

# Representational and Questionnaire Measures of Attachment: A Meta-Analysis of Relations to Child Internalizing and Externalizing Problems

Sheri Madigan  
University of Calgary

Laura E. Brumariu  
Adelphi University

Vanessa Villani and Leslie Atkinson  
Ryerson University

Karlen Lyons-Ruth  
Harvard Medical School

Although the quality of the attachment relationship is often cited as an important determinant of development, the extent of impact of this environmental influence in shaping behavioral outcomes has been a matter of considerable debate. This may, in part, be because of the variability in methodologies used for assessing attachment across infancy, childhood, and adolescence, including behavioral, representational, and questionnaire measures of attachment. Previous meta-analyses of the relations between attachment and internalizing and externalizing problems have focused on the behavioral measures of attachment used primarily in infancy. The current meta-analysis is a comprehensive examination of the literature on attachment and behavioral problems in children aged 3–18 years, focusing on the representational and questionnaire measures most commonly used in this age range. When secure attachment was compared with insecure attachment, modest associations with internalizing behavior (165 studies; 48,224 families;  $d = .58$ ; 95% confidence interval [CI] [.52–.64]) were found. Multivariate moderator analyses were used to disentangle the unique influence of each significant univariate moderator more precisely, and results revealed that effect sizes decreased as the child aged, and were larger in studies in which the participants were ethnically White, where the child was the problem informant, and when the internalizing measure was depressive symptoms. Attachment and externalizing behavior were also associated (116 studies; 24,689 families;  $d = .49$ ; 95% CI [.42–.56]), and effect sizes were larger in ethnically White samples, and in those where the child was the problem informant. Avoidant, ambivalent, and disorganized attachment classifications were associated with internalizing behavior, but only disorganized attachment was associated with externalizing behavior.

*Keywords:* attachment, internalizing behavior, externalizing behavior

Borne of the pioneering work of John Bowlby and Mary Ainsworth, a protocol was developed in the 1970s for measuring the quality of attachment formed between an infant and his or her mother (Ainsworth, Blehar, Waters, & Wall, 1978). This protocol, known as the Strange Situation Paradigm, relies on direct observations of interaction between a mother and child to assess the quality of attachment formed between them. The label “secure” was and still is used to describe a child’s confidence that a

supportive attachment figure or “secure-base” is available to respond to his or her needs and cues, and the term “insecure” is used to describe a child’s propensity to expect rejection or inconsistent responding when bids for proximity and closeness are initiated. Although considered a gold standard measure of attachment, the age range for which the Strange Situation Paradigm can be used in children is restricted to the infancy period. In the last two decades, attachment research has broadened its scope of study, focusing on measuring children’s transition to mental representations of attachment after infancy. With greater cognitive sophistication, children’s<sup>1</sup> perceptions of early and current attachment experiences with their caregivers are captured using nonobservational methodologies such as representational (e.g., story stem and narrative techniques) and/or questionnaire measures of attachment.<sup>2</sup> As a result, these attachment measures have become the predominant methodologies for assessing children’s attachment to caregivers beyond infancy. Indeed, the literature now consists of three meth-

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Sheri Madigan, Department of Psychology, University of Calgary; Laura E. Brumariu, Gordon F. Derner Institute of Advanced Psychological Studies, Adelphi University; Vanessa Villani and Leslie Atkinson, Department of Psychology, Ryerson University; Karlen Lyons-Ruth, Department of Psychiatry, Harvard Medical School.

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Correspondence concerning this article should be addressed to Sheri Madigan, Department of Psychology, University of Calgary, 2500 University Ave., 2500 University Dr. N.W., Calgary, AB, T2N 1N4, Canada. E-mail: [sheri.madigan@ucalgary.ca](mailto:sheri.madigan@ucalgary.ca)

<sup>1</sup> The words “child” and “children” in the current manuscript refers to both children and adolescents.

<sup>2</sup> Representation and questionnaire measures of attachment are hereafter referred to as attachment measures unless a distinction between the two measurement types is required.

odologically distinct attachment literatures that also differ by age of assessment: (a) behavioral measures of attachment, primarily assessed in infancy; (b) representational measures of attachment in early and middle childhood (e.g., story stem procedure; Bretherton, Ridgeway, & Cassidy, 1990), as well as in adolescence (e.g., Child Attachment Interview; Target, Fonagy, & Shmueli-Goetz, 2003); and (c) questionnaire measures of attachment in middle childhood (e.g., Security Scale; Kerns, Aspelmeier, Gentzler, & Grabill, 2001) and adolescence (e.g., Inventory of Parent and Peer Attachment; Armsden & Greenberg, 1987). The current meta-analytic synthesis focuses on the latter two attachment measures, and thus, encompasses all representational and questionnaire measures of attachment from the early childhood period through to adolescence.

Accompanying these advances in attachment methodologies over the past several decades is an explosion of research exploring the contribution of attachment to behavior problems among children. For example, a search in Google Scholar using the term *attachment* along with *internalizing* between the years 2010–2014 yielded ~17, 300 articles, compared with the 15,500 articles generated with the same term search from the preceding 10-year period (2000–2009). Despite this complex and extensive literature, a meta-analytic synthesis of the association between attachment and internalizing, as well as externalizing problems across the full spectrum of childhood is absent from the literature.

Since the conception of parent–child attachment theory over a half century ago, it has been cited as one of the most powerful environmental determinants of children’s well being (Bowlby, 1969; van Ijzendoorn, Schuengel, & Bakermans-Kranenburg, 1999). A number of previous meta-analyses have examined this relation using studies primarily assessing attachment in infancy (Fearon, Bakermans-Kranenburg, Van Ijzendoorn, Lapsley, & Roisman, 2010; Groh, Roisman, van Ijzendoorn, Bakermans-Kranenburg, & Fearon, 2012; Madigan, Atkinson, Laurin, & Benoit, 2013). These meta-analyses yield effect sizes that are small to moderate in magnitude ( $d = .31$  to  $.37$ ). More important, however, these meta-analyses are restricted to behavioral observations of attachment. In addition, they tackle the question of whether early attachment forecasts early behavioral difficulties, but not whether attachment at later ages is relevant for developing behavioral difficulties at later ages (Kerns & Brumariu, 2014). Thus, a significant gap exists in our understanding of whether this relation between attachment and behavior problems continues to hold when attachment is assessed later in childhood. It may be, for example, that the influence of the attachment relationship is strongest in the early years when the child is most dependent on the parent for care, and wanes in strength as the child becomes more independent and more influenced by peers and teachers. In addition to a more exclusive focus on the infancy period, previous meta-analyses on attachment and behavioral problems do not include recent advances in attachment methodology toward representational and questionnaire measures. Thus, there is also a need to synthesize the findings from child and adolescent studies because these newer attachment measures have not all been validated against attachment measures in infancy (e.g., Strange Situation, Attachment Q-sort). We cannot assume that the findings from behavioral studies in infancy will apply equally to studies using newer methodologies in childhood and adolescence.

The central aim of the current study is to address gaps in the meta-analytic literature on attachment and behavior problems by deriving effect sizes for the relations between attachment and internalizing and externalizing behavior from the burgeoning literature using representational and questionnaire measures of attachment from early childhood through to adolescence (i.e., age 3 to 18). It is paramount to investigate the robustness of these attachment methodologies in predicting adjustment outcomes, as findings often vary in strength and significance within and across studies. Findings from the current meta-analysis will allow for a more integrative conclusion regarding the predictive power of parent–child attachment across multiple methodologies for assessing attachment across the full developmental spectrum. However, there are also a number of subsidiary aims of the current work that consider questions not addressed in previous meta-analyses. First, analyses will assess whether there are meaningful differences between representational measures and questionnaire measures in predicting behavior problems across childhood, and, if so, how such differences may be related to problem informant and child age. Other potentially relevant moderators of the relation between attachment and behavior problems, such as gender, family risk, ethnicity, and socioeconomic status, will also be assessed. Second, until recently, the hierarchical structure of effect sizes has been largely ignored in meta-analyses, and, in the meta-analytic literature on attachment and behavior problems, it is absent altogether. The previous practice of examining moderators independent of other moderators can be misleading, insofar as findings regarding one moderator may be partially or entirely attributable to another moderator that was not simultaneously assessed (Atkinson, Niccols, et al., 2000). This, of course, is the issue of shared and unique variance, impossible to determine with bivariate moderator statistics. In the current meta-analysis, we use meta-regression, which allows for the assessment of the combined impact of multiple moderators. In this way, multiple sources of heterogeneity can be disentangled and the unique influence of each moderator more precisely estimated. Finally, following some previous meta-analyses focused primarily on the infancy period (Fearon et al., 2010; Groh et al., 2012; Madigan et al., 2013), we will examine effects associated with each type of attachment insecurity (avoidance, ambivalence, and disorganization). This will allow us to evaluate whether specific associations based on data from infancy, for example, relation between early avoidance and internalizing symptoms (Madigan et al., 2013), are also true of attachment assessed later in childhood.

