention studies. The father-child attachment relationship and father involvement have been positively linked to child pro-social behaviour (Li, Yin, Cai, & Sou, 2012). Moreover, there have also been qualitative differences found in how mothers and fathers tend to interact with their children. For instance, fathers tend to play more physically, follow their child's lead while playing, and help their child learn by challenging them to progress further in the activity or task they may be doing. Mothers tend to help their child learn through teaching and guiding them, converse empathically, and play in a more structured manner (John, Halliburton & Humphrey, 2013). Future research should explore how including both mothers and fathers in these interventions impacts the efficacy of these interventions and also look at the efficacy of these interventions for fathers who are the primary caregiver of their child.

In conclusion, prevention interventions based in attachment theory for children appear to be effective. However, there is still a need for further research to improve these interventions and to explore aspects of these interventions that lack research. It is crucial that the findings from the present moderator analyses are experimentally validated.

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Appendix A

Research Questions

Efficacy

1. Are prevention interventions based in attachment theory effective?
2. Are prevention intervention based in attachment theory effective 1 to 6 months post-intervention?
3. Are prevention interventions based in attachment theory effective 7 to 12 months post-intervention?

Bibliographic Characteristics

1. Does a study being peer reviewed versus not peer reviewed affect the effect size?
2. Does the publication year affect the effect size?
3. Does the continent the study was conducted in affect the effect size?

Methodological Characteristics

1. Does the type of comparison group (services versus no services) affect the effect size?
2. Does using a manual for the intervention affect the effect size?
3. Does using a self-report versus observational measure affect the effect size?
4. Does using a measure of attachment versus a proxy measure (externalizing behaviour problems, internalizing behaviour problems, and language development) affect the effect size?
5. Does having treatment fidelity check affect the effect size?

Sample Characteristics

1. Does the mean number of years of education of the caregivers affect the effect size?
2. Does the proportion of the sample that attended collage/university affect the effect size?
3. Does the rate of maternal psychopathology affect the effect size?
4. Does the percent of attrition affect the effect size?
5. Does the proportion of female children in the sample affect the effect size?
6. Does the proportion of female caregivers in the sample affect the effect size?
7. Does the mean age of the children at the start of the study affect the effect size?
8. Does the mean age of caregivers at the start of the study affect the effect size?
9. Does the proportion of the sample with a low family income affect the effect size?
10. Does the proportion of single parents affect the effect size?
11. Does the proportion of white participants affect the effect size?

Intervention Characteristics

1. Are prevention interventions that focus solely on caregiver sensitivity more effective?
2. Does the total number of sessions of the intervention affect the effect size?
3. Does the total number of hours of the intervention affect the effect size?
4. Does the total number of weeks of the intervention affect the effect size?
5. Does using video feedback affect the effect size?
6. Does using a behavioural focus affect the effect size?

Appendix B

Eligibility coding manual

Study title:**First Author:**

1. Is the study a randomized control trial? Yes/No
The participants must have been randomly assigned to the control or intervention group
2. Is there a quantitative comparison? Yes/No
The study must have at least a pre and post-measure of the intervention group and/or a measure of the intervention group and a control group post-intervention
3. Is the intervention a psychotherapeutic intervention? Yes/No
The intervention uses techniques based in psychology (e.g. talk therapy, behavioural observation, psychoeducation, etc.)
4. Is the intervention based in attachment theory? Yes/No
The focus of the intervention is on the socioemotional development of the child or the caregiver-child relationship. This also includes interventions that have the caregiver reprocess their relationship with their parent. Furthermore, the study must mention attachment either in the introduction or method when discussing the intervention that will be used.
5. Is the intervention a preventative intervention? Yes/No
The aim of the intervention is to stop any of the following before they can occur: insecure and disorganized attachment, externalizing behaviour problems, internalizing behaviour problems, delays in language development, or psychopathology. And the intervention targets either: the general population or an at risk group.
6. Is there a measure of attachment, externalizing behaviour problems, internalizing behaviour problems, language abilities, or psychopathology? Yes/No
Psychopathology measures can be continuous or dichotomous. That is they can measure on a continuum the symptoms or it can be whether or not the individuals meet the diagnostic criteria for a disorder.
7. At the start of the intervention were the children 12 years or younger? Yes/No
8. Is the study in English? Yes/No

Did you answer yes to all of questions 1 to 8? Yes/No

Appendix C

Coding Manual for Meta-Analysis of
Attachment Prevention InterventionsGeneral Coding Notes:

Record the Study ID number at the top of every page used to code a given study.

*In sections II – V, the data is broken down into insecure overall, avoidant, ambivalent, disorganized, and secure. If the study does not indicate which insecure style, use insecure overall. If it happens to report on **security** (as opposed to **insecurity**), please indicate this very clearly as effects will need to be reversed in the calculations.*

Please note the following definitions:

Anxious attachment: can mean either avoidant or ambivalent. Code as Insecure Overall.

Dismissive: Code as avoidant (usually used to describe adults)

Disoriented: Same as disorganized.

Fearful: Code as avoidant (usually used to describe adults)

Preoccupied: Code as ambivalent (usually used to describe adults)

Resistant: Same as ambivalent

***If the paper places the word “insecure” or “anxious” before or after another attachment style term, use that other term in coding. E.g., “anxious-ambivalent” should be coded as ambivalent.*

When both parent reports and teacher reports are available, always use parent reports over teacher reports. Only use teacher reports when necessary.

If more than one follow-up period, attach extra tables to code for these additional follow-ups

I. Study Level Descriptors

1. Bibliographic reference: _____

Write out the study reference in APA format. If two or more written reports were prepared on the same data, use the most comprehensive one.

2. Study ID number: _____

The Study ID number can be found in the “meta-analysis tracking file.”

3. Type of publication:

1. Journal article
2. Book chapter
3. Conference paper
4. Thesis or doctoral dissertation
5. Unpublished data
6. Other

Please circle the number corresponding to the type of publication of the most comprehensive report consulted for this study.

4a. Publication year: _____

4b. Indicate if only published online to date: Yes/No

5. Place study conducted in:

- a. US
- b. Canada
- c. Britain
- d. Europe: _____
- e. Australia
- f. Israel
- g. Other: _____

6. Is the study a randomized control trial? Yes/No

A randomized controlled trial is when the participants are randomly assigned to either the intervention or the control group after being assessed for eligibility.

