The significance of insecure attachment and disorganization in the development of children's externalizing behavior: A meta-analytic study

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Accepted Version

The Significance of Insecure Attachment and Disorganization in the Development of Children's Externalizing Behavior: A Meta-Analytic Study

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Abstract

This paper addresses the extent to which insecure and disorganized attachments increase risk for externalizing problems using meta-analysis. From sixty-nine samples (*N*= 5947), the association between insecurity and externalizing problems was significant, *d* = 0.31 (95% *CI* 0.23, 0.40). Larger effects were found for boys (*d* = 0.35), clinical samples (*d* = 0.49), and from observation-based outcome assessments (*d* = 0.58). Larger effects were found for attachment assessments other than the Strange Situation. Overall, disorganized children appeared at elevated risk (*d* = 0.34, *CI* 0.18, 0.50), with weaker effects for avoidance (*d* = 0.12, *CI* 0.03, 0.21) and resistance (*d* = 0.11, *CI* -0.04, 0.26). The results are discussed in terms of the potential significance of attachment for mental health.

KEY WORDS: ATTACHMENT, EXTERNALIZING BEHAVIOR PROBLEMS, MENTAL HEALTH, AGGRESSION, META-ANALYSIS

The Significance of Attachment Security and Disorganization in the Development of Children's Externalizing and Aggressive Behavior: A Meta-Analytic Study

Although the significance of the parent-child relationship was recognized by scientists and clinicians since the earliest days of formal psychological inquiry (e.g. Baldwin, 1895; Freud, 1908; James, 1890), two major advances occurred in the 1960s and 1970s that created lasting legacies for the study of human development. John Bowlby's theory of parent-child attachment was revolutionary in the way it integrated evolutionary, biological, developmental and cognitive concepts into a unified account of human attachment behavior (Bowlby, 1969). This remarkable achievement paved the way for the scientific study of attachment, largely because it created a conceptual framework for developing testable hypotheses about causal influences, developmental processes and expected long-term consequences of attachment for mental health (Bretherton, 1997). Critical among these novel contributions were the clear characterization of the proximal behavioral functions associated with attachment and their interplay with other biologically significant behavioral systems, the use of comparative evidence as crucial sources of theory-development and the concept of an internal working model as a framework for understanding continuities in attachment behavior across context and over time. The notion that the quality or organization of attachment behavior in early infancy or childhood might have implications for later socio-emotional development and mental health is arguably one of attachment theory's most well-known and contested predictions (Lamb, Thompson, Gardner, Charnov, & Estes, 1984; Rutter, 1995). Nowhere is this issue more significant than in the domain of aggression and externalizing behavior problems, where the social costs are substantial (Loeber & Hay, 1997).

Researchers working in the attachment field, following Bowlby and others, have considered a number of mechanisms that might explain why attachment experiences in early life might be associated with later adaptation and mental health. Several theorists have suggested that the role of

attachment may center on the way in which children respond to sources of threat and challenge, and the extent to which children are able to draw on parental support and comfort as a means of coping (Kobak, Cassidy, Lyons Ruth, & Ziv, 2005). Secure children, it is maintained, have had repeated experiences of a caregiver who is responsive when support and proximity are needed and expect the caregiver(s) to be available and comforting when called upon. In contrast, children with insecure attachment relationships may have had experiences in which bids for proximity have been discouraged, rejected or inconsistently responded to and rely more heavily on secondary coping processes to deal with stress and challenge.

Developmental continuities between the organization of the attachment relationship and functioning beyond it (in time or space) have generally been conceptualized with reference to the internal working models construct. This important conceptual heuristic is thought of as a set of organized cognitive-affective psychological structures that organize thinking, feeling and behavior vis-à-vis the attachment figure as a potential haven of safety and comfort in times of stress (Bretherton, 1995; Main, Kaplan & Cassidy, 1985). These models are thought to become generalized over time and influence functioning in wider interpersonal relationships across the lifespan and form the basis of a generalized sense of the self as worthy of love and care and others as available and responsive (Cassidy, 1988; Egeland, Carlson, & Collins, 2005). In addition to this primary explanatory construct, several other factors (possibly related to internal working models) have been discussed as potential mediators between a secure attachment relationship and lowered risk for mental health problems generally and externalizing problems more specifically, such as 1) a developing sense of self-confidence through repeated experiences of support and comfort and through effective exploration of the environment (Goldberg, 1997), 2) generalized positive social expectations (as opposed to mistrust and perceived hostility; see Dodge & Coie, 1987), 3) the socialization of moral emotions and values within a secure attachment relationship (Kochanska, 1997; Van IJzendoorn, 1997), 4) modeling of prosocial behavior by a sensitive caregiver (Guttmann-

Steinmetz & Crowell, 2006), 5) continuity in the quality and supportiveness of ongoing parental care (Lamb et al., 1984), and 6) the capacity for effective emotion regulation (e.g. Cassidy, 1994) . Other possibilities exist that have been given less attention, such as the social modulation of biological systems mediating stress and arousal regulation (e.g. Suomi, 2003; Weaver et al., 2004).

Although Bowlby's work was highly influential, the development of a standardized procedure for the systematic study of attachment behavior, as observed in a naturalistic setting, was a major further step forward in the establishment of an empirical knowledge base concerning the developmental significance of attachment (Ainsworth, Blehar, Waters, & Wall, 1978; Sroufe, 1983). Ainsworth et al.'s Strange Situation Procedure (SSP) has become one of the most widely used—if not *the* most widely used—standardized lab assessment of early childhood behavior based on direct observation and represents a paradigm example of how to systematically study naturally occurring behavior in quasi-naturalistic contexts. The identification of individual differences in patterns of reunion behavior following separation in the SSP triggered a program of research studies aimed at uncovering their developmental antecedents and sequelae (Belsky & Isabella, 1988; Schneider-Rosen & Rothbaum, 1993). Despite the accumulation of an impressive volume of data over the years, the picture that unfolded regarding the developmental consequences of attachment has proved complex and often contradictory, particularly in the domain of mental health and psychopathology (Goldberg, 1997).

One of the earliest and most influential longitudinal studies of the psychosocial outcomes of children observed in the SSP in infancy was launched in Minnesota by Byron Egeland, Alan Sroufe and colleagues (see Sroufe et al., 2005). Erickson, Sroufe and Egeland (1985) followed their relatively large sample of high-risk infants from 12 months to preschool and collected extensive assessments of children's behavior using observer and teacher ratings of social competence, ego control, peer confidence and externalizing behavior problems in the school setting. Most importantly for the current purposes, secure children scored lower than insecure children on assessments of

behavior problems and avoidant children stood out as being particularly at-risk, a finding echoed in several later studies (Burgess, Marshall, Rubin & Fox, 2003; Goldberg, Gotoweic & Simmons., 1995; Munson, McMahon & Spieker, 2001). Interestingly, a later report from the Minnesota study at grades 1-3 (Renken, Egeland, Marvinney, Mangelsdorf, et al., 1989) found associations between attachment insecurity and externalizing problems in boys but not girls (see also Lewis, Feiring, McGuffog, & Jaskir, 1984).

In a manner that was to become somewhat characteristic of the topic, the first reports of these findings were followed immediately by a non-replication. In the same monograph, Bates, Maslin and Frankel (1985) reported on a longitudinal follow up of 120 infants who had previously been observed in the SSP at 12 months and found no association between attachment security and parent reports of externalizing behavior problems at age 3. Any number of methodological factors could be considered when interpreting these early, apparently contradictory findings. Notably, the Erickson et al. (1985) study excluded cases that were not stable in terms of attachment classifications between 12 and 18 months, while Bates et al. (1985) only collected attachment data at 12 months. There are obvious reasons why the stability of attachment might be a factor in its predictive power. Furthermore, the Sroufe et al. study was drawn from a substantially more impoverished population than the Bates study, which was predominantly middle class. A number of authors have argued that attachment security should be thought of as an interactive risk factor that is more significant when other psychosocial stressors are present in the family ecology (Belsky & Fearon, 2002; Kobak et al., 2005). The two studies also employed different outcome measures (teacher versus parent report), which in turn may index contextual differences in the expression of externalizing behavior or in the validity of the assessments.