The current endeavor is timely given the surge of developmental, clinical, and medical theory and research focused on advancing understanding of the role of family processes in child psychopathology. A meta-analysis of the literature during this developmental time frame is critical for clinicians and the lay public alike, as chronic behavioral difficulties are most likely to become serious enough to warrant clinical attention during middle childhood and adolescence (Cohen & Hesselbart, 1993). Moreover, representational and questionnaire measures of attachment are increasingly used in clinical practice with children. Thus, an assessment of the consistency and reliability of effects across studies and across methodologies is needed to determine the clinical rigor of these assessment batteries (Crittenden, Claussen, & Kozlowska, 2007; Higgins, Thompson, Deeks, & Altman, 2003).

### Attachment as Risk Factor

During the infancy period, early interaction with caregivers is considered to be an important determinant of individual differences in emotion and behavioral regulation (Ainsworth et al., 1978; Bowlby, 1969). Children learn how to regulate their behavior in the context of interactions with caregivers (Kerns & Brumariu, 2014). Bowlby (1973) speculated that through repeated experiences, the enduring effects of these early interactions with caregivers are carried forward into later social relationships, and thus, problematic early interactions have an effect on the child's development of emotional and behavioral disorders. By middle childhood, the child's social world expands to include peers, teachers, and other noncaregiving attachment figures. Nonetheless, the foundation for the processing of ongoing internal and/or relational experiences, including those that are behaviorally problematic, are thought to be influenced by the child's attachment to his or her caregiver(s). Regardless of an individual's developmental stage, this dominant theoretical approach to psychopathology has been a mainstay of developmental research in the last half century.

Through Bowlby's (1969) work with juvenile thieves and other clinical groups, he pioneered the theory that disruptions in the child-caregiver relationship, such as parental loss, separation, or physical and/or emotional unavailability, were central to the development and maintenance of psychopathology. Ainsworth and colleagues (Ainsworth et al., 1978) and Bowlby's attachment trilogy (Bowlby, 1969, 1973, 1980) built on this foundation, arguing that, in both normative and clinical samples, children exposed to consistently sensitive responsiveness will develop secure attachment, and this relationship model will carry a developmental advantage by reducing the risk of socioemotional maladaptation (Fearon & Belsky, 2011; Pallini, Baiocco, Schneider, Madigan, & Atkinson, 2014). In contrast, when a child experiences uncertainty about attachment figures' availability to respond to attachment-related needs and signals, the child may be prone to developing insecure models of interpersonal relations, which in turn increases the risk of ensuing behavioral problems.

There are published meta-analytic syntheses on the developmental sequelae of secure and insecure attachment, derived from *behavioral assessments in the infancy period*, and each have provided support for Bowlby's (1969) global theory that attachment insecurity is linked with higher levels of internalizing (Groh et al., 2012; Madigan et al., 2013) and externalizing (Fearon et al., 2010) problems. Once adjusted for publication bias, the direct association between insecure attachment in infancy and subsequent externalizing and internalizing problems, is significant but small, accounting for 5.5% (Fearon et al., 2010) to 6% (Madigan et al., 2013) of the variance. On the opposite end of the developmental spectrum, there is a meta-analysis also demonstrating a small to moderate association between insecure adult *representations* of attachment as assessed with the Adult Attachment Interview specifically, and psychopathological functioning (Bakermans-Kranenburg & van IJzendoorn, 2009). However, there are no meta-analyses to date examining the association between attachment in childhood and adolescence and the two broadband dimensions of behavioral adjustment (i.e., internalizing and externalizing).

### Subtypes of Insecure Attachment and Behavior Problems

With the delineation of three insecure attachment patterns (ambivalent, avoidant, and disorganized; Ainsworth et al., 1978; Main & Solomon, 1986, 1990), the question of how each may be implicated in the development of behavioral problems in childhood has garnered considerable attention. In early theorizing, it was proposed that ambivalent attachment is relevant for the development of internalizing symptoms because ambivalent attachment is characterized by inhibition of autonomy and difficulty in mastering the environment, which in turn, may interfere with emotional regulation capabilities and promote the development of internalizing behavior (e.g., anxiety, helplessness, and depression; Finnegan, Hodges, & Perry, 1996; Hodges, Finnegan, & Perry, 1999; Manassis, 2001). In contrast, avoidant attachment was originally linked with externalizing problems. Carlson and Sroufe (1995) argued that avoidance would be associated with the development of conduct disorders and antisocial personality styles, as the attachment-related feelings of rejection and rebuff are likely to be expressed in the form of anger and frustration. Moreover, underlying the avoidant strategy is an inhibition of communication and/or a displacement of anger and distress (Lyons-Ruth, 1996). Carlson and Sroufe (1995) postulated that avoidantly attached children might also be prone to internalizing problems. They suggested that depression and withdrawal might result from avoidant as well as ambivalent attachment, because of experiences of loss and psychological unavailability of the attachment figure. However, much of the above theory appeared before disorganized attachment had been well-characterized.

Meta-analytic evidence suggests some support, but also partial contradictions with these theoretical propositions. In two recent meta-analyses on behavioral measures of attachment, ambivalent attachment (primarily assessed in the infancy period) was not related to either of the broadband dimensions of behavioral maladjustment (Fearon et al., 2010; Madigan et al., 2013). In addition, again using early behavioral observations of attachment, avoidant attachment behavior appeared to be more strongly related to internalizing ( $d = .29$ ) than to externalizing behavior ( $d = .11$ ; Fearon et al., 2010; Madigan et al., 2013).

Disorganized attachment was identified and described later than avoidant and ambivalent attachment patterns (Main & Solomon, 1990). Disorganized attachment was initially linked both theoretically and empirically to externalizing problems (Lyons-Ruth, 1996; Lyons-Ruth, Alpern, & Repacholi, 1993), based on the extent of overt conflict behavior seen in infancy and the degree of apparent impairment in the parent's ability to provide comfort and support to the infant. The greatest frustration of attachment needs was seen in this group, and this frustration was hypothesized to lead to the highest levels of anger and the lowest levels of self-regulation. Consistent with this theory, meta-analytic evidence indicates that disorganized attachment behavior in the infancy period increases the risk for externalizing behavior (Fearon et al., 2010), but not internalizing problems (Groh et al., 2012; Madigan et al., 2013). However, similar to avoidant and ambivalent attachment, little is known about the association between disorganized attachment assessed at later ages and behavioral problems.

## Developmental Periods, Attachment, and Behavior Problems

DeKlyen and Greenberg (2008) suggested that risk factors for behavioral maladjustment, such as insecure attachment, can have differential influences at various developmental periods. On the one hand, it is plausible that the role of attachment on internalizing and externalizing difficulty may have a more dominant influence in the early stages of child development, whereas other risk factors, such as cognitive ability, peer relationships, and/or family factors may exert a greater influence during childhood and adolescence (DeKlyen & Greenberg, 2008). Another possibility is that attachment is more relevant for psychopathology later in development when rates of psychopathology increase and when socialization challenges are heightened (Leve, Kim, & Pears, 2005). Thus, it cannot be inferred based on previous meta-analytic investigations confined primarily to the infancy period that insecure attachment is a risk factor for behavioral difficulty in all stages of childhood. Attachment has also been shown to be susceptible to modification in response to changes in life or family circumstances, such as changes in the caregiving environment (Vaughn, Egeland, Sroufe, & Waters, 1979). Further, attachment shows only moderate stability from infancy to any later point in time (average  $r = .39$ ; Fraley, 2002; Pinquart, Feußner, & Ahnert, 2013). In summary, for several reasons it is crucial to evaluate the effects of attachment on behavior problems across a wide-ranging developmental span rather than an isolated period of time such as infancy or adulthood (Waters, Hamilton, & Weinfield, 2000). Therefore, in the current analyses, we incorporate a broad age range (3 to 18 years old) that encompasses all representation and questionnaire measures of attachment during this time period.

### Methodological Approaches to Assessing Attachment in Childhood

The absence of a meta-analysis on attachment and behavior problems across childhood and adolescence may, in part, be because of the fact that measurement approaches to the assessment of attachment security differ considerably within this age range. Behavioral measures of the quality of attachment between a parent and child include the Strange Situation in infancy (Ainsworth et al., 1978) and its adaptations to preschool and school-age children (Cassidy & Marvin, 1992; Main & Cassidy, 1988), as well as the Attachment Behavior Q-sort (AQS; Everett Waters, 1987). Common to each of these behavioral measures is a direct observation of the primary caregiver and child interacting. For the first three measures, observation occurs in the laboratory setting, while the AQS observation occurs in the home. Although these were the initial methods for assessing the quality of the attachment relationship, these methodologies were not extended to middle childhood and adolescence until recently (Bureau, Easterbrooks, & Lyons-Ruth, 2009; Obsuth, Hennighausen, Brumariu, & Lyons-Ruth, 2014).