7. What did the study measure:

- a) Attachment insecurity
- b) Disorganized attachment
- c) Externalizing behaviour problems
- d) Internalizing behaviour problems
- e) Language development
- f) Psychopathology
- g) Emotional regulation

8. Measures used (list):

Indicate the name of the measure(s) and if the measure(s) was/were self-report or observational

9. Were there one or more follow-up data collections? Yes/No

If yes, how many months after the intervention ended was/were the follow-up(s) done (list)?

10. Does the intervention use a manual (circle): Yes/No

11. Is there a measure of treatment fidelity: Yes/No

12. Gender of children

	n male	n female	% male	% female
Total Sample				
Intervention group				
Comparison group:				
Other Comparison group: _____				

Indicate whether the sample was restricted to males, females, or if both genders were included. If both genders were included, indicate the percentage of the sample who were female and male.

13. Parent gender

	n male (fathers)	n female (mothers)	% male	% female
Total Sample				
Intervention group				
Comparison group: _____				
Other Comparison group: _____				

Indicate whether the sample was restricted to mothers, fathers, or if both mothers and fathers were included. If both mothers and fathers were included indicate the percentage of the parents who were mothers and fathers. For the purposes of this question, “mother” refers to any custodial female caregiver, while “father” refers to any custodial male caregiver.

14. Children’s age at start of study

	Mean	SD	Range	n
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Total Sample				
Intervention group				
Comparison group: _____				
Other Comparison group: _____				

Indicate the mean age of the sample and any subsamples as appropriate. Also indicate the standard deviation (SD) and sample size (n) where this information is available. Note that most studies will not provide information in all the categories. Record as much information as is available. At times you may need to calculate the mean age from other available data. If no age information is provided please write "Doesn't specify" beside children's age.

15. Parent age at start of study

	Mean	SD	Range	n
Total Sample				
Intervention group				
Comparison group: _____				
Other Comparison group: _____				

16. Rates of maternal psychopathology

	n with	n without	% with	% without
Total Sample				
Intervention group				
Comparison group: _____				
Other Comparison group: _____				

17. Rates of paternal psychopathology

	n with	n without	% with	% without
Total Sample				
Intervention group				
Comparison group: _____				
Other Comparison group: _____				

18. Rates of parental psychopathology overall

	n with	n without	% with	% without
Total Sample				
Intervention group				
Comparison group: _____				
Other Comparison group: _____				

19. Attrition – Caregiver-infant dyads

	n	%
Total Sample		
Intervention group		
Comparison group: _____		
Other Comparison group: _____		

20. Number of years of education of caregivers:

Continuous

The count should start from high school (grade 9), if the mean or range is below grade 9 code 0

	Mean	SD	Range	n
Total Sample				
Intervention group				
Comparison group: _____				
Other Comparison group: _____				

Categorical

Fill in categories and n for each category

For example

	Did not complete high school	High School diploma	College/ Trades diploma	Undergraduate University Degree	Graduate/ Professional Degree
Intervention	5	15	14	4	
Comparison	5	14	16	3	
Other Comparison					

Intervention					
Comparison					
Other Comparison					

21. Annual income of caregivers:

This only needs to be coded for studies from the past ten years (2003 and on)

Type of currency: _____

Continuous

	Mean	SD	Range	n
Total Sample				
Intervention group				
Comparison group: _____				
Other Comparison group: _____				

Categorical

Fill in categories used

Intervention					
Comparison					
Other Comparison					

Sample Risk Factors

To answer yes to any of the following risk factor questions the majority or all of the sample must possess the characteristic. Below each question that is answered yes, indicate whether it is the whole sample or the majority

22. Were the children in the study born prematurely? Yes/No

If the question was answered yes, how does the study define prematurity?

23. Did the children in the study have a low birth weight? Yes/No

If the question was answered yes, how does the study define low birth weights?

24. Are the children in the study in foster care? Yes/No

25. Have the children in the study been adopted? Yes/No

26. Have the children in the study been abused or neglected? Yes/No

27. Are the caregivers in the study “insensitive”? Yes/No

“Insensitive” means that the caregivers have a low sensitivity score or a high insensitivity score and the caregivers were selected for the study based on their scores

28. Is the sample low income? Yes/No

If the question was answered yes, how does the study define low income?

29. Are the caregivers in the sample single parents? Yes/No

30. Has the children’s caregiver that is participating in the study been incarcerated at any time since their birth? Yes/No

31. Is the sample composed of ethnic minorities? Yes/No

If the question was answered yes, please indicate which ethnic minorities and the percent of the sample of each minority.

32. Did the mothers of the children in the sample give birth to them when they were adolescents (19 years and younger)? Yes/No

45. Do the caregivers in the sample suffer from substance abuse? Yes/No

46. Do the caregivers in the sample suffer from anxiety? Yes/No

47. Do the caregivers in the sample suffer from depression? Yes/No

48. Do the caregivers in the sample suffer from other mental health issues? Yes/No
If yes, please list:

49. Are there any other risk factors the sample possesses (list)?

Intervention Characteristics

38. Total number of sessions: _____

The number of sessions the intervention consisted of

39. Total number of hours: _____

Total number of sessions X length of one session (in hours)

40. Total number of weeks: _____

The number of weeks the intervention lasted

Number of months X 4.35 = total number of weeks

41. Who delivered the intervention?

- a) Professional
- b) Lay person
- c) Not delivered in person

Professionals include: social workers, nurses, psychologists, psychiatrists, and early childhood educators

42. Where did the intervention take place?

- a) Participants' homes
- b) Clinic
- c) School
- d) Other: _____

43. Was video feedback used? Yes/No

44. What was the focus of the intervention?

- a) Sensitivity
- b) Sensitivity and other
- c) Other
- d) Insufficient information

Sensitivity: the focus of the intervention was on teaching parents sensitivity and responsiveness to their child's cues and signals (typically use video feedback).

Sensitivity and other: the intervention has a component that focuses on sensitivity, but may also include other components such as talk therapy for the caregiver, social supports, early childhood education, etc.

Other: may focus on the parents' attachment representations (focus on the internal working model of the parent, re-experiencing the past)

Insufficient information: the study does not provide adequate information to determine the focus of the intervention

How confident are you in your rating?

1	2	3	4	5	6	7
Not						Very
Confident						Confident

45. Was the intervention behaviourally based? Yes/No

Did the intervention focus directly on the caregivers' behaviours

46. Did the control group receive services or nothing?

Services that the control group may receive include help accessing other resources, a non attachment-based therapy, or check-ins in person or on the phone

II. Group Comparison Studies, Continuous DV

1. Total N (both/all groups): _____

2. Type of data effect size based on:

- i. Means and SD
- ii. Effect size
- iii. *t*-test
- iv. One-way ANOVA

Indicate what type of data the effect size will be based on. They are ordered here in order of preference, with means and standard deviations being the most preferred format. Only choose one.