Thus, even in the earliest phase of research into the longitudinal outcomes of attachment security and insecurity, positive findings, negative findings and interactions emerged in almost equal measure. A similar mix of results emerged from later studies conducted in the 1980s and early

1990s. With such a complex pattern of study outcomes, narrative reviews took diverging positions regarding the status of the evidence for an association between attachment and children's behavior problems (see Belsky & Nezworski, 1988).

The identification of disorganized attachment (Main & Solomon, 1986, 1990) led to renewed interest in the potential for attachment to robustly predict externalizing behavior problems (Carlson, 1998; Lyons Ruth, Alpern, & Repacholi, 1993; Moss, Cyr, & Dubois Comtois, 2004). These seemingly inexplicable, contradictory and fragmentary behaviors observed during the SSP are considered by many to represent relational processes at special risk for psychopathology, particularly in the domain of childhood aggression (Liotti, 1992; Lyons Ruth, Zeanah, & Benoit, 2003; Main & Morgan, 1996; Moss et al., 2004). Several authors have outlined hypotheses regarding the mechanisms by which disorganized attachment may lead to aggression, with considerable attention focusing on states of emotional dysregulation and dissociative processes that may block the person's awareness of his or her violent actions (e.g. Fonagy, 2004; Liotti, 1992; Solomon & George, 1999). Subsequently, a sizeable body of evidence emerged that was consistent with the view that disorganized attachment may be associated with increased risk for externalizing behavior problems and aggression. A meta-analysis of 12 studies carried out in 1999 (Van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999) showed that this association was robust, with a mean effect size of r = .29 (N = 734). Nevertheless, since 1999 a significant number of new studies have been conducted, including the largest ever longitudinal study of attachment (with more than 1,000 participants), the NICHD Study of Early Child Care and Youth Development, which failed to find strong evidence of greater externalizing behavior problems in disorganized children (Belsky & Fearon, 2002; NICHD Early Child Care Research Network, 2006).

The question of whether attachment insecurity plays a causal role in the development of externalizing psychopathology is a vital one for the field, but there is clearly little case for causality if there is no association. With the sheer volume, range and diversity of studies that have examined the

association between attachment security and children's externalizing behavior problems it has become virtually impossible to provide a clear narrative account of the status of the evidence concerning this critical issue in developmental science. Given that sample variability around an effect of zero can lead to false positives, and sampling variability around a positive effect can lead to false negatives, the question of whether the existing evidence is consistent with positive association is critical for a full appreciation of the predictive significance of attachment for later externalizing behavior problems. Meta-analysis provides a structured, principled methodology for resolving—within limits—these essential scientific questions. In the current paper, we analyzed over 60 independent studies that have conducted assessments of attachment security and insecurity using standardized observational tools and related them to measures of children's externalizing behavior problems. In line with expectations derived from the literature, we set out to test several hypotheses, namely that a) attachment insecurity, in particular avoidant attachment, would be significantly associated with externalizing behavior problems, b) stronger effects would be found in low SES samples than high SES samples, c) stronger associations would be found in boys than in girls, and d) attachment disorganization would predict externalizing problems more strongly than avoidance or insecurity generally. We added to these a focus on whether effects of attachment-related variation were moderated by age of assessment of externalizing problems. The claim that early attachment has enduring—rather than merely transient—effects on development requires that the magnitude of such associations are not reduced to nil over time. Finally, we also examined a range of relevant methodological factors that might account for systematic between-study variability in effect sizes, including the method of assessment of attachment and the type and context of outcome measurement.

Method

Literature Search

We systematically searched the electronic databases PsychInfo, Web of Science, MEDLINE, Science Citation Index Expanded, Social Sciences Citation Index, and Art & Humanities Citation

Index with the key words externalizing, aggressi*, conduct, psychopathology, opposition*, competence, social functioning, prosocial, anti-social, antisocial, behavior problem*, behavior problem* in the title or abstract (the asterisk indicates that the search contained the word or word fragment). This large set was narrowed down by adding the constraint that the papers must also contain the word attachment and child* or infan* in the title or abstract. This search returned over 1200 articles in each of the databases. Two further separate search-narrowing strategies were adopted, which yielded two partially overlapping study sets. In one search we targeted empirical studies by requiring the abstract to contain the words "sample" or "*N*". In another, we required that at least one of the words "secur*", "avoidan*", "resistan* or disorgani*" appeared in the title or abstract. In each case, this reduced the former search by around 60%. When these two sets of search results were merged, this resulted in 856 candidate articles. These were subjected to abstract review in the first instance, from which a large number of clearly irrelevant articles were discarded (e.g. non-empirical papers, studies not involving children). A further 115 articles remained. These were examined individually by the authors according to criteria described below. Second, the reference lists of the collected empirical papers and influential reviews were searched for relevant studies (e.g. Kobak et al., 2005). Third, data sets available to the authors since they were in the public field (NICHD Study of Early Child Care and Youth Development) or part of their ongoing research (SCRIPT, Van Zeijl et al., 2006) were analyzed with regard to the associations between attachment and externalizing behavior.

Studies were included if they reported on the relation between attachment and externalizing or aggressive behavior in children 12 years of age or younger. Externalizing behavior was defined as aggression, oppositional problems, conduct problems or hostility (either alone or in combination), as indicated in the descriptions provided in the method sections of the respective articles. Studies that did not differentiate between externalizing and internalizing problems (e.g. just total problems score of the CBCL) were excluded. Externalizing or aggressive behavior was assessed using observation

(e.g. Matas, Arend, & Sroufe, 1978; Turner, 1991), questionnaires (CBCL, PBQ) or clinical interviews (e.g. Speltz, DeKlyen & Greenberg, 1999), completed by parents (e.g. Aviezer, Sagi, Resnick, & Gini, 2002), teachers (e.g. Egeland & Heister, 1995) or clinicians/trained observers (e.g. Turner, 1991). We restricted the review to studies using observational measures of attachment, such as the SSP (Ainsworth et al., 1978), the Cassidy & Marvin Preschool Attachment system (Cassidy, Marvin, & The MacArthur Working Group on Attachment, 1989), the Attachment Q-Sort (AQS, Waters & Deane, 1985) and the Main and Cassidy system (Main & Cassidy, 1988). In cases where more than one attachment assessment was employed (e.g. the SSP) followed by Cassidy and Marvin at a later age) the earliest attachment assessment was selected. We did not include studies that reported on representational measures of attachment (e.g., Attachment Story Completion Task, Verschueren & Marcoen, 1999). When intervention studies were identified, we only included data from the non-treated control sample (e.g., Lieberman, Weston & Pawl, 1991). Only one study that met our entry criteria also reported on outcome data for father-child attachment security (Aviezer, et al., 2002). As this would not allow a meaningful comparison of effect sizes between mother and father attachment, this study was excluded. The meta-analyses reported herein therefore only pertain to mother-child attachment. Also noteworthy is the fact that only 4 studies were based on samples from predominantly minority-ethnic communities.

Several studies presented data on (partly) overlapping samples, such as Shaw and colleagues (Shaw, Owens, Vondra, & Keenan, 1996; Shaw & Vondra, 1995) and the studies reported by Moss and colleagues (Moss, Bureau, Cyr, Mongeau, & St Laurent, 2004; Moss, Parent, Gosselin, Rousseau, & et al., 1996; Moss et al., 2006). Because participants cannot be included in a meta-analysis more than once, the papers that reported on the largest groups of participants were included in our meta-analysis (e.g. Moss, et al., 2004). In total, after excluding reports involving overlapping samples, we found 53 studies that yielded 69 independent samples that could be included in our meta-analyses, with sample sizes ranging from 26 to 1075 (see Table 1). In many cases, outcome

statistics were only presented for the avoidant and resistant classifications combined, or indeed for the resistant, avoidant and disorganized cases combined. Consequently, we focused our primary analyses on the overall contrast between security and insecurity, with insecurity represented by the avoidant, resistant and (in the cases where disorganization had been coded) disorganized classifications. In these analyses we also tested whether it made a difference to the overall effect size for security if disorganization had been coded. In addition, a number of studies used the AQS to measure attachment security, which does not yield data on the different subtypes of insecurity. As a result, these studies only appear in the meta-analyses involving the overall contrast between security and insecurity. Subsequently, we also extracted more focused contrasts targeting specific insecure categories from the smaller set of studies where these could be identified. The numbers of studies involved in these sub-analyses are indicated in the text.