In the middle childhood and adolescent period there has been no dominant conceptual or methodological approach to the assessment of attachment, and several distinct instruments have aimed to capture attachment security through representational and questionnaire measures (Kerns, 2008). Generally, there are three central techniques utilized. Two have focused on the children's mental

representations of attachment using semiprojective or narrative discourse techniques and a third has focused on children's perceptions of attachment via questionnaire measures. First, semiprojective techniques, such as story-stem narratives and picture response procedures, assess internal representations of attachment (e.g., Attachment Story Completion Task, Bretherton et al., 1990; Separation Anxiety Test [SAT], Slough & Greenberg, 1990; for reviews, see Solomon & George, 1999; Kerns & Seibert, *in press*). The Adult (or Adolescent) Attachment Interview (AAI, George, Kaplan, & Main, 1996) and an adapted version for children (Child Attachment Interview; Target et al., 2003) are narrative discourse measures used to assess a person's state of mind regarding their attachment history. Second, a variety of questionnaires assessing the child's perceptions of attachment have been developed (e.g., the Security Scale (Kerns et al., 2001); the Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987). Because variation in measurement is often a source of inconsistent findings (e.g., McLeod, Wood, & Weisz, 2007), we test whether attachment methodology (i.e., representational vs. questionnaire) accounts for between-study variability in effect sizes.

A core focus of each attachment measure described above is to capture the child's internal representation or perceived appraisal of attachment. Measures of attachment during this time period have been conceived of as drawing upon the same definitions and theoretical base regarding attachment as the well-established behavioral methodologies from the infancy and adulthood periods (Kerns, 2008). To synthesize the literature across all three methodologically distinct paradigms, that is, behavioral, representational, and questionnaire measures, in the current study we first provide effect sizes for representational and questionnaire measures, and second we contrast and compare those effect sizes with the combined effect sizes for behavioral measures of attachment that were generated in previously published meta-analyses by Fearon et al. (2010) and Madigan et al. (2013). These two steps should yield the most comprehensive examination of attachment and internalizing and externalizing problems to date.

### Methodological Approaches to Assessing Behavioral Problems

A longstanding debate in clinical practice and research on psychopathology is the choice of behavior problem informant. Meta-analytic findings have indicated a modest correlation of  $r = .28$  between the reports of different informants on child behavior problems (Achenbach, McConaughy, & Howell, 1987), suggesting some agreement across problem informants, but also sizable discrepancy. Discrepancies exist across multiple methodologies for assessing behavior problems in children (e.g., questionnaires, structured interviews; Grills & Ollendick, 2002), and moreover, given the developmental span covered, problem informant is especially important to examine as a moderator in the current study. Teachers or parents often provide reports of problematic behavior in younger children, whereas older children are more often the source of information regarding their own level of internalizing and externalizing difficulty. Moreover, meta-analytic evidence suggests that the degree of problem informant correspondence differs for internalizing and externalizing behavior, with stronger informant agreement among the more observable behaviors (i.e., externalizing) compared with less observable behaviors (i.e., in-

ternalizing; Achenbach et al., 1987; De Los Reyes & Kazdin, 2005). Thus, we examine whether effect sizes vary as a function of the informant of problematic behavior for both broadband dimensions of behavior problems.

The literature related to behavior problems uses a broad array of definitions and measures to encompass the behavioral concept of “internalizing” (e.g., anxiety, depression) and “externalizing” (e.g., aggression, delinquency) behavior. In their narrative review, Brumariu and Kerns (2010) suggest that the association between specific internalizing symptomatology (i.e., depression and anxiety) may be differentially related to attachment. Thus, we also evaluate specific components of internalizing and externalizing behavior problems to assess whether findings are more robust in relation to the global constructs of internalizing and externalizing problems, or whether they are more specific to a particular subcomponent of maladaptation (e.g., depression, aggression).

### Common Method Variance

From a methodological perspective, it is important to address the potential confound of common method variance because in studies using representational and questionnaire measures the child may be the informant of attachment status as well as the problem informant. Concerns regarding common method variance are especially heightened when self-report methodologies and cross-sectional designs are simultaneously used (Spector, 2006). Thus, common method variance may be a particularly important confound in studies that assess children’s perceptions of attachment status in relation to children’s self-reports of problem behaviors. We will address this issue using meta-regression analyses in the current study.

### Additional Potential Moderators

Males and females are differentially susceptible to various forms of psychopathology (Zahn-Waxler, Shirtcliff, & Marceau, 2008). Gender is also a significant moderator of the association between attachment and behavior problems, with meta-analytic evidence from behavioral measures of attachment suggesting that insecurity in boys is an important correlate of internalizing and externalizing outcomes (Fearon et al., 2010; Madigan et al., 2013). Thus, child gender will also be examined as a potential moderator in the current study. Socioeconomic status (SES) and family risk status are also associated with increased risk for psychopathology in childhood (Zahn-Waxler et al., 2008) and will, thus, be examined as moderators. Culture also influences the manifestation and prevalence of different forms of psychopathology (Mezzich, Lewis-Fernández, & Ruiperez, 2008). Therefore, geographical location and ethnicity of participants will be examined. We also examine publication year because this meta-analysis spans several decades, and previous meta-analytic findings in the field of attachment have shown that effect sizes decrease over time (Madigan et al., 2013; Verhage et al., in press). Finally, we assess whether the strength of the hypothesis that attachment is associated with behavior problems is contingent on three dimensions of study quality: (a) the type of research design utilized (e.g., cross-sectional vs. longitudinal); (b) publication status (i.e., dissertation vs. publication) because of possible publication bias; and (c) quality of the publication outlet (i.e., journal impact score).

## Method

### Literature Search

Published and unpublished studies were located in three ways, as detailed in the PRISMA statement (Moher, Liberati, Tetzlaff, & Altman, 2009) in Figure 1. The stems of the following identifiers or keywords in the title or abstract were used in the separate or combined searches: *internal\**, *external\**, *behavior problem\**, *social functioning*, *anx\**, *depress\**, *aggress\**, *conduct\**, and *psychopathology*, in conjunction with the names of the various attachment-related measures used in childhood (e.g., Child Attachment Interview). Our search was restricted to published and unpublished studies in English through January 2013.<sup>3</sup>

### Inclusion and Exclusion Criteria

A study was included if it fulfilled the following four criteria. First, the study involved children under the age of 18 years. Second, the attachment relationship was assessed using a representational or questionnaire measure of attachment with one or both parents. Some measures of attachment represent security of attachment with parent(s) as a continuous measure (e.g., Security Scale, IPPA) whereas others represent attachment categorically (e.g., AAI). Studies were included in both instances, as effect sizes can be calculated using either approach. It is important to note that studies examining attachment collectively across peers, partners, and/or parents were excluded, as these measures do not focus exclusively on the specific parent–child relationship, but rather examine attachment as a global construct across a number of potential attachment influences. Third, a teacher, parent, or self-report measure, or an interview assessment of behavior problems was collected concurrently or prospectively to the assessment of attachment. Studies were included if the behavioral outcome was a diagnosis or measure of one of the two broadband dimensions (internalizing or externalizing) or on a more focused aspect of internalizing (e.g., depression, anxiety) and/or externalizing (e.g., aggression) problems. Fourth and finally, a study was included if the study statistics could be transformed into an effect size. When studies did not report sufficient information for the calculation of an effect size (e.g., no means, *SDs*, correlations, etc., and/or if authors only reported effect sizes for subscales of a particular attachment measure), the corresponding authors were contacted. In total, we contacted 57 corresponding authors by email. Of those contacted, 21 (37%) replied with the necessary statistics and the remaining studies ( $k = 36$ ) were subsequently excluded.

In total, 165 studies (48,224 families) met the final inclusion criteria for the meta-analysis on attachment and internalizing behavior and 116 studies (24,689 families) met the inclusion criteria for the meta-analysis on attachment and externalizing behavior (87 studies had concurrent reports of both internalizing and externalizing behavior). Study characteristics are presented in Table 1.

**Multiple results from single samples represented across more than one publication.** To ensure independence of effect sizes, a protocol for selecting nonoverlapping samples was derived. First, we identified overlapping samples of participants by

<sup>3</sup> The earliest eligible study available in the literature was 1990.