Effect size – what comparison was made (e.g., pre- and post-comparison of intervention group, pre- and post-comparison of the intervention and control groups, etc.)?

***d* = _____ Confidence Interval: _____**

Follow-up *d* = _____ Confidence Interval: _____

What was the follow-up time period (e.g. 3 months post-intervention)?

Avoidant Pre-intervention:

Comparison	Mean	SD	n	t	F	df	p
Intervention							
Comparison							
Other Comparison							

*If means, standard deviations (SD) and sample size (n) are available, the other columns (t, F, df, p) do not need to be filled-in. Please note, for ANOVAs, **only oneway ANOVAs** are eligible for effect size calculation. Also, for both t-tests and ANOVAs, record the most specific p value you can locate. If a specific p value is not indicated you may record the alpha level (e.g., $p < .05$) or n.s. for nonsignificant, if appropriate.*

Avoidant Post-intervention:

Comparison	Mean	SD	n	t	F	df	p
Intervention							
Comparison							
Other Comparison							

Avoidant Follow-Up:

If more than one follow-up done, attach extra pages and fill in one of these tables for each follow-up. Please indicate the time of follow-up (e.g., 3 months, 6 months, etc.) above each table

Comparison	Mean	SD	n	t	F	df	p
Intervention							
Comparison							
Other Comparison							

Ambivalent Pre-Intervention:

Comparison	Mean	SD	n	t	F	df	p
Intervention							
Comparison							
Other Comparison							

Ambivalent Post-Intervention:

Comparison	Mean	SD	n	t	F	df	p
Intervention							

Comparison							
Other Comparison							

Ambivalent Follow-Up:

If more than one follow-up done, attach extra pages and fill in one of these tables for each follow-up. Please indicate the time of follow-up (e.g., 3 months, 6 months, etc.) above each table

Comparison	Mean	SD	n	t	F	df	p
Intervention							
Comparison							
Other Comparison							

Insecure overall Pre-Intervention (if study doesn't break up into avoidant and ambivalent):

Comparison	Mean	SD	n	t	F	df	p
Intervention							
Comparison							
Other Comparison							

Insecure overall Post-Intervention:

Comparison	Mean	SD	n	t	F	df	p
Intervention							
Comparison							
Other Comparison							

Insecure overall Follow-Up:

If more than one follow-up done, attach extra pages and fill in one of these tables for each follow-up. Please indicate the time of follow-up (e.g., 3 months, 6 months, etc.) above each table

Comparison	Mean	SD	n	t	F	df	p
Intervention							
Comparison							
Other Comparison							

Disorganized Pre-Intervention:

Comparison	Mean	SD	n	t	F	df	p
Intervention							

Comparison							
Other Comparison							

Disorganized Post-Intervention:

Comparison	Mean	SD	n	t	F	df	p
Intervention							
Comparison							
Other Comparison							

Disorganized Follow-Up:

If more than one follow-up done, attach extra pages and fill in one of these tables for each follow-up. Please indicate the time of follow-up (e.g., 3 months, 6 months, etc.) above each table

Comparison	Mean	SD	n	t	F	df	p
Intervention							
Comparison							
Other Comparison							

Other Measure (please specify):

If there are more than one “other” measures used, attach extra sheets to code this information

Pre-Intervention:

Comparison	Mean	SD	n	t	F	df	p
Intervention							
Comparison							
Other Comparison							

Post-Intervention:

Comparison	Mean	SD	n	t	F	df	p
Intervention							
Comparison							

Other Comparison							
------------------	--	--	--	--	--	--	--

Follow-Up:

If more than one follow-up done, attach extra pages and fill in one of these tables for each follow-up. Please indicate the time of follow-up (e.g., 3 months, 6 months, etc.) above each table

Comparison	Mean	SD	n	t	F	df	p
Intervention							
Comparison							
Other Comparison							

IV. Chi-square studies/Group Comparison Studies, Categorical DV

Effect size – what comparison was made (e.g., pre- and post-comparison of intervention group, pre- and post-comparison of the intervention and control groups, etc.)?

$d =$ _____ Confidence Interval: _____

Follow-up $d =$ _____ Confidence Interval: _____

What was the follow-up time period (e.g. 3 months post-intervention)?

Place the appropriate n in each box

Attachment**Pre-Intervention**

	Insecure overall	Avoidant	Ambivalent	Disorganized	Secure
Intervention					
Comparison					
Other Comparison					

Post-Intervention

	Insecure overall	Avoidant	Ambivalent	Disorganized	Secure
Intervention					
Comparison					
Other Comparison					

Follow-Up

If more than one follow-up done, attach extra pages and fill in one of these tables for each follow-up. Please indicate the time of follow-up (e.g., 3 months, 6 months, etc.) above each table

	Insecure overall	Avoidant	Ambivalent	Disorganized	Secure
Intervention					
Comparison					
Other Comparison					

Other Measure (please specify):

If there are more than one “other” measures used, attach extra sheets to code this information

Pre-Intervention

Intervention					
Comparison					
Other Comparison					

Post-Intervention

Intervention					
Comparison					
Other Comparison					

Follow-Up

If more than one follow-up done, attach extra pages and fill in one of these tables for each follow-up. Please indicate the time of follow-up (e.g., 3 months, 6 months, etc.) above each table

Intervention					
Comparison					
Other Comparison					

V. Categorical DV, prevalence

Place the appropriate % in each box

Pre-Intervention

	Insecure overall	Avoidant	Ambivalent	Disorganized	Secure
Intervention					
Comparison					
Other Comparison					

Post-Intervention

	Insecure overall	Avoidant	Ambivalent	Disorganized	Secure
Intervention					
Comparison					
Other Comparison					

Follow-Up

If more than one follow-up done, attach extra pages and fill in one of these tables for each follow-up. Please indicate the time of follow-up (e.g., 3 months, 6 months, etc.) above each table

	Insecure overall	Avoidant	Ambivalent	Disorganized	Secure
Intervention					
Comparison					
Other Comparison					

Other Measure (please specify):

Fill in the categories used in the study on the tables

If there are more than one “other” measures used, attach extra sheets to code this information and label the tables

Pre-Intervention

Intervention					
Comparison					
Other					

Comparison					
------------	--	--	--	--	--

Post-Intervention

Intervention					
Comparison					
Other Comparison					

Follow-Up

If more than one follow-up done, attach extra pages and fill in one of these tables for each follow-up. Please indicate the time of follow-up (e.g., 3 months, 6 months, etc.) above each table