Coding System

We used a structured coding system for assessing the characteristics of the samples and their study designs. The measurement of attachment was coded straightforwardly, as all studies included one of several well-known attachment assessments (SSP, AQS, Preschool Attachment Assessment, Cassidy & Marvin, Main & Cassidy). In each case, the coder extracted effect sizes at the level of the individual attachment classification where possible (i.e., A, B, C and D). In addition to a number of background variables like year of publication and data source (journal, book chapter, unpublished data) we coded several important potential moderators related to the sample: gender (% male), socio-economic status (high/middle versus low), and clinical status (clinical-child, clinical-parent, non-clinical). Where the gender composition of the sample was not precisely reported we assumed a 50% split. Furthermore, when socio-economic status was not noted, a default of high/middle class was recorded (this occurred in 5 cases). Clinical status was recorded if either the parent or the target child were identified as having a clinical diagnosis or if they had been selected using a clinical cut-off score on a validated instrument. In addition to the measure used to assess attachment, four other

design characteristics were coded: 1) age of attachment assessment, 2) age of externalizing assessment, 3) type of outcome measure, and 4) observer/reporter of externalizing behavior. When measurements of externalizing problems at different points in time were reported, we selected the first measurement. When measurements at different points in time were in some way merged (averaged or a trajectory extracted) we recorded the mid-point of the range as the age of the externalizing assessment (e.g. Keller, Spieker & Gilchrist, 2005). To assess intercoder reliability, twenty randomly selected studies were coded by two coders. The agreement between the coders across the moderator variables was 97% (correlations between continuous moderators were > .95).

Meta-Analytic Procedures

A number of studies reported results separately for boys and girls and four studies reported on samples involving only boys or only girls. In these cases we calculated separate effect sizes for each gender, and the subsamples were treated as independent outcomes in the analyses. When multiple measures of aggression and/or externalizing behaviors were used within one study (e.g. Solomon, George, & De Jong, 1995), we selected the outcome for externalizing behavior for the primary set of studies. In a separate set of meta-analyses we tested whether outcomes were different when aggression outcomes were selected (see below).

Statistical Analyses

Four sets of meta-analyses were conducted, one for the relation between attachment insecurity and externalizing or aggressive behavior, one for the relation between avoidance and externalizing or aggressive behavior, one for the relation between resistance and externalizing or aggressive behavior and one for the relation between attachment disorganization and externalizing or aggressive behavior. The meta-analyses were performed using the Comprehensive Meta-Analysis (CMA) program (Borenstein, Rothstein, & Cohen, 2005, Version 2). For each study, an effect size (*d*) was calculated as the standardized difference between the two pertinent groups (e.g., secure versus insecure). In those cases where continuous attachment scores were correlated with externalizing scores (for

example when the study reported on the Attachment Q-Sort) we re-computed the statistic into Cohen's *d* (see Mullen, 1989, and Mullen and Rosenthal, 1985, chapter 6, for the formulae for transformation of various statistics into Cohen's *d*). Effect sizes indicating a positive relation between externalizing behavior and insecurity, avoidance, and disorganization, respectively (higher levels of externalizing behavior in the insecure, avoidant, or disorganized group compared to the reference group), were given a positive sign. Thus, a positive combined effect for the set of studies comparing disorganized children with secure children on externalizing behaviors would mean that across these studies the level of externalizing behaviors in disorganized children was higher than in secure children. In the main analyses we compared externalizing behaviors of the children in each attachment classification with all other classifications combined. In an additional analysis on a smaller set of studies with pertinent data we also compared each classification with the secure classification as the most 'pure' reference category.

Using CMA, combined effect sizes were computed. Significance tests and moderator analyses were performed through fixed or random effects models, depending on the homogeneity of the study outcomes. Fixed effects models are based on the assumption that effect sizes observed in a study estimate the corresponding population effect with random error that stems only from the chance factors associated with subject-level sampling error in that study (Lipsey & Wilson, 2001; Rosenthal, 1991). This assumption is not made in random effects models (Hedges & Olkin, 1985). Random effects models allow for the possibility that there are random differences between studies that are associated with variations in procedures, measures, settings, that go beyond subject-level sampling error, and thus point to different study populations (Lipsey & Wilson, 2001). To test the homogeneity of the overall and specific sets of effect sizes, we computed *Q*-statistics (Borenstein et al., 2005). In addition, we computed 95% confidence intervals (*CI*s) around the point estimate of each set of effect sizes. When the set was homogeneous, *CI*s were based on fixed estimates. In cases where there was heterogeneity across studies, we based *CI*s on random estimates. *Q*-statistics and *p*-values were also

computed to assess differences between combined effect sizes for specific subsets of studies grouped by moderators. Again, fixed effects model tests were used in the case of homogeneous sets of outcomes, and more conservative random effects model tests were used in the case of heterogeneous outcomes. In the present study random models were tested unless otherwise specified. Contrasts were only tested when at least two of the subsets consisted of at least four studies (Bakermans-Kranenburg, Van IJzendoorn, & Juffer, 2003).

When the children in two sets of studies (partially) overlapped (e.g., some studies reported both aggression and externalizing, and we wanted to compare the combined effects for aggression and externalizing), it was impossible to directly compare effect sizes across these sets. We computed 85% confidence intervals for the point estimates of the combined effect sizes in the two sets: non-overlapping 85% CI's indicate a significant difference between combined effect sizes (Bakermans-Kranenburg et al., 2003). This approach of comparing 85% confidence intervals served as a conservative significance test (Goldstein & Healy, 1995). We used the "trim and fill" method (Duval and Tweedie, 2000a, 2000b) to calculate the effect of potential data censoring (or publication bias) on the outcome of the meta-analyses. Using this method, a funnel plot is constructed of each study's effect size against the sample size or the standard error (usually plotted as 1/SE, or precision). It is expected that this plot has the shape of a funnel, because studies with smaller sample sizes (larger standard errors) have increasingly larger variation in estimates of their effect size as random variation becomes increasingly influential, whereas studies with larger sample sizes have smaller variation in effect sizes (Duval & Tweedie, 2000b; Sutton, Duval, Tweedie, Abrams, & Jones, 2000). The plots should only be shaped like a funnel if no data censoring is present. However, since smaller or non-significant studies are less likely to be published (the 'file-drawer' problem, Mullen, 1989), studies in the bottom left hand corner of the plot are often omitted (Sutton, Duval, Tweedie, Abrams, & Jones, 2000). In our meta-analyses, the *k* right-most studies considered to be symmetrically unmatched were trimmed. The trimmed studies can then be replaced and their missing counterparts imputed or "filled"

as mirror images of the trimmed outcomes. This then allows for the computation of an adjusted overall effect size and confidence interval (Sutton et al., 2000; Gilbody, Song, Eastwood, & Sutton, 2000).

For each meta-analysis we also calculated the number of studies with average sample size and non-significant outcome that would be required to bring the combined effect size of the meta-analysis to a non-significant level (fail-safe number, Mullen, 1989). Rosenthal (1991, p. 106) suggested that a fail-safe number of more than $5k + 10$ (k = number of studies included) may be considered a general criterion for robustness.

For each study, Fisher's *Z* scores were computed as well-distributed equivalents for the effect size *d,* and the Z scores were standardized to test for outliers. No outliers (standardized *Z*-values smaller than -3.29 or larger than 3.29; Tabachnik & Fidell, 2001) were found for study effect sizes.