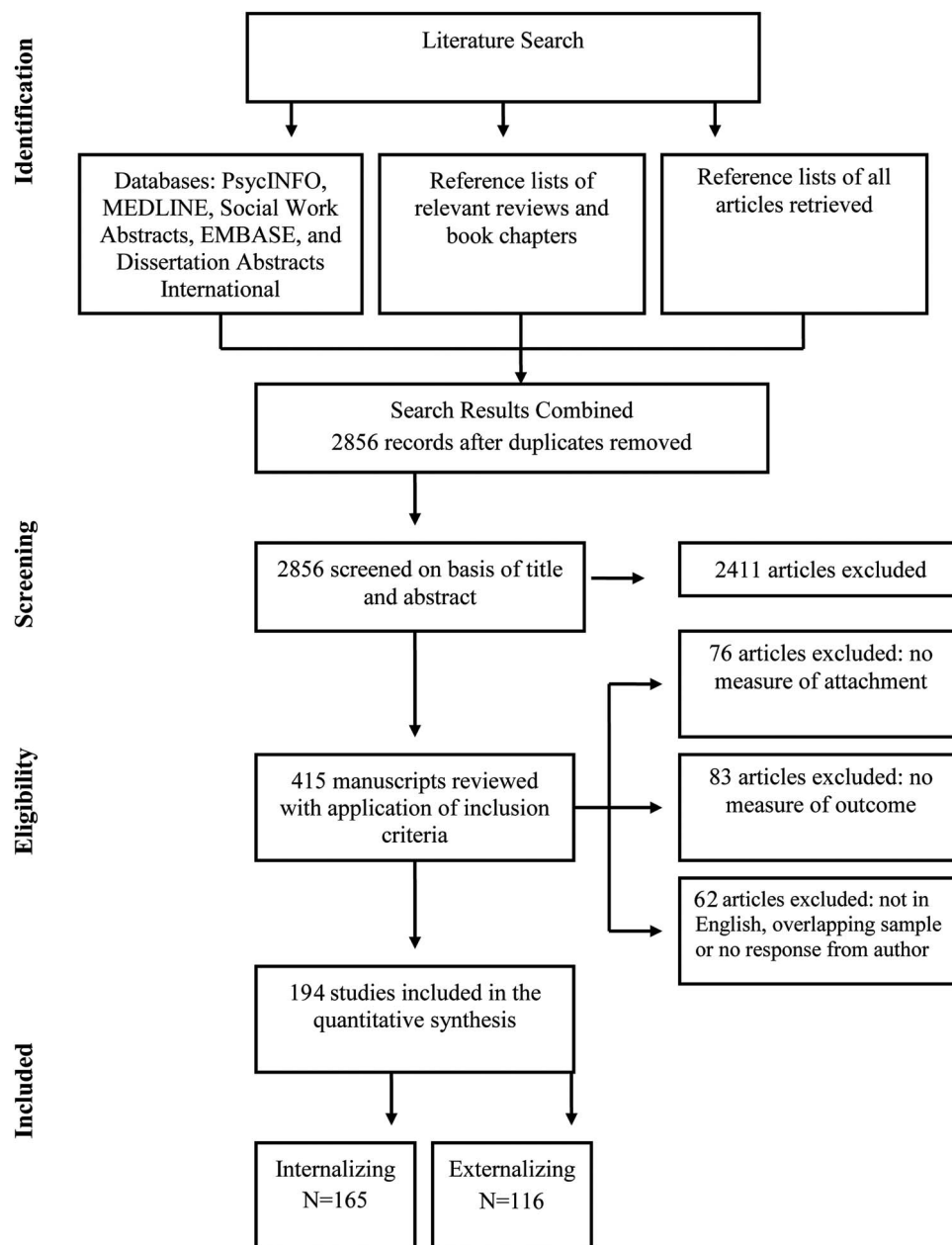


Figure 1. PRISMA flow used to identify studies for detailed analysis of attachment and internalizing/externalizing problems.

cross-referencing authorship across multiple publications. Second, we cross-referenced studies with sample sizes of similar magnitude to determine whether the participants originated from the same sample. If a sample of participants was published in more than one study, only one study was included in the meta-analysis. In such cases, we included the study with the largest sample size and most comprehensive data extraction information.

**Multiple results from single samples with single studies.** Several studies had multiple types or time points for behavioral difficulty, as well as various types of attachment measures. To ensure independence of effect sizes, each sample was only repre-

sented once in the separate meta-analyses on attachment and internalizing behavior, and attachment and externalizing behavior. In samples with multiple assessments of behavioral difficulty and/or measures of attachment, we implemented the following protocol to include a single effect size per sample:

1. If a study was longitudinal, with multiple assessments of attachment, the earliest measure of attachment was selected for analysis. If one representational and one questionnaire measure were collected, we selected the representational measure, as there were relatively

Table 1

*Reviewed Studies, Sample Characteristics, Methods of Assessment, and Study Effect Sizes for All studies Included in the Meta-Analysis on Attachment and Internalizing Problems, and Attachment and Externalizing Problems*

Study	N	Age <sup>a</sup>	Attachment measure		Behavioural problem measure		Study design
			Type	Parent	Type	Informant	
Abela et al. (2005)	140	9.8	Q	M, F	Dep	C	C
Allen et al. (1998)	131	16.0	R	M, F	Int; Ext	C; C	C
Allen et al. (2007)	167	15.0	R	M, F	Dep; Ext	C; C	L
Al-Yagon (2011)	150	15.8	Q	M, F	Int	C	C
Amble (2011)	139	15.4	Q	M, F	Int	P	C
Armsden et al. (1990)	55	13.5	Q	M, F	Dep	I	C
Audet (2008)							
Romanian orphanage children	22	10.5	Q	M, F	Ext	P	L
Canadian nonadopted children	33	10.5	Q	M, F	Ext	P	L
Canadian early adopted children	16	10.5	Q	M, F	Ext	P	L
Bámaca-Colbert et al. (2012)							
Early adolescence	129	12.3	Q	M	Dep	C	C
Middle adolescence	142	15.2	Q	M	Dep	C	C
Bauman et al. (2006)							
Zimbabwe	50	12.4	Q	M	Dep	C	C
United States	50	13	Q	M	Dep	C	C
Bennett (2002)	225	12.9	R	M, F	Int; Ext	P; P	C
Bogard (2005)							
females	173	12.6	Q	M	Dep	C	C
males	201	12.6	Q	M	Dep	C	C
Bohlin et al. (2000)	88	8.6	R	—	Anx	C	L
Bohlin et al. (2012)	65	5.42	R	M, F	Ext	Mix	L
Booth-LaForce et al. (2006)	73	10.2	Q	M	Anx; Agg	Mix; Mix	C; C
Bopp Litz (2007)	26	9.1	R	M or F	Int; Ext	Mix; Mix	C; C
Borelli (2010)	97	10.1	R	M, F	Dep	C	C
Bosmans et al. (2011)	514	13.9	Q	M, F	Int	C	C
Branje et al. (2010)	1,313	13.7	Q	M, F	Dep	C	C
Brown & Wright (2003)	30	17.0	R	—	Int; Ext	C; C	C
Brumariu & Kerns (2008)	74	11.0	Q	M	Anx	C	L
Buist et al. (2004)	288	13.5	Q	M, F	Int; Agg	C; C	L
Bureau & Moss (2010)	104	8.6	R	M	Int; Ext	T; T	C
Burge et al. (1997)	137	18.2	Q	M, F	Int	I	C
Busseri et al. (2006)	3,876	15.8	Q	M, F	Int	C	C
Bystritsky (1999)	62	12.0	Q	M or F	Int; Ext	C; C	C
Capaldi & Stoolmiller (1999)	202	12.0	Q	M, F	Dep; Ext	C; C	C
Caples & Barrera (2006)	232	13.0	Q	M	Int; Ext	C; P	C
Chabrol et al. (2011)							
Females	378	16.7	Q	M, F	Dep; Agg	C; C	C
Males	594	17.1	Q	M, F	Dep; Agg	C; C	C
Chang (2007)							
Females	44	11.3	Q	M	Int; Ext	P; P	C
Males	40	11.3	Q	M	Int; Ext	P; P	C
Chavez (2008)	92	15.9	Q	M, F	Agg	C	C
Chédebois (2009)	292	17.0	Q	M, F	Dep	C	C
Chaowiang (2008)	950	17.0	Q	M	Dep	C	C
Chung & Emery (2010)	454	13.4	Q	M or F	Int; Ext	C; C	C
Clark (2010)	114	17.1	Q	M, F	Int	C	C
Constantine (2006)	283	16.6	Q	M or F	Dep	C	C
Cook (2009)	335	14.6	Q	M, F	Int; Ext	C; C	C
Cook et al. (2012)	338	14.10	Q	M, F	Ext	C	C
Costa & Weems (2005)							
Females	50	11.0	Q	M	Anx	Mix	C
Males	38	11.0	Q	M	Anx	Mix	C
Costa (2007)	74	11.34	Q	M, F	Int	Mix	C
Cotterell (1992)							
Females	28	15.9	Q	M, F	Dep	C	C
Males	29	15.9	Q	M, F	Dep	C	C
Crocetti et al. (2008)	1,868	14.2	Q	M, F	Int; Agg	C; C	C
Crocetti et al. (2010)	1,975	14.5	Q	M, F	Int,Anx	C	C
Cunha et al. (2008)	288	14.6	Q	M, F	Anx	C	C
DeBoard-Lucas et al. (2010)	150	10	Q	M, F	Int; Ext	C; P	C

(table continues)