Intervention					
Comparison					
Other Comparison					

Table 1

Characteristics of Studies Included in the Meta-Analysis

Study	Child Age at Start of Study	Measure(s)	Intervention
Ammaniti et al. (2006)	Prenatal	Scales of Mother-Infant interactional systems	Home visiting intervention that aimed at enhancing maternal sensitivity to her child's cues, increasing maternal-child interaction, and to support marital interaction.
Bernard et al. (2012)	10	Strange Situation	Home visiting intervention that used video feedback to enhance parental sensitivity and responsiveness. Also focused on helping parents to override issues from their past that may hinder their ability to respond sensitively to their child.
Brisch et al. (2003)	Birth	Strange Situation	Intervention consisted of a parent group, parent psychotherapy, sensitivity training, and a home visit. Intervention focused on enhancing parental sensitivity, parental coping, and helping parents to be able to reflect on their past attachment relationships.
Cassidy et al. (2011)	7	Strange Situation	Home visiting intervention that used video feedback to enhance maternal sensitivity and responsiveness. Also focused on helping mothers become aware of psychological processes that may affect their ability to respond sensitively.
Cheng et al. (2007)	5	Child Behavior Checklist	Home visiting intervention that focused on enhancing maternal sensitivity and feelings of competence.
Cicchetti et al. (2000)	20	WPPSI-R	The intervention focused on how maternal representations affect their interactions and feelings towards their child. The intervention aimed at helping mothers to form or maintain positive attachment representations of their child and to foster maternal sensitivity and responsiveness.
Cicchetti et al. (2006) & Stronach (2012)	13	Strange Situation	Home visiting intervention that focused on how mothers' representations affect their interactions and feelings towards their child. The intervention aimed at helping mothers to form or maintain positive attachment representations of their child and to foster maternal sensitivity and responsiveness.
Egeland & Erickson (1993)	Prenatal	Strange Situation	Intervention included a home visiting and group component, which focused on promoting maternal sensitivity. Intervention also targeted factors that may interfere with mothers' ability to respond sensitively, such as a lack of social support, their past attachment experiences, and lack of empowerment.
Fisher & Kim (2007)	53	Parent Attachment Diary	Intervention included parent training, consultation from clinician, parent support group meetings, and child playgroups. Focus of intervention was on enhancing parental responsiveness and helping the parent create a consistent environment.
Franz et al.	54	Strengths and	Group-based intervention that focused on reducing

(2011)		Difficulties Questionnaire	maternal depression and increasing maternal sensitivity and responsiveness to child's emotions. Intervention also focused on mother's perceptions and helped to teach mothers to manage stress and conflict.
Heinicke et al. (2001)	Prenatal	Child Expectation of Being Cared For scale Child Response to Separation scale	Intervention included home visiting and an infant-mother group. Focus of intervention was to use the therapeutic relationship as a way for the mother to experience a stable trusting relationship and to improve maternal sensitivity and responsiveness.
Juffer et al. (1997)	6	Strange Situation	Home visiting, video feedback intervention that aimed at enhancing maternal sensitivity and responsiveness.
Kalinauskiene et al. (2009)	6	Attachment Q-Sort	Home visiting, video feedback intervention that aimed at enhancing maternal sensitivity and responsiveness.
Krupka (1996)	6	Attachment Q-Sort Strange Situation	Home visiting intervention that aimed at building a strong therapeutic relationship and used video feedback to promote maternal sensitivity.
Moran et al. (2005)	6	Strange Situation	Home visiting intervention that aimed at building a strong therapeutic relationship and used video feedback to promote maternal sensitivity.
Moss et al. (2011)	40	Child Behavior Checklist	Home visiting, video feedback intervention that aimed at enhancing parental sensitivity.
Spieker et al. (2012)	18	Child Behavior Checklist Bayley-III Screening Test	Home visiting, video feedback intervention that aimed at enhancing maternal sensitivity and responsiveness.
Van Den Boom (1994 & 1995)	6	Strange Situation	Home visiting intervention that focused on enhancing maternal sensitivity and responsiveness.
Van Doesum et al. (2010)	5	Infant Toddler Social and Emotional Assessment	Home visiting intervention that primarily used video feedback to enhance maternal sensitivity.
Velderman et al. (2006)	7	Child Behavior Checklist	Home visiting, video feedback intervention that aimed at enhancing maternal sensitivity and responsiveness.

Note. Child age is given in months. WPPSI-R = Wechsler Preschool and Primary Scale of Intelligence-Revised.

Table 2
All Studies Included in the Meta-Analysis

Study	Outcome Variable	<i>N</i>	<i>d</i>	95% CI	<i>p</i> -value
Bernard et al. (2012)	Secure Attachment	120	0.42	[0.01, 0.83]	.043
Brisch et al. (2003)	Secure Attachment	68	-0.48	[-1.06, 0.10]	.105
Cassidy et al. (2011)	Secure Attachment	169	0.22	[-0.11, 0.56]	.192
Cicchetti et al. (2006) & Stronach (2012)	Secure Attachment	104 ^a	1.14	[0.33, 1.95]	.005
Egeland & Erickson (1993)	Secure Attachment	97	0.06	[-0.38, 0.50]	.781
Fisher & Kim (2007)	Secure Attachment	113	0.15	[-0.26, 0.56]	.472
Heinicke et al. (2001)	Secure Attachment	64	1.64	[1.07, 2.21]	<.001
Juffer et al. (1997)	Secure Attachment	60	0.74	[-0.04, 1.53]	.064
Kalinauskiene et al. (2009)	Secure Attachment	54	0.00	[-0.53, 0.53]	1
Krupka (1996)	Secure Attachment	45	0.82	[0.17, 1.47]	.014
Moran et al. (2005)	Secure Attachment	99	0.43	[-0.01, 0.87]	.058
Moss et al. (2011)	Secure Attachment	67	0.88	[0.30, 1.45]	.003
Van Den Boom (1994 & 1995)	Secure Attachment	100	1.00	[0.51, 1.49]	<.001
Ammaniti et al. (2006)	Emotional Regulation	82	0.04	[-0.39, 0.48]	.852
Spieker et al. (2012)	Emotional Regulation Behaviour Problems	128	-0.02	[-0.36, 0.33]	.932
Van Doesum et al. (2010)	Emotional Regulation Behaviour Problems	71	-0.10	[-0.57, 0.36]	.661
Cheng et al. (2007)	Behaviour Problems	85	0.20	[-0.23, 0.63]	.356
Franz et al. (2011)	Behaviour Problems	37	0.57	[-0.11, 1.25]	.100
Velderman et al. (2006)	Behaviour Problems	77 ^b	-0.03	[-0.58, 0.52]	.910
Cicchetti et al. (2000)	Verbal IQ	97	0.50	[0.08, 0.90]	.005

Note. If studies had more than one time point where measures were taken and more than one measure, *N* is given for the largest number of participants and the first time point. The effect sizes in the table are aggregated for studies with more than one time point or measure. ^a*N* consists of an intervention group and two comparison groups, effect sizes were aggregated for these comparisons. ^b*N* consist of two intervention groups and a comparison group, effect sizes were aggregated for these comparisons.