Results

Is Insecure Attachment Associated With More Externalizing Problems?

The first set of meta-analyses concerned the difference in externalizing behaviors between children rated as secure versus children classified as insecure. In 69 studies including $N = 5947$ participants the association between attachment security and externalizing behaviors was reported. Any study assessing attachment and externalizing was included in this total set, regardless of type of measures used. If disorganized attachment was assessed this category was included in the insecure group. In this overall set we found a significant combined effect size of $d = 0.31$ (see Table 2). Children rated as insecure showed higher levels of externalizing behaviors than children rated as secure. The effect size was modest but robust, as more than 1700 studies with null results (fail-safe number) would be needed to reduce this effect to non-significance. Further support for the absence of the file-drawer problem was evident through the trim-and-fill approach, showing that only 5 studies had to be trimmed and filled, with a resulting significant combined effect size of $d = 0.27$ (95% *CI* 0.18, 0.36).

As the total set of studies for secure versus insecure attachment was heterogeneous (see Table 3) we looked for significant moderators that might account for between-study variability in outcome. Gender appeared to be a significant moderator (see Table 2). In samples with only girls the combined effect size was d = -0.03 (ns), whereas in the samples with only boys and in the mixed samples (i.e., with boys and girls) the combined effect sizes were significant, d = .35 and d = 0.36 respectively, and significantly different from the null effect in the girls-only samples. Within the mixed samples the percentage of males in the study tended to be positively related to the magnitude of the attachment-externalizing problems effect size (slope = .013, p = .11). Clinical samples also showed a significantly larger combined effect size (d = 0.49) than non-clinical samples (d = 0.26). This moderator effect was not dependent on gender differences as only two of the clinical samples consisted of boys only (Greenberg et al., 1991; Speltz et al., 1999). Contrary to expectations, socio-economic status was not a significant moderator (see Table 2).

The type of assessment of externalizing behaviors and of attachment appeared to make a difference to the effect sizes. When externalizing behavior was observed directly (7 studies) or was indexed by a clinical diagnosis (6 studies) the combined effect sizes were larger than in cases where a parent or teacher rated the level of externalizing behaviors. The group of studies based on observations of externalizing behavior was homogeneous. Its combined effect size of d = 0.58 was therefore an adequate estimate of the average effect, which amounted to a quite strong association between attachment security and externalizing behavior. The way in which attachment security was assessed also made a significant difference. In particular, studies conducted with the AQS showed the largest effect sizes (d = 0.70), whereas studies using the SSP yielded the lowest combined effect size (d = 0.18), though this latter effect was nevertheless significant. Because the different attachment measures are typically conducted at different ages, we also conducted a meta-regression analysis with age at the assessment of attachment as a predictor. As expected, the regression was significant (slope = .006, p = .01). Notably though, the effect of age was not significant within the SSP, AQS or

Cassidy and Marvin studies, suggesting that age and attachment measure were confounded. Furthermore, the regression with age did not appear to result solely from the larger effects associated with the AQS, as the same regression was significant when AQS studies were excluded (slope = .005, p = .03). It is also noteworthy that the overall effect size for security did not vary as a function of whether or not disorganization had been coded (Q = 0.10, p = .78). Note that this latter analysis excludes AQS studies by definition, as this procedure does not yield a score or classification for disorganized attachment.

Because the SSP is considered to be the gold standard for measuring attachment security, and the set of SSP studies was sufficiently large (k = 43) we decided to conduct complementary analyses for secure versus insecure attachment on this sub-set (see Table 2). In this homogeneous set of studies we did not find a difference in combined effect size between clinical and non-clinical samples. The difference between samples with only girls versus only boys or mixed samples, however, was significant again, with all-female samples showing no association between attachment security and externalizing problems (d = -0.06). Also, we confirmed the larger combined effect size for those SSP studies that included observational measures of externalizing (d = 0.61) compared to the other types of assessment.

Interestingly, among the SSP studies the age at which the assessment of externalizing behavior was taken yielded a significant regression weight, with a slope of .002 (p = .02), indicating that the association between attachment security and externalizing became stronger with age. Because the SSPs are usually conducted within a small age window of 12-18 months, this significant slope suggested that the prediction of externalizing from attachment security was better with later—not earlier—assessments of externalizing, which is surprising given the longer interval between assessments in these studies.

Is insecure-avoidant attachment associated with more externalizing problems?

In 34 studies involving $N = 3675$ participants the insecure-avoidant attachment classifications were differentiated from the other classifications, and in this sub-set of studies the combined effect size was only $d = 0.12$, which was significant but small in magnitude (see Table 3). Insecure-avoidantly attached children displayed somewhat more externalizing behaviors than comparisons. With one study trimmed and filled the resulting significant effect size was $d = 0.11$, but the fail safe number of studies needed to bring the effect down below significance was only 24. Because this number is below the Rosenthal (1991) criterion of $5k + 10$, this outcome should be considered with caution. No significant moderator effects were found. The effect did not vary according to whether or not disorganization had been coded. Within the SSP sub-set of 25 studies the combined effect size for insecure-avoidant attachment was $d = 0.13$, and the moderator analyses on this sub-set converged with the analyses on the total set of studies for avoidance (see Table 3 for those contrasts that could be tested).

Is Insecure-Resistant Attachment Associated With More Externalizing Problems?

In 35 studies involving $N = 3568$ participants the insecure-resistant attachment classifications were differentiated from the other classifications. In this sub-set of studies the combined effect size was not significant, $d = 0.11$ (see Table 4), and no significant moderator effects were found. Within the SSP sub-set of 24 studies the combined effect size for insecure-resistant attachment was only $d = 0.05$, and the contrasts on this sub-set showed no significant moderators (see Table 4 for those contrasts that could be tested).

Is Disorganized Attachment Associated With More Externalizing Problems?

In 34 studies including $N = 3778$ participants a significant combined effect size of $d = 0.34$ (see Table 5) was found for the association between disorganized attachment and externalizing behavior. As expected, disorganized attachment was associated with a higher risk for externalizing behavior later in childhood. However, eight studies had to be trimmed and filled, with a re-computed significant combined effect size of $d = 0.18$ (95% CI 0.01, 0.34). The fail-safe number amounted to k

= 407 which was above the Rosenthal criterion, suggesting that the file-drawer problem was not responsible for the association found in the current set of studies.

The set of studies was heterogeneous, and moderator analyses showed that gender was a significant moderator (see Table 5). Remarkably, in the samples with females only the association between disorganized attachment and externalizing behaviors was significantly different from the samples with only boys or with mixed gender, and in fact, the relation was negative, that is, disorganized attachment was associated with less externalizing behavior. However, the combined effect size of the six female samples (N = 702) was modest, d = -0.20. Clinical status, SES, or type of assessment (for both SSP and externalizing behavior) did not appear to moderate the association between disorganized attachment and externalizing behavior.

In the set of 24 SSP studies with N = 3161 participants we found a significant combined effect size of d = 0.27 which was similar to the effect size computed for the total set. No significant moderators were found in this set (see Table 5 for those contrasts that could be tested).