Table 1 (continued)

Study	N	Age <sup>a</sup>	Attachment measure		Behavioural problem measure		Study design
			Type	Parent	Type	Informant	
De Jesus (1997)	58	14	Q	M, F	Int; Ext	C; C	C
Deković (1999)	508	15.0	Q	M, F	Dep; Agg	C; C	C
Deković et al. (2012)	256	16.02	Q	M or F	Ext	C	C
Richaud de Minzi (2006)	1,019	10.0	Q	M	Dep	C	C
Deng & Roosa (2007)							
Females	360	13.8	Q	M or F	Agg	C	C
Males	321	13.8	Q	M or F	Agg	C	C
DiFilippo & Overholser (2000)							
Females	32	15.6	Q	M, F	Dep	C	C
Males	18	15.6	Q	M, F	Dep	C	C
Diamond et al. (2002)	30	14.9	Q	M	Int; Ext	C; C	C
Dinizulu & Jane (2009)	153	13.0	Q	M, F	Ext	C	C
Donnellan et al. (2005)	731	13	Q	M, F	Ext	T	C
Duchesne & Larose (2007)	121	13.0	Q	M, F	Int; Ext	P; P	C
Duchesne et al. (2009)	636	11.8	Q	M	Dep	C	C
Eberhart & Hammen (2006)	97	17.9	Q	M, F	Dep	C	C
Easterbrooks & Abeles (2000)	45	8.0	R	—	Int; Ext	P; P	C
Ehrlich et al. (2011)	189	16.6	R	M, F	Dep; Ext	C; C	C
Elmore & Huebner (2010)	419	10.1	Q	M, F	Agg	C	C
El-Sheikh & Buckhalt (2003)	106	9.5	Q	M, F	Int; Ext	T; T	C
Fang et al. (2010)	108	13.1	Q	M	Dep	C	C
Fanti et al. (2008)	499	12.5	Q	M, F	Int; Ext	C; C	C
Feres (2010)	282	13.8	Q	M, F	Int	C	C
Fergusson et al. (2000)	922	16.0	Q	M, F	Int; Con	Mix; Mix	C
Formoso et al. (2000)	284	13.3	Q	M, F	Dep; Con	C; C	C
Fournier (2009)	111	9.0	Q	M	Dep	C	C
Futh et al. (2008)	113	5.5	R	M, F	Int; Con	Mix; Mix	C
Gatz (2001)	162	16	Q	M, F	Dep	C	C
Gaylord-Harden et al. (2009)	393	12.0	Q	M	Dep	C	L
Goldwyn et al. (2000)	39	6.3	R	—	Int; Ext	P; P	C
Gonzales et al. (2006)	175	12.9	Q	M	Int; Con	P; P	C
Goodman et al. (2012)	36	7.5	R	—	Dep	C	C
Granot & Mayseless (2001)	113	10.2	R	M	Int; Ext	T; T	C
Grizzle (2007)	178	11.9	Q	M, F	Anx	C	C
Gullone et al. (2006)	326	9.0	R	M, F	Dep	C	C
Gushnowski (2007)	41	4.8	R	M	Int; Ext	T; T	C
Guttman-Steinmetz et al. (2012)	50	9.5	Q	M, F	Int; Ext	P; P	C
Hale et al. (2006)	1,106	14.4	Q	M, F	Anx	C	C
Haranin (2008)	293	8.5	Q	M, F	Int; Ext	C; C	C
Harold et al. (2004)	181	12.7	Q	M, F	Int; Ext	Mix; Mix	C
Hubbs-Tait et al. (1994)	27	3.7	R	M	Int; Ext	P; P	L
Hüsler et al. (2005)	1,028	15.5	Q	M, F	Dep	C	C
Ivarsson et al. (2010)	100	15.0	R	M, F	Int	C	C
James (2009)	101	9.7	Q	M or F	Int; Ext	P; P	C
Jent & Niec (2006)	60	10.2	Q	M, F	Int; Ext	P; P	C
Karageorge (2009)							
Females	250	11.9	Q	M, F	Int; Ext	C; C	C
Males	243	11.9	Q	M, F	Int; Ext	C; C	C
Keiley (2007)	73	15.6	Q	M, F	Int; Ext	P; P	C
Kenny et al. (1998)							
Females	132	13.5	Q	M, F	Dep	C	L
Males	121	13.5	Q	M, F	Dep	C	L
Kenny et al. (2002)	100	14.8	Q	M, F	Dep	C	C
Kerns et al. (2011)	1,364	10.0	Q	M	Anx	P	L
Kerr (2010)	151	11.6	Q	M	Dep; Ext	C; P	C
Kim (1992)	59	5.2	R	—	Int; Agg	T; T	C
Kim-Spoon et al. (2012)							
Females	145	12.6	Q	M or F	Int; Ext	C; C	C
Males	177	12.6	Q	M or F	Int; Ext	C; C	C
Kobak et al. (1991)	48	15.7	R	M, F	Dep	C	C
Korbel (2009)	100	13.5	Q	M	Dep	C	C
Kovacs (2010)	90	10.5	Q	M	Int	P	C
Laible et al. (2000)	89	16.0	Q	M	Int; Agg	C; C	C
Laible et al. (2004)	246	18.6	Q	M, F	Agg	C	C



Table 1 (continued)

Study	N	Age <sup>a</sup>	Attachment measure		Behavioural problem measure		Study design
			Type	Parent	Type	Informant	
Leadbeater et al. (1999)							
Females	230	12.5	Q	M	Int; Ext	C; C	L
Males	230	12.5	Q	M	Int; Ext	C; C	L
Leenaars et al. (2008)	2,319	15.5	Q	M, F	Dep; Agg	C; C	C
Liebman (1997)	121	16	Q	M	Dep	C	C
Liu (2006)	1,144	14.0	Q	M	Dep	C	C
Loukas & Prelow (2004)							
Females	264	12.0	Q	M	Int; Ext	P; P	C
Males	257	12.0	Q	M	Int; Ext	P; P	C
Mackaman (1996)	62	4.8	R	—	Int; Ext	P; P	C
Mahatmya (2009)	498	12.0	Q	M, F	Int; Ext	P; P	C
Marcus & Betzer (1996)	163	12.7	Q	M, F	Agg	C	C
Martens (2005)	47	4.5	R	M, F	Ext	P	C
McConnell (2008)	27	17.0	R	M, F	Dep	C	C
McKay-Killingbeck (2007)	146	14.5	Q	M	Ext	P	C
McKenney (2008)	749	15.8	Q	M	Ext	C	C
McLewin (2010)	38	9.2	Q	M	Int; Ext	P; P	C
Miljkovitch et al. (2007)	71	3.1	R	—	Int	P	C
Milne & Lancaster (2001)	59	15.7	Q	M, F	Dep	C	C
Muris et al. (2001)	155	12.8	Q	M, F	Int	C	C
Nicholas (1998)	188	15.7	Q	M	Dep	C	C
Nielsen (2012)	69	12.3	R	M	Agg	P	C
Noom et al. (1999)	400	15.1	Q	M, F	Int; Ext	C; C	C
Nunn (1998)	97	15.0	Q	M, F	Con	R	C
O'Connor et al. (2011)	991	14.5	Q	M	Int	C	C
Orgel (2007)							
Fostercare	72	4.9	R	—	Int; Ext	P; P	C
Kinship	55	4.9	R	—	Int; Ext	P; P	C
Padilla-Walker & Nelson (2010)							
females	72	16.2	Q	M	Ext	C	C
males	62	16.2	Q	M	Ext	C	C
Papafratzeskakou et al. (2011)							
Females	118	12.5	Q	M, F	Dep	C	C
Males	143	12.5	Q	M, F	Dep	C	C
Papini & Roggman (1992)	47	12.6	Q	M, F	Dep	C	C
Parent-Boursier & Hebert (2010)	79	8.8	Q	M, F	Int; Ext	C; C	C
Pasma (2008)	173	16.2	Q	M	Con	C	C
Peacock et al. (2003)	91	11.7	Q	M, F	Con	C	C
Pettineo (2011)	177	14.0	Q	M	Dep	C	L
Pianta & Longmaid (1999)	144	5.9	R	M, F	Anx; Ext	T; T	C
Pittman & Richmond (2007)	266	18.5	Q	M, F	Int; Ext	C; C	C
Pomerantz et al. (2009)							
Americans	364	12.8	Q	M, F	Anx	C	C
Chinese	388	12.7	Q	M, F	Anx	C	C
Pugliese (1998)	50	5.9	R	M, F	Int; Ext	P; P	C
Puissant et al. (2011)	225	15.7	Q	M, F	Dep	C	C
Ramos-Marcuse & Arsenio (2001)	45	4.7	R	—	Int; Ext	T; T	C
Rashwan (2008)	179	16.0	Q	M, F	Int; Ext	C; C	C
Reese (2008)	83	16.0	Q	M or F	Int; Ext	P; P	C
Reitz et al. (2006)	650	13.4	Q	M, F	Int; Ext	C; C	L
Richmond (2010)	103	13.8	Q	M	Ext	C	C
Ridenour et al. (2006)	310– 320	11.0	Q	M, F	Dep; Con	C; C	C
Roalson (2007)	167	12	Q	M, F	Dep; Con	C; C	C
Rothman & Steil (2012)	23	16	Q	M, F	Int	C	C
Ruijten et al. (2011)	455	14.3	Q	M, F	Dep	C	C
Salzinger et al. (2007)	200	10.5	Q	M or F	Int; Ext	T; T	L
Salzinger et al. (2011)	667	12.5	Q	M or F	Int; Ext	C; C	L
Sampat (2008)							
Females	143	15.9	Q	M, F	Int; Ext	C; C	L
Males	149	15.9	Q	M, F	Int; Ext	C; C	L
Sarracino et al. (2011)							
Females	92	11.8	Q	M, F	Ext	C	C
Males	77	11.8	Q	M, F	Ext	C	C