Table 3

Main Effects

Effect	No. Studies	<i>d</i>	<i>p</i> -value ^a	95% CI	<i>Q_T</i>	<i>p</i> -value ^b
All	20	0.37	<.001	[0.18, 0.57]	61.94	<.001
1 to 6 Months Post-Intervention	16	0.48	<.001	[0.26, 0.70]	49.63	<.001
7 to 12 Months Post-Intervention	5	0.40	.265	[-0.30, 1.00]	20.52	<.001

Note. Q_T is the test for heterogeneity, it is the ratio of variation between studies to the variation within studies. Studies included in the 1 to 6 months analysis were: Ammaniti et al. (2006), Bernard et al. (2012), Cassidy et al. (2011), Cicchetti et al. (2000), Cicchetti et al. (2006), Fisher & Kim (2007), Franz et al. (2011), Heinicke et al. (2001), Juffer et al. (1997), Kalinauskiene et al. (2009), Krupka (1996), Moss et al. (2011), Moran et al. (2005), Spieker et al. (2012), Van Den Boom (1994), and Van Doesum et al. (2010). Studies included in the 7 to 12 months analysis were: Brisch et al. (2003), Egeland & Erickson (1993), Stronach (2012), and Van Den Boom (1995). ^a*p*-value for the effect size (*d*). ^b*p*-value for the test of heterogeneity (Q_T)

Table 4

Moderator Analyses

Moderator	No. Studies	Q	p -value	R^2
Peer Reviewed	20	0.00	.954	0.00%
Year	20	2.05	.152	6.13%
Continent	20	2.25	.324	0.00%
Comparison Group	19	0.01	.918	0.00%
Observational Measure	19	2.31	.128	6.18%
Attachment Measure	20	2.94	.086	8.63%
Treatment Manualized	20	0.37	.544	0.00%
Treatment Fidelity Check	20	0.07	.790	0.00%
% Female Children	16	0.09	.764	0.00%
Children Mean Age	20	0.12	.726	0.00%
% Female Caregivers	18	0.87	.350	0.05%
Younger Caregiver Mean Age	17	3.78	.052	16.19%
% Maternal Psychopathology	6	1.19	.275	0.00%
% Attrition	19	0.40	.529	0.00%
Mean Years Caregiver Education	5	1.09	.296	3.44%
% Caregivers who attended College/University	4	1.06	.303	0.00%
% Single Parents	12	5.99	.014	37.17%
% Low income	10	0.00	.974	0.00%
% Caucasian	10	0.60	.440	0.00%
Intervention – total number of sessions	16	7.56	.006	38.44%
Intervention – total number of hours	10	0.00	.958	0.00%
Intervention – total number of weeks	14	1.95	.163	4.48%
No Video Feedback	20	3.07	.079	9.26%
Sensitivity Focus	19	0.25	.627	0.00%
Behavioural Focus	20	0.69	.405	0.00%

Note. Q is the statistic used to test the significance of the meta-regression. R^2 is the proportion of variance explained by the moderator.

Table 5

Studies Included in the Moderator Analyses

Moderator	Studies Included in Moderator Analysis
Comparison Group	Ammaniti et al. (2006), Bernard et al. (2012), Brisch et al. (2003), Cassidy et al. (2011), Cheng et al. (2011), Cicchetti et al. (2000), Cicchetti et al. (2006) & Stronach (2012), Fisher & Kim (2007), Franz et al. (2011), Heinicke et al. (2001), Juffer et al. (1997), Kalinaukiene et al. (2009), Krupka (1996), Moran et al. (2011), Moss et al. (2011), Spieker et al. (2012), Van Den Boom (1994 & 1995), Van Doesum et al. (2008), Verlderman et al. (2006)
Observational Measure	Ammaniti et al. (2006), Bernard et al. (2012), Brisch et al. (2003), Cassidy et al. (2011), Cheng et al. (2011), Cicchetti et al. (2000), Cicchetti et al. (2006) & Stronach (2012), Egeland & Erickson (1993), Fisher & Kim (2007), Franz et al. (2011), Heinicke et al. (2001), Juffer et al. (1997), Kalinaukiene et al. (2009), Krupka (1996), Moran et al. (2011), Moss et al. (2011), Van Den Boom (1994 & 1995), Van Doesum et al. (2008), Verlderman et al. (2006)
% Female Children	Ammaniti et al. (2006), Bernard et al. (2012), Brisch et al. (2003), Cassidy et al. (2011), Cheng et al. (2011), Cicchetti et al. (2000), Cicchetti et al. (2006) & Stronach (2012), Fisher & Kim (2007), Juffer et al. (1997), Kalinaukiene et al. (2009), Krupka (1996), Moran et al. (2011), Moss et al. (2011), Spieker et al. (2012), Van Den Boom (1994 & 1995), Van Doesum et al. (2008)
% Female Caregivers	Ammaniti et al. (2006), Bernard et al. (2012), Brisch et al. (2003), Cassidy et al. (2011), Cheng et al. (2011), Cicchetti et al. (2000), Cicchetti et al. (2006) & Stronach (2012), Egeland & Erickson (1993), Franz et al. (2011), Heinicke et al. (2001), Juffer et al. (1997), Kalinaukiene et al. (2009), Krupka (1996), Moran et al. (2011), Moss et al. (2011), Van Den Boom (1994 & 1995), Van Doesum et al. (2008), Verlderman et al. (2006)
Younger Caregiver Mean Age	Ammaniti et al. (2006), Bernard et al. (2012), Brisch et al. (2003), Cassidy et al. (2011), Cheng et al. (2011), Cicchetti et al. (2000), Cicchetti et al. (2006) & Stronach (2012), Franz et al. (2011), Heinicke et al. (2001), Juffer et al. (1997), Kalinaukiene et al. (2009), Krupka (1996), Moss et al. (2011), Spieker et al. (2012), Van Den Boom (1994 & 1995), Van Doesum et al. (2008), Verlderman et al. (2006)
% Maternal Psychopathology	Ammaniti et al. (2006), Cheng et al. (2011), Cicchetti et al. (2000), Franz et al. (2011), Heinicke et al. (2001), Van Doesum et al. (2008)