Additional analyses

The core set of studies on externalizing included assessments of externalizing as well as of aggressive behavior in the case of studies that did not present data on externalizing problems. In order to examine whether the more focused aggression studies would result in higher effect sizes we decided to conduct two sets of meta-analyses, one for studies with data on externalizing and one for studies presenting aggression data. These two sets of studies partially overlapped (as some studies reported both), and it was therefore impossible to directly compare effect sizes across these sets (see Method). We computed 85% confidence intervals for the point estimates of the combined effect sizes, and compared these intervals across the two sets of studies: non-overlapping 85% *CI*'s indicated a significant difference in combined effect sizes (Bakermans-Kranenburg et al., 2003). For the association between secure versus insecure attachment and externalizing behavior (k = 65) a combined effect size of d = 0.32 (p < .01; 85% *CI* 0.26, 0.38) was found. The comparable combined

effect size for the aggression outcomes (k = 32) was d = 0.24 (p < .01; 85% *CI* 0.13, 0.35). For the association between avoidant versus non-avoidant attachments and externalizing (k = 33) the combined effects size was d = 0.12 (p < .01; 85% *CI* 0.06, 0.21), and for the aggression outcomes (k = 20) the combined effect size amounted to d = 0.28 (p < .05; 85% *CI* 0.08, 0.49). For the association between resistant versus non-resistant attachments and externalizing (k = 34) the combined effects size was d = 0.10 (p > .05; 85% *CI* -0.01, 0.21), and for the aggression outcomes (k = 22) the combined effect size was d = 0.05 (p > .05; 85% *CI* -0.10, 0.21). Finally, for the association between disorganized attachments and externalizing (k = 33) the combined effect size was d = 0.37 (p < .01; 85% *CI* 0.25, 0.49), whereas for the aggression outcomes (k = 16) this combined effect size was d = 0.12 (p > .05; 85% *CI* -0.06, 0.30). The 85% *CI*s did overlap for each of these comparisons, indicating that study outcomes with externalizing behavior or with aggression did not result in significantly different effect sizes.

Because the various comparisons (secure versus insecure, avoidant versus non-avoidant, and disorganized versus non-disorganized) were based on varying numbers of studies and participants, we also selected a core set of 19 studies that provided data on all four comparisons. For the association between attachment security and externalizing the combined effect size was d = 0.27 (p < .01; 85% *CI* 0.15, 0.39). For avoidance this combined effect size amounted to d = 0.06 (p > .05; 85% *CI* -0.01, 0.13), for resistance it was d = 0.11 (p < .05; 85% *CI* 0.03, 0.19), and for disorganization the combined effect size was d = 0.29 (p < .01; 85% *CI* 0.13, 0.45). The 85% confidence intervals of the combined effect sizes for attachment security and disorganization did not overlap with the 85% confidence interval of the combined effect size for avoidance, but for the other comparisons the 85% confidence intervals overlapped. Resistant attachment did not show a different combined effect size compared to all other attachment classifications. Insecure and disorganized attachments thus implicate a higher risk for externalizing behavior than avoidant attachment. We also compared each of the non-secure classifications with the secure classification. In a core set of 18 studies that

provided data on all three comparisons, the combined effect size for the association between avoidance versus security and externalizing was $d = 0.12$ ($p < .05$; 85% *CI* 0.04, 0.20). For resistant versus secure attachment it was d = 0.19 ($p < .01$; 85% *CI* 0.11, 0.28), and for disorganized versus secure attachment the combined effect size was $d = 0.27$ ($p < .01$; 85% *CI* 0.13, 0.41). For all three comparisons, the 85% confidence intervals overlapped, implying that the effects of the various types of insecurity showed similar associations with externalizing behavior.

Discussion

Since Bowlby's earliest work on attachment and separation, there have been persistent suggestions in the literature that attachment insecurity may play an important role in the development of aggression and antisocial behavior (Bowlby, 1944; Lewis et al., 1984; Lyons Ruth et al., 1993; Renken et al., 1989; Van IJzendoorn, 1997). The body of research that subsequently tested this association is impressive in its sheer size. However, despite an extensive accumulation of data, a clear view on the empirical standing of this important hypothesis has been elusive. Apparently contradictory findings, non-replications and a diversity of study designs and sample sizes has created a body of work that is difficult to integrate coherently in narrative reviews.

The central question we thus posed in this meta-analysis was whether attachment insecurity was associated with externalizing behaviors across all the studies conducted to date. The results showed quite clearly that the answer to this question is a firm yes. Drawing from data on nearly 6000 children tested in standardized observational assessments of mother-child attachment security, the average effect size for the contrast between secure and insecure children was $d = 0.31$ (95% *CI* 0.23, 0.40). Over 1700 studies of average sample size with null results would need to be added to the database to reduce this effect to non-significance. For clinical samples the average effect size amounted to $d = 0.49$ (95% *CI* 0.32, 0.66). On the face of it, these robust findings lend direct support to the notion that attachment plays a significant role in the evolution of children's behavior problems, for typically developing children as well as for clinical groups.

It should be noted that for meta-analytic results the evaluation of combined effect sizes in terms of absolute magnitude is problematic (McCartney & Rosenthal, 2000). It is arguably more meaningful to consider the global association between insecurity and externalizing problems in the context of other studies examining similar phenomena and employing similar methodologies (McCartney & Rosenthal, 2000). In that respect, the combined effect size of $d = 0.31$ reported here is of similar magnitude to meta-analytic results concerning the association between aggression and hostile attributional biases ($d = 0.35$, see Orobio De Castro, Veerman, Koops, Bosch & Monshouwer, 2002) or resting heart rate ($d = -0.38$, Lorber, 2004) and substantially higher than that between aggression and basal cortisol ($d = -0.10$, see Alink et al., 2008). The combined effect found in this analysis gains even greater significance in light of the fact that a majority of the studies included in the analysis were longitudinal investigations, where independent and dependent variables were measured often several years apart (with an intervening period of 25 months on average).

Three perhaps obvious additional points about the effects should be made at the outset. First, there were so few outcome studies that examined father-child attachment security that we were unable to include them in this meta-analysis. There is clearly an urgent need for further research into the contribution of father-child attachment security and insecurity to children's development. Second, the effects reported in this meta-analysis reflect statistical association, not causation and—although they provide evidence relevant to efforts to determine causality and its mechanisms—alone they are mute on this issue. Third, the effects are uncorrected for the influence of relevant third variables. Controls for these could reduce or increase the magnitude of the global meta-analytic effects. Furthermore, the effects represent an average across a potentially large number of moderating relationships that could amplify or attenuate the association between attachment and externalizing problems (e.g. Belsky & Fearon, 2002; NICHD ECCRN, 2006). Related to this point, the association for children from non-clinical populations was highly heterogeneous, indicating large between-study differences in effect size, which could have resulted from a number of methodological factors, such

as the composition of the populations studied, the length of the follow-up period and/or the measurement strategies that were adopted. Indeed, the larger effect found in clinical samples (d = 0.49) illustrates this point, and at the same time demonstrates the significance of attachment for clinical groups.

Within clear constraints, the analyses reported in this paper were able to consider the role of a number of other potentially important moderators that have been highlighted in the literature. Central among these were socio-economic status (with low risk samples anticipated to yield larger effects), gender (insecure boys expected to show more behavior problems) and age of outcome (with effects expected to persist over time). In contrast to our expectations, the magnitude of the association between attachment and behavior problems was relatively consistent across high and low SES samples (d = 0.25 vs. d = 0.31, respectively). SES represents a rather blunt approximation of a number of important proximal psychosocial risk processes that may be more clearly implicated in the association between attachment and children's externalizing problems. Nevertheless, SES does account for a considerable portion of the variance in externalizing problems in childhood (Bradley & Corwyn, 2002) and the absence of moderation in this meta-analysis is a potentially important result. The finding certainly suggests that attachment insecurity is associated with higher levels of behavior problems even in apparently low-risk psychosocial circumstances. However, possible effects of SES should not be ruled out, as a broad division of samples into low versus high or middle class is clearly limited in precision and in several cases the reviewed studies involved mixtures of differing levels of socio-economic disadvantage that were not captured in our coding scheme.

Turning to gender, the results were consistent with our expectations and the findings of some early longitudinal studies (Lewis et al., 1984; Renken et al., 1989), in that attachment was more strongly associated with externalizing behavior problems in samples of boys than in samples of girls (d = 0.35 vs. d = -0.03, respectively). The set of studies on girls was homogeneous; therefore the absence of a significant association was not due to one or a few outlying outcomes in the lower range.

Furthermore, within the mixed sample (boys and girls), a meta-regression showed a trend for stronger effects in samples with comparatively more boys than girls. Given that the variation in gender composition within this subset reflected a very narrow range, this finding—when combined with those from the single-gender studies—provides quite compelling evidence of the elevated significance of attachment for behavior problems in boys. Nevertheless, the mixed samples, constituting the large majority of the studies, showed equally strong effect sizes as those with only boys, suggesting that the association between attachment and externalizing cannot be ascribed to boys only.