(table continues)

Table 1 (continued)

Study	N	Age <sup>a</sup>	Attachment measure		Behavioural problem measure		Study design
			Type	Parent	Type	Informant	
Schoenfelder et al. (2011)	99	11.3	Q	M or F	Dep	C	C
Schmidt (1998)	68	4.0	R	M, F	Int; Ext	P; P	L
Scott et al. (2011)	248	12.5	R	M, F	Con	P	C
Shiakou (2012)	20	8.5	R	M, F	Int; Ext	P; P	C
Shlafer et al. (2009)	57	9.0	Q	M or F	Int; Ext	M; M	L
Shochet et al. (2008)	153	15.2	Q	M, F	Dep	C	C
Simons et al. (2001)	68	13.3	Q	M	Agg	C	C
Smeekens et al. (2009)	111	5.3	R	M, F	Int; Ext	Mix; Mix	C
Solomon et al. (1995)	42	5.9	R	M, F	Agg	P	C
Starr & Davila (2008)	76	13.5	Q	M, F	Int	C	C
Staves (2005)	23	12	Q	M, F	Anx	C	C
Stebbins (2008)							
Females	247	13.7	R	M, F	Dep	C	C
Males	263	13.7	R	M, F	Dep	C	C
Stevens (2008)	56	15.0	Q	M, F	Int; Ext	C; C	C
Thomas (2011)	290	15.2	Q	M, F	Con	C	L
Torres et al. (2012)	91	6.12	R	M, F	Agg	P	C
Undheim & Sund (2008)	2231	13.7	Q	M, F	Dep	C	C
van Eijck et al. (2012)	1,313	14.6	Q	M, F	Anx	C	C
van Leeuwen et al. (2010)	292	17.1	Q	M, F	Dep	C	L
Ventura-Cook (1997)	29	4.8	R	M, F	Int; Ext	T; T	C
Verschueren & Marcoen (1999)	76	5.3	R	M, F	Int; Ext	T; T	C
Vu (2009)	30	4.8	R	M, F	Int; Agg	P; P	C
Wampler & Downs (2010)	164	14.6	Q	M or F	Int; Ext	C; C	C
Wilkinson (2010)	495	16.4	Q	M, F	Dep	C	C
Williams & Kelly (2005)	115	12.5	Q	M, F	Int; Ext	T; T	C
Wong (1999)	144	15.7	Q	M, F	Dep	C	C
Woodman (2005)	58	15.6	R	M, F	Int; Ext	P; P	C
Yumoto (2007)	78	14.3	R	M, F	Int; Ext	T; T	C

*Note.* For attachment measure type, Q = questionnaire; R = representational measure. For attachment measure parent, M = mother; F = father; — = unknown. For behavioural problem measure type, Int = internalizing; Dep = depression; Anx = anxiety; Ext = externalizing; Agg = aggression; Con = conduct. For behavioural problem measure informant, C = child; P = parent; T = teacher; R = record; I = Diagnostic Interview; Mix = a combination of informants. For study design, C = cross-sectional; L = longitudinal.

<sup>a</sup> If only one age is provided, the study assessed attachment and behavioral problems concurrently. If two ages are provided, the study was longitudinal and the first age is age at attachment, while the second is age at the problem behavior assessment. Age is reported in mean years.

- fewer of these measures in the literature. If two representational measures were collected at the same time point, the measure with the strongest psychometric properties was selected. An identical strategy was used when a study had two questionnaire measures of attachment.
- Some measures of attachment (e.g., IPPA, Security Scale) derive separate scores, as well as combined scores, across parental figures. When all three scores were presented (i.e., child–mother, child–father, and combined child–parent attachment), the combined parental score was selected for analyses. When the associations between child attachment and behavioral difficulty were presented separately for mothers and fathers, an average effect size was computed and entered in the dataset. In some studies, children were asked to complete the attachment measure based on either parent, or the parent to whom they felt they were closest. In such cases, the studies did not distinguish between mothers and fathers in their analyses; thus, these studies are represented in the analyses as attachment to either mother or father.
- If a study presented both concurrent and longitudinal associations between attachment and behavior problems, we selected the most temporally distant measure of behavior problems to maximize longitudinal research in our meta-analyses.
- If there were multiple types of measures of internalizing or externalizing behavioral difficulty at one time point, the more global measure of difficulty was selected over a subtype of that behavioral difficulty (e.g., internalizing subscale of the Youth Self Report over a depression inventory). If a global measure of internalizing difficulty was not available, but effect sizes for two specific forms of behavioral difficulty (e.g., depression and anxiety separately) were available at the same time point, the effects were combined and entered into the data set as one global internalizing effect size.
- If there were multiple problem informants at one time point, we selected parent/teacher reports over self-reports, as parent/teacher informants were underrepresented in our data.

**Multiple samples within a study.** In some studies, results were presented separately for subgroups within the sample (e.g., boys vs. girls; high vs. low risk). In such cases, effect sizes for these nonoverlapping groups were calculated and entered into the meta-analysis separately.

### Coding of Studies

A standard coding form was developed by the authors to rate each study on measurement characteristics, as well as study-level and sample-level moderators.

**Attachment measure.** Attachment measure was examined in three ways, as: (a) a two category variable to contrast questionnaire versus representational measures of attachment; (b) a category variable to contrast attachment methods within both questionnaire measures (IPPA vs. Security Scale, vs. Parental Attachment Questionnaire), and representational measures (AAI vs. all attachment measures that involved a story or narrative completion); and (c) a three category variable to measure if attachment was to (a) both parents; (b) either mother or father; or (c) mother only.

**Problematic behavior.** Three outcome categories for internalizing behavior were used: (a) internalizing difficulty, (b) depression only, and (c) anxiety only. Three outcome categories were included for externalizing behavior: (a) externalizing difficulty, (b) aggressive behavior, and (c) conduct/delinquent behavior. A four-category variable was created to represent the various problem informants: (a) parent-report, (b) teacher-report, (c) self-report, or (d) diagnostic interview.

**Child gender.** Child gender was coded according to percent of males in each sample. A subset of studies presented effect sizes separately for males ( $k = 28$ ) and females ( $k = 18$ ) and, thus, allowed for a second avenue of data analyses where effect sizes were compared categorically for boys and girls.

**Child age.** The age of the child at the time of the assessment of attachment was examined continuously through 18 years of age. The majority of studies provided the mean age of study participants. In cases where the age was not directly provided, we estimated age using valid indicators (e.g., range, median age).

**Socioeconomic status (SES).** All studies provided indices of SES either explicitly through quantitative methods (e.g., statement of low, middle, or upper SES; sample income average), or less directly (e.g., education levels), although the former report was most often provided. Based on this information, SES was represented categorically in one of three groups: (a) low SES, (b) middle to upper SES, or (c) mixed SES.

**Geographical location.** Children's geographical location and culture influences were recorded. A five-category variable was created for geographical location: (a) Australia, (b) Canada, (c) Europe, (d) U.S.A., and (e) other (e.g., South Korea, China, etc.).

**Ethnic origins of participants.** Ethnicity was recorded using a four-category variable, where, consistent with previous meta-analytic research (e.g., Lucas-Thompson, Goldberg, & Prause, 2010) over 80% of a particular ethnicity within a sample represented a majority: (a) majority White, (b) majority Black, (c) majority Hispanic, and (d) diverse ethnicity with no particular ethnic majority.<sup>4</sup>

**Family risk status.** A two-category variable was created to represent the child's exposure to either zero or one or more risks. Examples of factors considered to place the child at risk include:

children of adolescent parents, living with a single parent, parental psychopathology, maltreatment history, incarcerated parent, and/or child involvement in the juvenile justice system or social services. Samples were classified as being at risk if over 80% of the sample presented with the particular family risk indicator. Although low SES is undoubtedly considered to be a family risk, we only included samples with low SES as a risk indicator if another family risk indicator was also reported (e.g., majority single parent households). This data selection procedure was performed in an effort to create nonoverlapping moderator variables. Similarly, ethnic minority was not considered to be an indicator of family risk.