% Attrition	Ammaniti et al. (2006), Bernard et al. (2012), Brisch et al. (2003), Cassidy et al. (2011), Cheng et al. (2011), Cicchetti et al. (2006) & Stronach (2012), Fisher & Kim (2007), Franz et al. (2011), Heinicke et al. (2001), Juffer et al. (1997), Kalinaukiene et al. (2009), Krupka (1996), Moran et al. (2011), Moss et al. (2011), Spieker et al. (2012), Cicchetti et al. (2000), Van Den Boom (1994 & 1995), Van Doesum et al. (2008), Verlderman et al. (2006)
Mean Years Caregiver Education	Heinicke et al. (2001), Kalinaukiene et al. (2009), Krupka (1996), Moss et al. (2012), Spieker et al. (2012)
% Caregivers who attended College/University	Cicchetti et al. (2000), Franz et al. (2011), Juffer et al. (1997), Kalinaukiene et al. (2009)
% Single Parents	Cassidy et al. (2011), Cheng et al. (2011), Cicchetti et al. (2000), Cicchetti et al. (2006) & Stronach (2012), Franz et al. (2011), Heinicke et al. (2001), Kalinaukiene et al. (2009), Krupka (1996), Moran et al. (2011), Moss et al. (2011), Van Den Boom (1994 & 1995), Van Doesum et al. (2008)
% Low income	Cassidy et al. (2011), Cicchetti et al. (2006) & Stronach (2012), Franz et al. (2011), Heinicke et al. (2001), Krupka (1996), Moran et al. (2011), Moss et al. (2011), Spieker et al. (2012), Van Den Boom (1994 & 1995), Van Doesum et al. (2008)
% Caucasian	Bernard et al. (2012), Cassidy et al. (2011), Cicchetti et al. (2000), Cicchetti et al. (2006) & Stronach (2012), Fisher & Kim (2007), Heinicke et al. (2001), Moran et al. (2011), Spieker et al. (2012), Van Den Boom (1994 & 1995), Van Doesum et al. (2008)
Intervention – total number of sessions	Bernard et al. (2012), Cassidy et al. (2011), Cheng et al. (2011), Cicchetti et al. (2000), Cicchetti et al. (2006) & Stronach (2012), Franz et al. (2011), Heinicke et al. (2001), Juffer et al. (1997), Kalinaukiene et al. (2009), Krupka (1996), Moran et al. (2011), Moss et al. (2011), Spieker et al. (2012), Van Den Boom (1994 & 1995), Van Doesum et al. (2008), Verlderman et al. (2006)
Intervention – total number of hours	Cassidy et al. (2011), Cheng et al. (2011), Franz et al. (2011), Kalinaukiene et al. (2009), Krupka (1996), Moran et al. (2011), Moss et al. (2011), Spieker et al. (2012), Van Den Boom (1994 & 1995), Van Doesum et al. (2008)
Intervention – total number of weeks	Ammaniti et al. (2006), Cheng et al. (2011), Cicchetti et al. (2000), Cicchetti et al. (2006) & Stronach (2012), Egeland & Erickson (1993), Fisher & Kim (2007), Franz et al. (2011), Heinicke et al. (2001), Krupka (1996), Moss et al. (2011), Spieker et al. (2012), Van Den Boom (1994 & 1995), Van Doesum et al. (2008), Verlderman et al. (2006)

Sensitivity	Ammaniti et al. (2006), Bernard et al. (2012), Brisch et al. (2003), Cassidy et al. (2011), Cheng et al. (2011), Cicchetti et al. (2000), Cicchetti et al. (2006) & Stronach (2012), Egeland & Erickson (1993), Fisher & Kim (2007), Franz et al. (2011), Heinicke et al. (2001), Juffer et al. (1997), Kalinaukiene et al. (2009), Krupka (1996), Moran et al. (2011), Moss et al. (2011), Spieker et al. (2012), Van Den Boom (1994 & 1995), Van Doesum et al. (2008)
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Note. Table only displays moderator variables that did not have data from all of the studies (i.e., those that had a $k < 20$).

Table 6

Correlation Matrix for the Second Meta-Regression Model

	Caregiver Mean Age	% Single Parents	Total # of Sessions	Video Feedback
Caregiver Mean Age	-			
% Single Parents	.124	-		
Total # of Sessions	.068	-.533	-	
Video Feedback	.440	-.134	.498	-