There are a number of plausible ways of interpreting this gender effect. First, on the face of it the effect may not be surprising, given the substantially higher risk of externalizing problems in boys (Loeber & Hay, 1997). However, this broad explanation subsumes several distinct possibilities that are worthy of attention. First, the lower rates of externalizing behavior problems in girls may impose a range restriction on the dependent variable, which in turn would attenuate the effect size (DeKlyen & Greenberg, 2008). On the other hand, the lower rates of externalizing problems may represent a manifestation of a differing set of etiological mechanisms in girls than boys, with attachment processes figuring more significantly in the developmental trajectories of boys. Certainly, some behavior genetic studies have suggested partially independent genetic and environmental contributions to externalizing symptoms (e.g., Vierikko, Pulkkinen, Kaprio, Viken, & Rose, 2003). Furthermore, a number of non-genetic studies have documented distinct risk factors for girls and boys (Cairns & Cairns, 1984; Cummings, Iannotti, & Zahn Waxler, 1989). A further important possibility to consider is that attachment (and indeed other risk factors) may contribute to a common latent process that has distinctive behavioral manifestations, which in turn are more commonly associated with boys than girls. Pertinent candidate examples might include the behavioral and contextual differences between physical and relational aggression (Crick & Grotpeter, 1995) or overt versus covert antisocial behavior (Loeber & Schmaling, 1985). To the extent that these behavioral

processes are measured by different instruments, are evident in different contexts or are weighted differently by different observers we may expect differential associations by gender. A further important possibility to consider, which may not be independent of the possibilities described above, is that insecurity in girls is more associated with internalizing problems rather than externalizing problems (see DeKleyn & Greenberg, 2008).

In light of claims made by many in the field that attachment has persistent effects on future development, we also expected the association between attachment and behavior problems to be evident in studies with relatively long-term follow-up periods. Consistent with this expectation, we found that the age of the child at the point when externalizing problems were assessed was not significantly associated with the magnitude of study effect sizes. Even more intriguingly, among studies employing the SSP ($k = 43$ studies), applied within a small time window, effect sizes appeared to increase significantly over time.

In addition to these *a priori* hypotheses, method of measurement proved a significant factor that distinguished studies with relatively small and large effects in two distinct ways. First, different assessments of attachment appeared to be associated with reliable differences in the magnitude of the attachment-behavior problems association. Broadly speaking, the SSP produced smaller effect sizes than the other attachment assessments and the AQS produced comparatively larger effect sizes. Critically however, it was not possible to entirely disentangle the role played by measurement type (e.g., SSP versus other assessments) from the age at which the assessment was conducted (infancy or later), as these were essentially confounded. Notably, age was not a significant regressor within the SSP studies or within the non-SSP studies, so a substantial portion of the overall effect came exclusively from the difference between the SSP studies on the one hand and the other assessment types on the other. Although the AQS evidenced the strongest effect sizes by some margin ($d = 0.70$), the meta-regression of age on effect size remained significant even when the AQS was removed from the analysis. Thus, while it was clear that security assessed by the AQS was rather more strongly

associated with behavior problems than that derived from the SSP, later assessments of attachment beyond the SSP also appeared to yield stronger effect sizes. On that basis it was not possible to determine whether the critical factor was some methodological or coding variation that distinguishes the SSP from the other attachment assessments, or some factor more closely related to development itself. It is certainly plausible that important developmental changes take place around the beginning of the third year that amplify the link between attachment and externalizing problems.

The second critical measurement factor that emerged from this meta-analysis concerned the measurement of outcome. Studies that assessed externalizing behavior problems via direct observation identified reliably larger effect sizes ($d = 0.58$) than those that relied on questionnaires from parents or teachers ($d = 0.22$ and $d = 0.30$, respectively). This is a potentially important finding from a variety of perspectives. First, the vast majority of the studies that investigated externalizing behavior in relation to attachment reviewed here did not use any objective source of information concerning the outcome. Not only does this strategy limit the conclusions that can be drawn (see Kagan, 2007), it could also partially explain the mixed effects across attachment-outcome studies as a whole. It is noteworthy that the effect sizes cited above are apparently positively correlated with the degree of objectivity of the observer.

Nevertheless, although the objectivity of measurement is one potential account of the stronger effect sizes associated with direct observation, it could also be that direct observation reveals qualitatively distinct features of behavior or qualitatively distinct contexts in which behavior takes place. Notably, studies that used observational methods typically focused on the peer setting (e.g., Booth et al., 1991; Matas et al., 1978; Suess, Grossmann, & Sroufe, 1992) and hence may have been tapping behavior more closely connected with social competence than those that relied on parent or teacher questionnaires. However these effects are understood, the limited agreement between objective observers, teachers and parents concerning children's behavior problems creates a strong imperative to use multiple sources of outcome data in future studies of attachment security and its

sequelae. At the same time, more data sources per se will not solve this problem. What is arguably needed is a better understanding of the precise circumstances and mechanisms under which aggression and other antisocial acts may be triggered and the contribution that attachment processes make to this. It is hard to imagine that this degree of mechanistic specificity could be achieved without greater reliance on field studies that involve direct and extensive observations in a range of relevant social settings.

Arguments put forward in the literature, and results of an earlier meta-analysis, led us to expect that attachment disorganization would be a stronger predictor of externalizing behavior problems than attachment insecurity generally (Van IJzendoorn et al., 1999). However, the findings of the current meta-analysis were only partially supportive of the special status sometimes accorded to disorganized attachment as a precursor of children's externalizing problems. The global effect size for attachment security (d = 0.31) was very similar to that for disorganization (d = 0.34). It should be noted that these effect sizes do not reflect the outcomes of the same set of studies so direct comparisons are difficult. However, in an analysis of 19 studies where data from all four attachment groups were available the results corresponded to the aforementioned global effects. The effects for security and disorganization were significant and of similar magnitude (d = 0.27 and d= 0.29, respectively), while the effects for avoidance and resistance were small and in the case of avoidance non-significant (d = 0.06 and d = 0.11, respectively). The 85% confidence intervals for security and disorganization did not overlap with that for avoidance, suggesting significantly stronger effects for insecurity and disorganization than for avoidance. The effect for resistance did not differ from any of the other contrasts, in part because this effect showed marked heterogeneity. Furthermore, in the larger set of studies, resistant attachment was not significantly associated with externalizing problems and showed an effect size numerically similar to that for avoidance. When only studies that provided direct pairwise comparisons between groups were considered, secure children scored lower on measures of externalizing problems than disorganized (d = 0.27), avoidant (d = 0.12) and resistant (d

= 0.19) children; and while the confidence intervals for these effects overlapped, disorganized children demonstrated numerically larger effects than the other insecure categories.

Although the effect sizes for disorganization and security compare favorably with other prominent risk factors for externalizing behavior, they also leave room for the possibility that the association may be moderated by other factors. It is highly noteworthy that few if any of the studies reviewed in this paper directly addressed questions of mechanism. Arguably, until mediating mechanisms are better understood, we may struggle to find the relevant moderators. Given that an association clearly exists, there is an obvious need for strong theory-driven studies that address mediating processes, particularly those drawing on methods derived from other fields. Some well-studied risk processes worthy of consideration (in addition to the traditional internal working models construct) include impulsivity, negativity emotionality, affect regulation, hostile attributional biases and physiological hypo-arousal (Belsky, Fearon, & Bell, 2007; Dodge & Coie, 1987; Eisenberg et al., 2001; Raine, Venables, & Mednick, 1997). Risk factors such as these, situated at the biological, cognitive or affective level may be considered proximal determinants of externalizing behavior, with the quality of the attachment relationship with a primary caregiver conceptualized as a more distal determinant. A crucial question in that context has long been, and remains, the extent to which longitudinal continuities in the effects of attachment represent the ongoing supportive function provided by the attachment relationship as opposed to the early effects of attachment experiences on the emergence of stable psychological structures, such as internal working models. It is notable that Belsky and Fearon's (2002) analysis of the NICHD data at age 1-3 years suggested that the effects of attachment tended to persist primarily when there was continuity in the quality of maternal care. Given the centrality of this issue and the cogent arguments made by several authors on this subject (e.g. Sameroff, 2000; Sroufe et al., 2005), it is unfortunate that few studies have attempted to address this. Related to this, few studies have directly considered the possibility that certain parenting characteristics may be common determinants of both attachment insecurity and externalizing

behavior problems. Thus, the extent to which attachment processes per se can be shown to make a specific and causal contribution to children's externalizing problems, either independently of parenting or as a causal mediator of its effects, remains to be seen.