**Additional moderators.** These included: (a) publication date, ranging from 1990–2013, to assess, roughly, whether the association between attachment and behavior problems has changed over time, due either to changes in assessment methodology or the true relation between these variables; (b) dissemination medium (i.e., journal article, book chapter, or dissertation) to assess for potential publication bias; (c) study design (e.g., cross-sectional or longitudinal); and (d) impact score of the journal article using the Web of Science, Journal of Citation Reports, Thomson Scientific (2005), to assess for study quality.

Two graduate students coded all studies. A random sample of 10% of the articles was double coded to ensure coding accuracy and reliability. Reliability between the two coders on continuous measures (e.g., age) ranged from  $r = .85$  to 1.00 and agreement on categorical variables was above 90%. Disagreements were resolved by joint re-examination of the data and consensus coding.

### Computation of Effect Sizes

Effect sizes were calculated and analyzed using Comprehensive Meta-Analysis (CMA) Version 3.0 software (Borenstein, Hedges, Higgins, & Rothstein, 2014). Effect sizes were weighted according to the inverse of their variance to ensure that more precise estimates influenced overall effect size most heavily and to attenuate the upwardly biased estimates of smaller studies (Hedges & Olkin, 1985). When nonsignificant findings were reported without accompanying statistical information ( $k = 5$ ), a  $p$  value of .50 was entered (Rosenthal, 1995).

We based calculations on a random effects model, as they more adequately mirror the heterogeneity in behavioral studies (Hedges & Olkin, 1985). We assessed for heterogeneity of effect sizes and for significance of categorical moderators using  $Q$ -statistics (Borenstein et al., 2014; Rosenthal, 1995). The significance of each continuous bivariate moderator was assessed using meta-regressions (Thompson & Higgins, 2002). In addition, we performed multivariate meta-regression (i.e., simultaneous entry of moderators into a meta-regression) to examine specific questions regarding the unique or interactive contribution of moderators to the effect sizes. These analyses were conducted post hoc based on

<sup>4</sup> Approximately 20% of studies did not report ethnicity statistics. To address this issue, we searched for other publications that used the identical data set (authored by the same primary author) and extracted ethnicity from these publications, if available. We were able to ascertain ethnicity for an additional 7% studies using this method. Thus, 13% of studies in the current meta-analysis contained missing data on the ethnicity variable.

the identification of bivariate moderators that significantly explained the heterogeneity in effect sizes.

**Publication bias.** Because of the bias toward publication of studies with significant findings, meta-analyses typically overestimate mean effect size (Borenstein, Rothstein, & Cohen, 2005; Lipsey & Wilson, 2001). To test and correct for publication bias, the Duval and Tweedie (2000) trim-and-fill procedure was used. In this procedure, a funnel plot is derived to show the association between sample size and effect size. When no publication bias is present, the plot is shaped as an inverted funnel, with effect sizes distributed symmetrically around the combined effect size. Large samples with smaller variations in effect sizes, located toward the top of the funnel, should estimate effect sizes most precisely and smaller studies with higher error should increase symmetrically toward the bottom of the plot. In cases where the expected effect size is positive and publication bias is present, fewer studies than expected are found on the bottom left hand side of the mean effect size (Borenstein, Hedges, Higgins, & Rothstein, 2011). If more studies with smaller samples are located to the right hand compared with the left hand side of the mean, the funnel plot is considered to be symmetrically unmatched, and the trim-and-fill procedure inserts symmetrical extreme values to balance the plot. All these effect sizes, observed and computed, are used to derive an adjusted effect size (with confidence intervals), reflecting the combined effect size when no publication bias would have been present. This estimate represents the major advantage of Trim and Fill, compared with more traditional methods for assessing bias (Duval & Tweedie, 2000).

### Moderator Analyses

In some cases, the number of studies available for testing for potential moderators was small. Consistent with previous meta-analytic research on attachment and its related outcomes (e.g., Bakermans-Kranenburg et al., 2003; Madigan et al., 2013), we only included a potential moderator if there were four or more studies available.

**Bivariate moderators.** We adopted a hierarchical approach to the search for moderators. First, we assessed moderators one at a time to identify which are significantly related to effect size. However, this bivariate approach (assessing the relation between a single potential moderator and effect size) can produce confounded results, wherein the supposed impact of the examined moderator is actually because of some second moderator examined in a separate bivariate analysis (Atkinson, Niccols, et al., 2000).

**Meta-regression analyses.** In a second step, using meta-regression in CMA, we simultaneously entered clusters of variables that had proven significant in the bivariate analyses but were interrelated at the study level (e.g., studies that sampled older children were more likely to use self-report measures than studies of younger children, so age and behavioral measure were entered into the same regression equation as they were likely conflated with one another). Categorical variables in meta-regression analyses are created using dummy codes. When there were more than two categories (e.g., ethnicity has majority White, Black, Hispanic, and ethnically diverse), we selected a reference group (although selection does not affect

statistical results), with mean effect of the reference group serving as the intercept. The series of dummy variables was defined as a "Set." The multiple regression derives a b-weight, z-value, and significance level for each dummy-coded variable in the Set. The Set itself is analyzed for the impact of a categorical moderator (e.g., ethnicity) in general, that is, it is an omnibus test assessing for differences in effect sizes among ethnicities using Q-statistics (Borenstein et al., 2014).

The only variable with missing data for the meta-regression was ethnicity (13% of the data was missing). Although there are a variety of methods for dealing with missing data (e.g., multiple imputation), these imputation methods are not available in the CMA software. As a result, we used a single imputation method technique known as hot deck imputation (HD; Myers, 2011). HD is a valid approach to handling missing data that is categorical in nature, such as demographic characteristics. The performance of HD techniques is good, even when data are categorical (e.g., Kozhimannil, Attanasio, McGovern, Gjerdingen, & Johnson, 2013; McCurdy, Gannon, & Daro, 2003). In HD imputation, as it relates to meta-analysis, studies with missing values are replaced by the value of a closely matched "donor" study with respect to characteristics observed by both cases in the dataset (Andridge & Little, 2010). The following variables were used to estimate the donor values for ethnicity, again, the only variable for which we had missing data: country of origin, family risk, SES, and percent White. To be consistent with the bivariate analyses, and to ensure sufficient power, we only conducted HD in cases where there were four or more studies per ethnic background. Thus, if fewer than four studies were available for an ethnic group, for example, South East Asian, they were not included in the hot deck imputation so as to retain sensitivity of analyses. HD imputation was calculated in SPSS and imputed data was subsequently transferred to CMA for the purposes of meta-regression analyses that contained missing data on ethnicity. Meta-regression analyses were examined with and without imputed data and results from both analyses are reported herein.

## Results

### Attachment and Internalizing Behavior

**Secure versus insecure attachment.** In 165 studies, having a combined total of 48,224 participants, the combined effect size was significant,  $d = .58$  (95% confidence interval [CI] .52–.64). These data demonstrate support for the link between attachment and internalizing difficulty. The Duval and Tweedie procedure did not indicate publication bias (see Figure 2). The  $Q$  statistic ( $Q = 1498.96$ ,  $p < .0001$ ) was significant, indicating heterogeneity of effect sizes, and moderator analyses were conducted to explain this variability.

### Significant Bivariate Moderators

We examine all potential moderators of the association between attachment and internalizing behavior. The results of all moderator analyses can be found in Table 2, and significant bivariate moderators are discussed in more detail below.

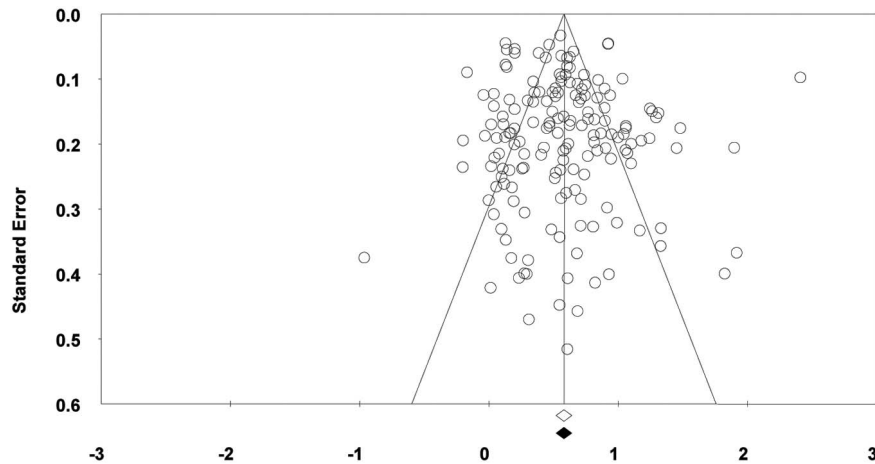
Attachment and Internalizing: Funnel Plot of Standard Error by Hedges's  $g$ 

Figure 2. The y-axis on the funnel plot represents the standard error, and the x-axis is Hedge's  $G$ . The white diamond represents the observed mean effect size.