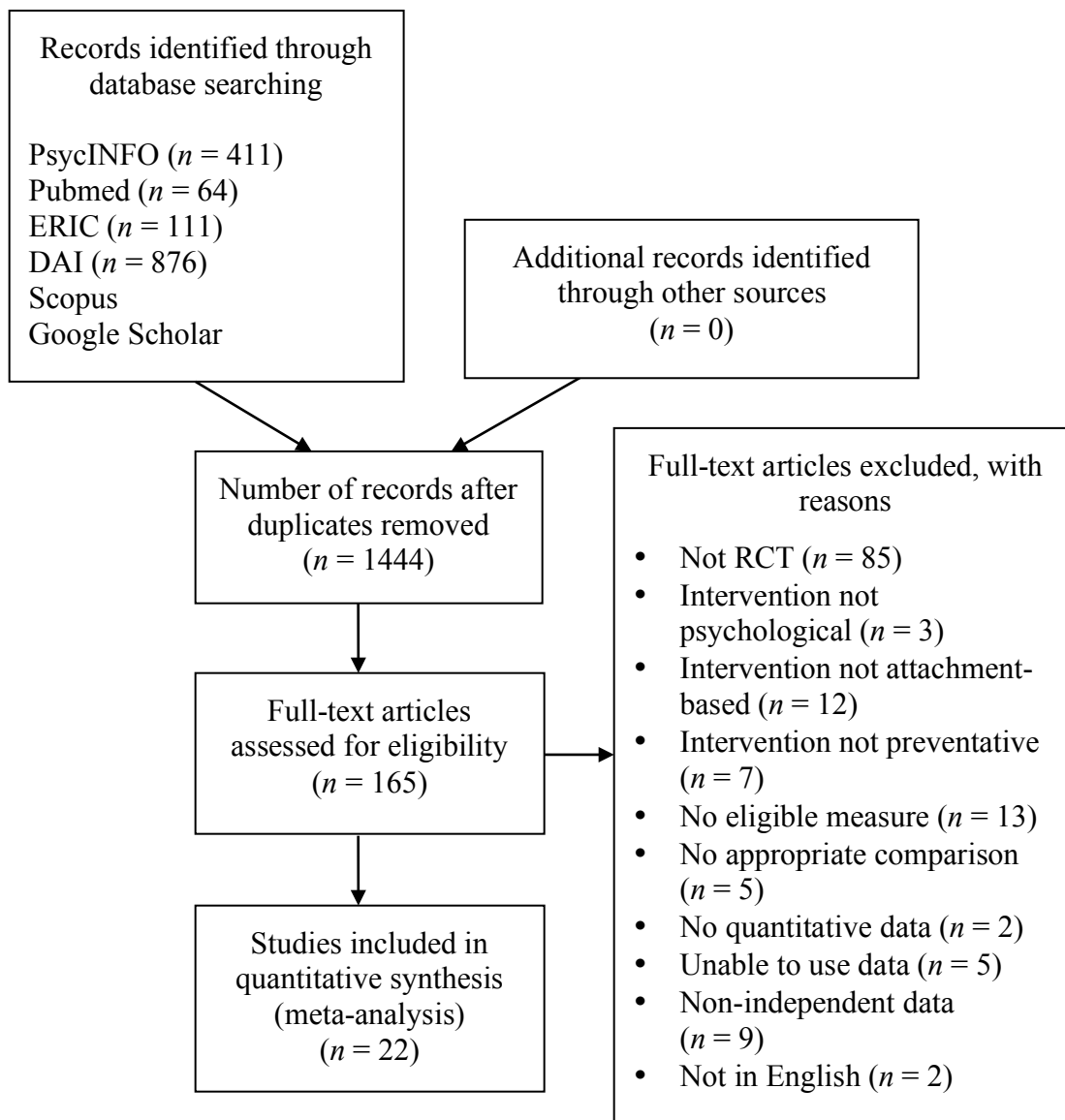


Figure 1. PRISMA flow diagram of information through the different stages of the meta-analysis (PRISMA; Moher, Liberati, Tetzlaff, & Altman, 2009). RCT = randomized control trial.

^aRecords retrieved from that database were screened until 200 in a row were not relevant.

^bArticles from Scopus and Google Scholar are not included in this count.

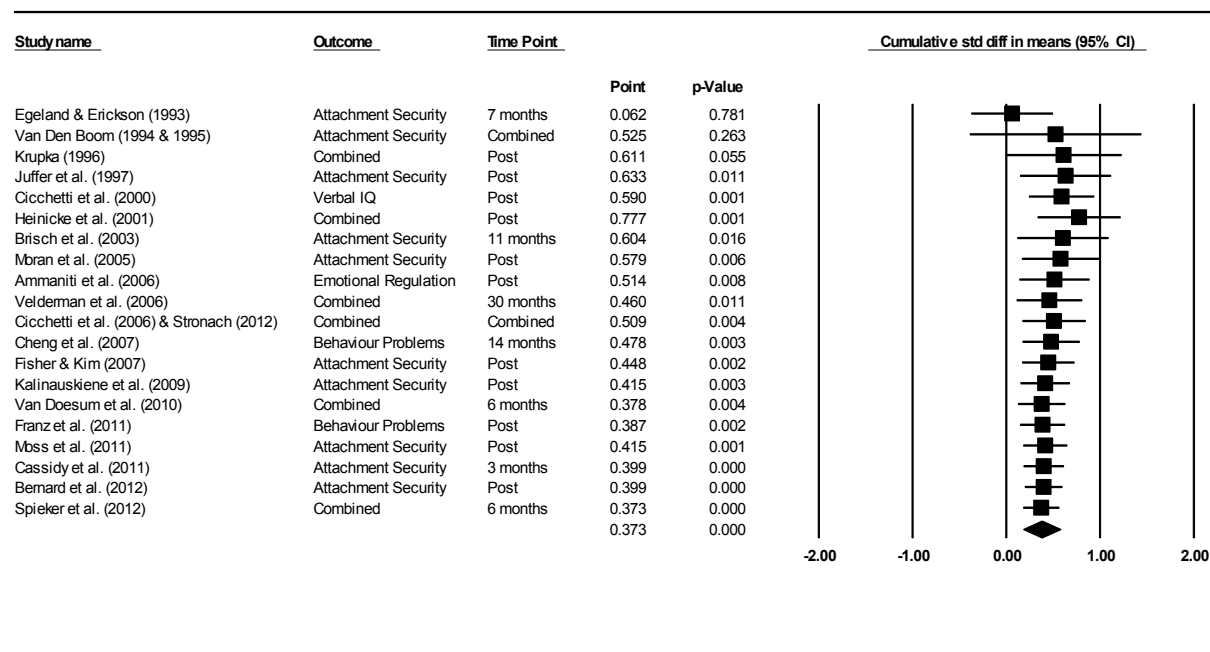


Figure 2. Cumulative forest plot from oldest to most recent publication date.

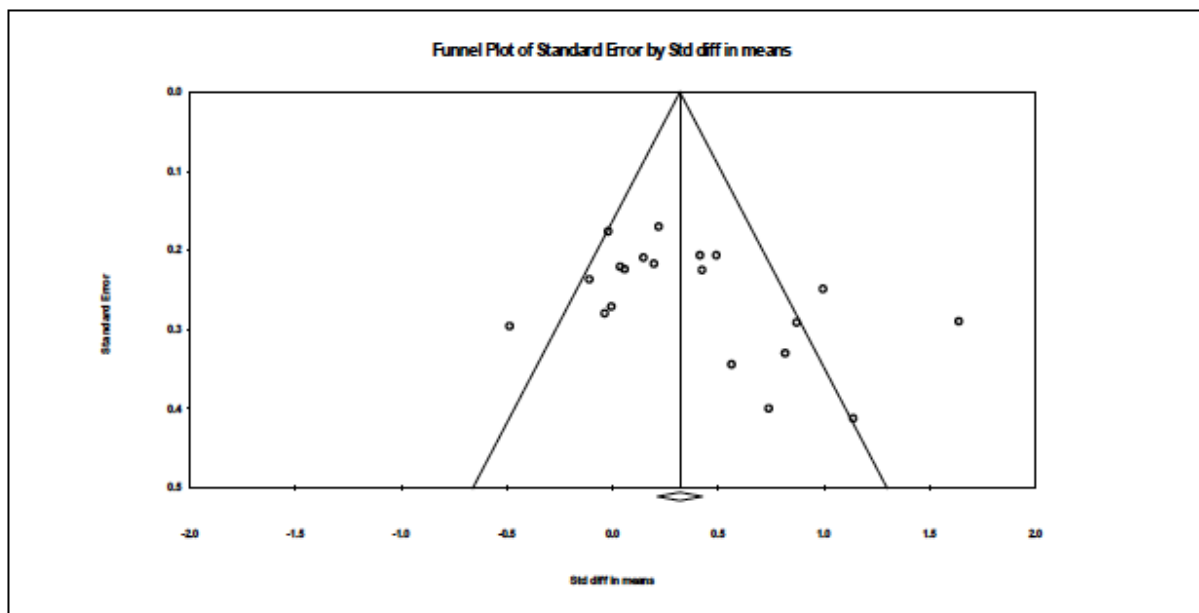


Figure 3. Funnel plot of studies included in the meta-analysis.