There is also a clear need for a better understanding of causation. In that regard, the absence of studies that have repeatedly assessed both attachment and outcome is a significant barrier. Longitudinal studies that employ cross-lagged panel designs could provide elegant tests of causation by focusing on temporal ordering. However, in order to do this there is an urgent need to establish robust measurement protocols that allow for meaningful repeated assessments of attachment and hence the documentation of change. Of course, causal hypotheses can also be powerfully addressed by intervention studies (Bakermans-Kranenburg, Van IJzendoorn, Mesman, Alink, & Juffer, 2008) and in the future these may be critical for determining the role of attachment in children's behavior problems, as well as that of the causal mediators and moderators of its effects.

Author note

Support from the Netherlands Organization for Scientific Research to Marinus van IJzendoorn (NWO SPINOZA award) and to Marian Bakermans-Kranenburg (NWO VIDI grant) is gratefully acknowledged. The study was also supported in part by a grant from the National Science Foundation to Glenn I. Roisman (BCS-0720538).

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Table 1

Sample characteristics for primary set of studies

Source	Sub Sample Description	Attachment Measure[1]	Outcome[2]	*N*
Anan & Barnett, 1999		CassMarv	CBCL	56
Aviezer et al., 2002		SSP	CBCL	63
Bakermans-Kranenburg & Van IJzendoornl., 2006	Boys subsample	SSP	CBCL	23
	Girls subsample	SSP	CBCL	24
Bates & Bayles, 1988	Boys subsample	SSP	CBCL	28
	Girls Subsample	SSP	CBCL	27
Booth, Rose Krasnor, & Rubin, 1991	High risk subsample	SSP	Obs	20
	Low risk subsample	SSP	Obs	16
Booth, Rose Krasnor, McKinnon, & Rubin, 1994		SSP	CBCL	69
Burgess, Marshall, Rubin, & Fox, 2003		SSP	CBCL	140
Carlson, 1998	Minnesota Study: Effect size for D versus non D only	SSP	CBCL	78
Cicchetti, Rogosch, & Toth, 1998		AQS	CBCL	128
Cohn, 1990	Boys subsample	SSP	Other	34
	Girls Subsample	SSP	Other	46
DeMulder, Denham, Schmidt, & Mitchell, 2000	Boys subsample	AQS	Other	51
	Girls subsample	AQS	Other	43
DeVito & Hopkins, 2001		PAA	CBCL	58
Edwards, Eiden, & Leonard, 2006	Clinical Fathers subsample	SSP	CBCL	82
	Non-Clinical Fathers subsample	SSP	CBCL	94
Egeland & Heister, 1995	Minnesota Study: B versus non-B effect size	SSP	CBCL	64
Fagot & Leve, 1998		SSP	CBCL	136
Fearon, unpublished data	Twin sample	SSP	CBCL	27
Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002		SSP	CBCL	189
Goldberg, Gotowiec, & Simmons, 1995	Cystic Fibrosis sample	SSP	CBCL	40
	Coronary heart disease sample	SSP	CBCL	54
	Non-clinical sample	SSP	CBCL	51
Goldberg, Corter, Lojkasek, & Minde, 1990		SSP	Other	69
Greenberg, Speltz, Deklyen, & Endriga, 1991	ODD+Controls	CassMarv	Diag	50

Howes, Matheson, & Hamilton, 1994		SSP	Other	74
Hubbs Tait, Osofsky, Hann, & McDonald Culp, 1994		SSP	CBCL	44
Keller, Spieker, & Gilchrist, 2005		SSP	CBCL	169
Klein Velderman, Bakermans-Kranenburg, Juffer & Van Ijzendoorn, 2006		SSP	CBCL	26
Lewis et al., 1984	Boys subsample modified SSP	SSP	CBCL	51
	Girls subsample modified SSP	SSP	CBCL	57
Lieberman, Weston, & Pawl, 1991	Intervention – control sample only	SSP	Obs	52
Lyons Ruth et al., 1993		SSP	Other	62
Madigan, Moran, Schuengel, Pederson & Otten, 2007.		SSP	CBCL	64
Marchand & Hock, 1998		AQS	CBCL	46
Matas et al., 1978		SSP	Obs	48
Moss, Cyr et al., 2004		CassMarv	Other	220
Munson, McMahon, & Spieker, 2001		SSP	CBCL	101
NICHD	Boys High SES subsample	SSP	CBCL	490
	Boys Low SES subsample	SSP	CBCL	55
	Girls High SES subsample	SSP	CBCL	460
	Girls Low SES subsample	SSP	CBCL	70
Pannebakker, unpublished		SSP	CBCL	115
Perez Corres, 2006		SSP	CBCL	51
Pierrehumbert, Miljkovitch, Plancherel, Halfon, & Ansermet, 2000		SSP	CBCL	40
Radke Yarrow, McCann, DeMulder, Belmont, & et al., 1995		SSP	Diag	95
Rothbaum, Rosen, Pott, & Beatty, 1995		SSP	CBCL	32
Schmidt, Demulder, & Denham, 2002		AQS	CBCL	49
Schuengel et al., unpublished data		SSP	CBCL	38
Seifer et al., 2004		SSP	CBCL	732
Shaw et al., 1996		SSP	CBCL	77
Smeekens, Riksen Walraven, & van Bakel, 2007		SSP	CBCL	105
Solomon et al., 1995		MC	Other	40
Speltz, Greenberg, & DeKlyen, 1990		CassMarv	Diag	50

Speltz, DeKlyen, & Greenberg, 1999		CassMarv	Diag	160
Stams, Juffer, & van Ijzendoorn, 2002		SSP	CBCL	155
Suess, Grossmann, & Sroufe, 1992		SSP	Obs	35
Turner, 1991	Boys subsample	CassMarv	Obs	18
	Girls subsample	CassMarv	Obs	22
Van IJzendoorn, Sagi, & Lambermon, 1992		SSP	Other	68
Van Zeijl et al., 2006	1yr ssp Boys	CassMarv	CBCL	25
	1yr ssp girls	CassMarv	CBCL	18
	2yr ssp boys	CassMarv	CBCL	28
	2yr ssp girls	CassMarv	CBCL	10
	3yr ssp boys	CassMarv	CBCL	18
	3yr ssp girls	CassMarv	CBCL	16
Vondra, Shaw, Swearingen, Cohen, & Owens, 2001		SSP	CBCL	165
Weiss & Seed, 2002		AQS	CBCL	110
Wood, Emmerson, & Cowan, 2004		AQS	CBCL	37

Note:

[1] AQS = Waters and Deane (1985) Attachment Q-Set; CassMarv= Cassidy and Marvin/MacArthur Preschool Attachment Coding System, PAA=Crittenden Preschool Attachment Assessment, MC=Main and Cassidy age 6 Scoring System.

[2] Obs=externalizing directly observed; CBCL=Child Behavior Checklist; Other=Other externalizing questionnaire; Diag=clinical diagnosis.