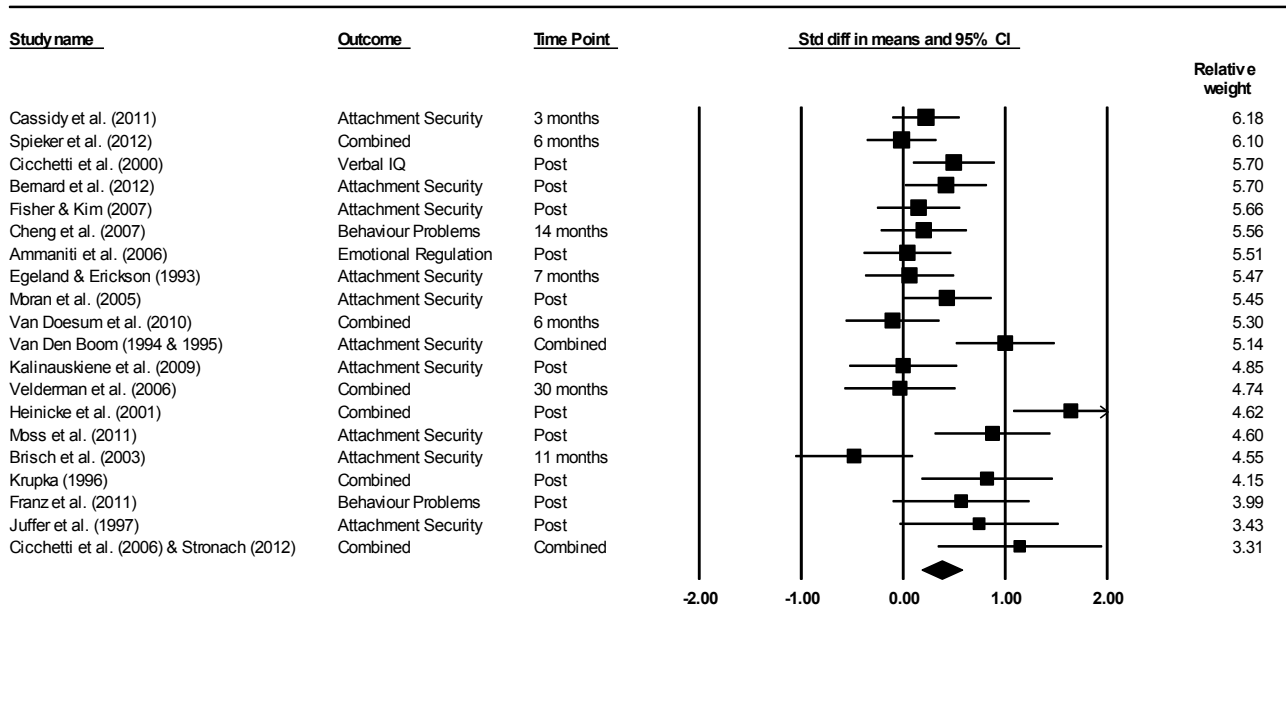


Figure 4. Forest plot of studies included in the meta-analysis ordered from largest to smallest weight.

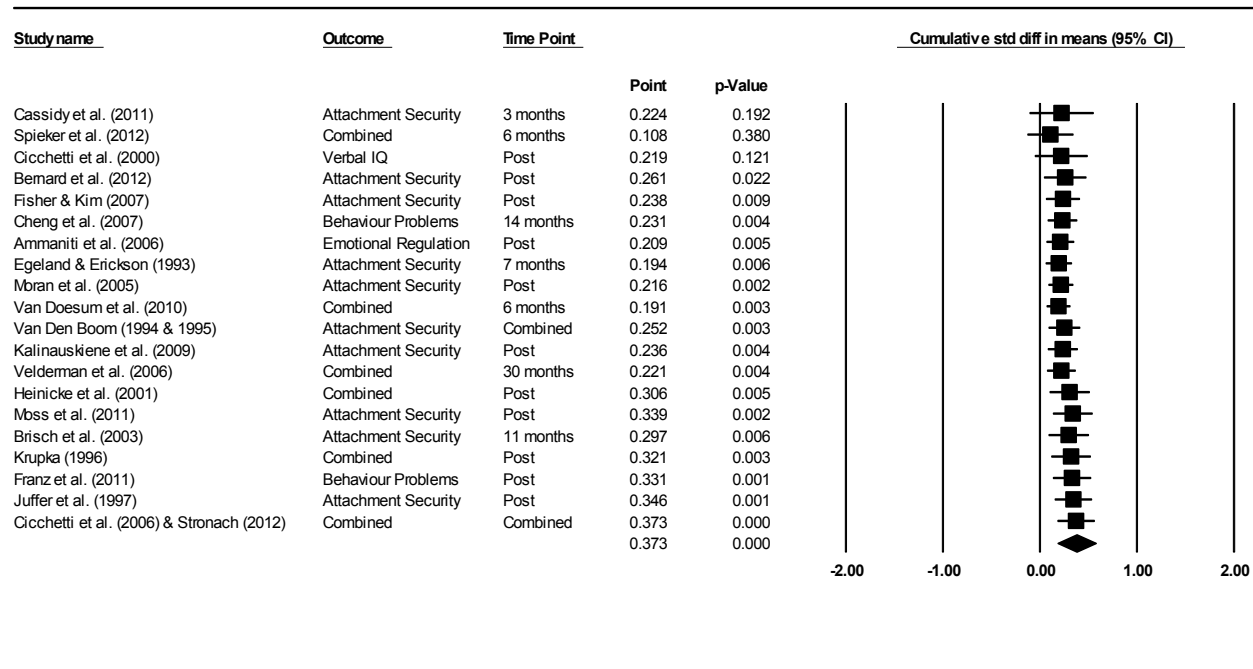


Figure 5. Cumulative forest plot from highest to lowest weighted studies.