Table 2

Insecure Attachment and Externalizing Behavior: Total Set and Set of SSP Studies

	k	*N*	*d'*	*Confidence Interval 95%*	*Homogeneity Q*	*Contrast Q*	*Contrast p*
Total set	69	5947	0.31**	0.23, 0.40	135.18**		
clinical						5.48	.02
non-clinical	56	4812	0.26**	0.17, 0.35	89.06**		
clinical	13	1135	0.49**	0.32, 0.66	29.98**		
gender						8.49	.01
boys	14	1210	0.35**	0.17, 0.54	32.41**		
girls	12	907	-0.03	-0.16, 0.11	13.93		
mixed	43	3830	0.36**	0.26, 0.46	69.79**		
SES						0.05	.82
low	14	1801	0.25**	0.15, 0.35	15.49		
middle/high	55	4146	0.31**	0.21, 0.41	119.69**		
measure						14.49	<.01
SSP	43	4488	0.18**	0.12, 0.24	57.31		
AQS	7	464	0.70**	0.51, 0.90	5.57		
CassMarvin	12	708	0.37**	0.16, 0.57	32.18**		
other	7	287	0.39**	0.14, 0.64	10.93		
Observer Ext						10.27[1]	.02
mother	44	4129	0.22**	0.12, 0.32	72.37**		
teacher	10	922	0.30**	0.17, 0.44	15.72		
observed	7	211	0.58**	0.30, 0.86	4.12		
other	6	425	0.62**	0.35, 0.89	15.83**		
combined	2	260	0.45**	0.20, 0.71	2.21		
SSP studies							
All SSP studies	43	4488	0.18**	0.12, 0.24	57.31		
clinical						0.03	.86
non-clinical	36	3899	0.22**	0.13, 0.31	55.33*		
clinical	7	589	0.21*	0.04, 0.38	1.83		
gender						13.08	<.01
boys	6	836	0.18*	0.04, 0.32	4.27		
girls	6	753	-0.06	-0.21, 0.09	8.52		
mixed	31	2899	0.24**	0.17, 0.32	31.44		
SES						0.90	.34
low	12	1635	0.22**	0.12, 0.32	11.47		
middle/high	31	2853	0.19**	0.09, 0.29	44.87*		
Observer Ext						8.91[1]	.01
mother	31	3499	0.13**	0.06, 0.20	39.35		
teacher	4	463	0.22*	0.03, 0.40	0.79		
observed	5	171	0.61**	0.29, 0.92	0.80		
other	1	95	0.32	-0.10, 0.73			
combined	2	260	0.45**	0.20, 0.71	2.21		

[1]subgroup with $k < 4$ excluded from contrast

Table 3

Avoidant Attachment and Externalizing Behavior: Total Set and Set of SSP Studies

	k	*N*	*d*[1]	*Confidence Interval 95%*	*Homogeneity Q*	*Contrast Q*	*Contrast p*
Total set	34	3675	0.12**	0.03, 0.21	40.54		
clinical						0.93	.33
non-clinical	28	3273	0.10*	0.01, 0.20	35.62		
clinical	6	402	0.22*	0.01, 0.43	3.98		
gender						1.24	.54
boys	9	890	0.19*	0.03, 0.36	5.32		
girls	7	763	0.13	-0.09, 0.34	8.45		
mixed	18	2022	0.08	-0.04, 0.20	25.53		
SES						2.42	.12
low	5	1001	-0.01	-0.20, 0.17	6.81		
middle/high	29	2674	0.15**	0.06, 0.25	31.31		
measure						0.00[1]	.98
SSP	25	3054	0.13**	0.03, 0.23	26.01		
CassMarvin[2]	7	523	0.13	-0.11, 0.37	12.78*		
other	2	98	-0.20	-0.69, 0.28	0.01		
SSP studies							
All SSP studies	25	3054	0.13**	0.03, 0.23	26.01		
gender						0.03	.98
boys	5	647	0.12	-0.08, 0.33	1.09		
girls	6	753	0.16	-0.06, 0.38	1.77		
mixed	14	1654	0.15*	0.01, 0.33	23.03*		
SES						2.95	.10
low	5	1001	-0.01	-0.20, 0.17	6.81		
middle/high	20	2053	0.18**	0.07, 0.29	16.25		

[1]subgroups with $k < 4$ excluded from contrast

Table 4 Resistant Attachment and Externalizing Behavior: Total Set and Set of SSP Studies

	k	*N*	*d*[1]	*Confidence Interval 95%*	*Homogeneity Q*	*Contrast Q*	*Contrast p*
Total set	35	3568	0.11	-0.04, 0.26	66.32**		
clinical						1.36	.24
non-clinical	29	3165	0.06	-0.10, 0.23	48.76**		
clinical	6	403	0.30	-0.05, 0.64	14.27*		
gender						0.11	.95
boys	9	883	0.16	-0.02, 0.34	7.47		
girls	10	809	0.16	-0.20, 0.52	22.88**		
mixed	16	1876	0.10	-0.12, 0.32	35.45**		
SES							
low	3	857	0.04	-0.17, 0.24	0.66		
middle/high	32	2711	0.11	-0.06, 0.28	65.17**		
measure						0.97[1]	.33
SSP	24	2910	0.05	-0.13, 0.24	35.54*		
CassMarvin[2]	9	559	0.25*	0.05, 0.45	12.90		
other	2	99	0.39	-0.23, 1.01	13.24**		
Observer Ext							
mother	27	2831	0.08	-0.12, 0.28	54.62**		
teacher	3	334	0.21	-0.29, 0.71	7.14*		
observed	1	48	-0.07	-0.66, 0.52			
other	3	250	0.24	-0.02, 0.49	1.03		
combined	1	105	0.10	-0.29, 0.49			
SSP studies							
All SSP studies	24	2910	0.05	-0.13, 0.24	35.54*		
gender						0.56	.75
boys	5	637	0.11	-0.14, 0.36	4.17		
girls	7	766	0.17	-0.19, 0.53	16.59*		
mixed	12	1507	0.01	-0.13, 0.14	14.03		
SES							
low	3	857	0.04	-0.17, 0.24	0.66		
middle/high	21	2053	0.05	-0.14, 0.23	34.87*		

[1]subgroups with $k < 4$ excluded from contrast
[2]Insecure-Other included in Disorganized

Table 5

Disorganized Attachment and Externalizing Behavior: Total Set and Set of SSP Studies

	k	*N*	*d*	*Confidence Interval 95%*	*Homogeneity Q*	*Contrast Q*	*Contrast p*
Total set	34	3778	0.34**	0.18, 0.50	99.66**		
clinical						0.75	.39
non-clinical	27	3184	0.30**	0.12, 0.49	83.00**		
clinical	7	594	0.43**	0.26, 0.61	11.91		
gender						6.58	.04
boys	8	839	0.35*	0.03, 0.66	20.84**		
girls	6	702	-0.20*	-0.39, -0.01	5.62		
mixed	20	2237	0.44**	0.26, 0.61	42.82**		
SES						0.42	.52
low	9	1266	0.44**	0.28, 0.60	13.42		
middle/high	25	2512	0.31**	0.12, 0.50	80.22**		
measure						1.32[1]	.25
SSP	24	3161	0.27**	0.10, 0.45	69.00**		
CassMarvin[2]	9	573	0.50**	0.16, 0.84	19.41*		
other	1	44	1.10**	0.41, 1.79			
Observer Ext						5.78[1]	.06
mother	24	2758	0.20*	0.02, 0.39	52.94**		
teacher	4	415	0.48*	0.06, 0.91	11.73**		
observed	0	0					
other	4	345	0.62**	0.39, 0.84	5.32		
combined	2	260	0.61*	0.08, 1.13	7.32**		
SSP studies							
All SSP studies	24	3161	0.27**	0.10, 0.45	69.00**		
clinical						0.08	.77
non-clinical	20	2817	0.29**	0.09, 0.48	67.25**		
clinical	4	344	0.26*	0.03, 0.38	1.55		
gender						10.99[1]	<.01
boys	3	568	0.12	-0.12, 0.36	5.17		
girls	4	669	-0.24*	-0.44, -0.05	1.84		
mixed	17	1924	0.39**	0.22, 0.56	31.38**		
SES						2.15	.14
low	9	1266	0.44**	0.28, 0.60	13.42		
middle/high	15	1895	0.17	-0.03, 0.38	43.81**		

[1]subgroup with $k < 4$ excluded from contrast
[2]Insecure-Other included in Disorganized