### Behavioral, representational, and questionnaire measures.

Questionnaire measures of attachment showed stronger links to internalizing behavior ( $k = 126$ ,  $d = .63$ ,  $p < .001$ , CI [.56–.70]) than did representational measures ( $k = 39$ ,  $d = .39$ ,  $p < .001$ , CI [.25–.53]). Next, we compared these (representational- and questionnaire-based) effect sizes with the mean effect size generated by an earlier meta-analysis (Madigan et al., 2013) of behavioral measures of attachment (e.g., Strange Situation, Attachment Q-sort) and internalizing behavior. Madigan et al. (2013) showed an effect size of  $d = .37$  (95% CI [.27–.46]) across 60 studies. Comparison of mean effects and confidence intervals shows that behavioral measures generate effect sizes that are comparable with those derived from representational measures and significantly smaller than effect sizes generated by questionnaire measures. Figure 3 shows effect sizes across questionnaire, representational, and behavioral methods of assessing attachment.

**Child age.** Effect sizes varied as a function of the child's age at the time of the assessment of attachment ( $k = 165$ ,  $b = .02$ ,  $p < .01$ ). The direction of this finding indicates that the prediction of internalizing behavior from attachment strengthened when attachment was assessed at later ages. Effect sizes also varied as a function of the age at the time of the internalizing behavior assessment ( $k = 165$ ,  $b = .03$ ,  $p < .01$ ), and similar to effect sizes related to age at attachment, the effect size linking attachment and internalizing behavior increased when the behavior problem was assessed at a later age.<sup>5</sup>

**Informant of problematic behavior.** Effect sizes varied according to who served as informant regarding the child's internalizing behavior. Self-reports of internalizing behavior yielded a significantly larger effect size ( $k = 106$ ,  $d = .73$ ,  $p < .001$ , CI [.66–.80]) than parent ( $k = 33$ ,  $d = .21$ ,  $p < .01$ , CI [.12–.30]) and teacher ( $k = 14$ ,  $d = .21$ ,  $p < .05$ , CI [.03–.38]) reports of internalizing difficulty. Studies that combined informants and presented a composite score of behavioral problems (i.e., mixed reports,  $k = 10$ ) had an effect size of  $d = .43$  (CI [.09–.76]) that was marginally lower ( $p < .056$ ) than the effect size for self-report.

**Type of internalizing behavior.** We examined whether effect sizes varied across measures of global internalizing behavior, depression, or anxiety. Although all effect sizes were moderate to high, effect sizes were significantly larger in studies using depression-specific measures ( $k = 62$ ,  $d = .81$ ,  $p < .001$ , CI [.72–.90]), compared with those examining global internalizing difficulty ( $k = 88$ ,  $d = .45$ ,  $p < .001$ , CI [.37–.52]) or anxiety-specific measures ( $k = 15$ ,  $d = .38$ ,  $p < .001$ , CI [.23–.52]).

**Family risk status.** With all eligible studies included, the family risk status moderator was significant, although in an unexpected direction. Effect sizes linking attachment and internalizing behavior were significantly larger in studies where children had no family risk factors ( $k = 124$ ,  $d = .63$ ,  $p < .001$ , CI [.55–.70]), compared with studies where participants had one or more indices of family risk ( $k = 41$ ,  $d = .43$ ,  $p < .001$ , CI [.31–.54]).

**Socioeconomic status.** SES status was a significant moderator, with the same unexpected pattern. Larger effect sizes were found for the middle to upper class group ( $k = 20$ ,  $d = .77$ ,  $p < .001$ , CI [.6–.94]), compared with those in the lower class group ( $k = 41$ ,  $d = .46$ ,  $p < .001$ , CI [.32–.60]) and those from the mixed class group ( $k = 104$ ,  $d = .58$ ,  $p < .001$ , CI [.51–.67]).

**Ethnicity.** Ethnicity was a significant moderator of the association between attachment and internalizing behavior. Studies with participants who were primarily White (i.e., 80% or more of the sample;  $k = 60$ ,  $d = .76$ ,  $p < .001$ , CI [.65–.86]) had comparatively larger effect sizes than ethnically diverse ( $k = 68$ ,  $d = .47$ ,  $p < .001$ , CI [.39–.54]), primarily Hispanic ( $k = 6$ ,  $d = .34$ ,  $p < .05$ , CI [.04–.64]), and majority Black ( $k = 4$ ,  $d = .33$ ,  $p < .11$ , CI [–.07–.73]) groups.

**Nonsignificant moderators.** As detailed in Table 2, we also tested several other potential moderators of the association be-

<sup>5</sup> Parallel analyses were run with studies that concurrently assessed attachment and internalizing behavior. The same pattern of findings emerged: effect sizes were positively associated with age, that is, effect size strengthened when attachment and internalizing behavior were both assessed later in childhood ( $k = 145$ ,  $b = .03$ ,  $p < .001$ ).

Table 2  
*Results of Categorical and Continuous Moderators for the Associations Between Insecure Attachment and Internalizing Problems*

Categorical moderators	<i>k</i>	Total <i>N</i>	<i>d</i>	95% CI	Homogeneity <i>Q</i>	<i>p</i> -value
Gender					1.07	.30
Girls	27	3,808	.79***	.63–.95		
Boys	17	2,980	.65***	.45–.84		
Attachment measure type					9.73	.01
Questionnaire	126	44,488	.63***	.56–.70		
Representational	39	3,736	.39***	.25–.53		
Questionnaire measures					1.86	.40
IPPA	99	41,006	.62***	.54–.70		
PAQ	4	506	.90***	.55–1.25		
Security scale	23	6,710	.60***	.33–.88		
Representational measures					3.76	.16
AAI/CAI	13	1,630	.58***	.29–.87		
Family drawings	4	630	.39***	.19–.59		
Story stem <sup>a</sup>	22	1,186	.27**	.11–.42		
Attachment figure					1.43	.49
Both parents	96	35,157	.64***	.55–.72		
Mother only	40	10,613	.55***	.36–.74		
Mother or father	12	2,454	.55***	.39–.71		
Informant					55.86	.0001
Mixed informants	10	1,820	.43*	.09–.76		
Parent	33	5,906	.21**	.12–.30		
Self	106	39,056	.73***	.66–.80		
Teacher	14	1,250	.21*	.03–.38		
Behavioral problems					39.76	.0001
Anxiety	15	5,491	.38***	.23–.52		
Depression	62	22,142	.81***	.72–.90		
Internalizing	88	21,394	.45***	.37–.52		
Socioeconomic status					7.45	.02
Low	41	6,018	.46***	.32–.60		
Middle to upper	20	2,180	.77***	.60–.94		
Mixed	104	40,892	.58***	.51–.67		
Risk status					7.00	.01
No risk	124	41,409	.63***	.55–.70		
Risk	41	6,815	.43***	.31–.54		
Ethnicity					19.40	.001
Diverse	68	18,916	.47***	.39–.54		
Majority White	60	23,407	.76***	.65–.86		
Majority Hispanic	6	1,025	.34*	.04–.64		
Majority Black	4	727	.33	–.07–.73		
Clinical					.08	.77
Nonclinical	154	48,192	.58***	.52–.65		
Clinical	11	835	.54***	.28–.79		
Dissemination medium					3.01	.08
Publication	114	40,295	.62***	.54–.69		
Dissertation	51	8,030	.49***	.38–.61		
Research design					1.56	.21
Cross-sectional	145	41,299	.59***	.53–.66		
Longitudinal	20	6,925	.47***	.35–.60		
Country of origin					3.35	.19
Australia	7	2,081	.80***	.56–1.03		
Canada	12	7,666	.53***	.35–.70		
Europe	32	15,589	.52***	.40–.65		
United States	107	18,149	.57***	.49–.64		
Continuous moderator	<i>k</i>	Total <i>N</i>	Slope	<i>SE</i>	<i>z</i> -value	<i>p</i> -value
Age at attachment	165	48,224	.027	.010	2.81	.01
Age at internalizing	165	48,224	.022	.001	2.29	.01
Time between assessments	165	48,224	–.007	.004	–1.87	.06
Percent of males in sample	165	48,224	–.002	.001	–1.85	.07
Year of publication	165	48,224	–.002	.007	–.30	.77
Impact factor	100	31,950	.034	.031	1.10	.28

*Note.* IPPA = Inventory of Parent and Peer Attachment; PAQ = Parental Attachment Questionnaire; AAI/CAI = Adult Attachment Inventory/Child Attachment Inventory; *Q* indicates the heterogeneity across studies; *k* = number of studies; CI = confidence intervals. Contrasts were only tested for subgroups with four or more studies.

<sup>a</sup> Story stem includes all attachment measures that involved a story or narrative completion.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

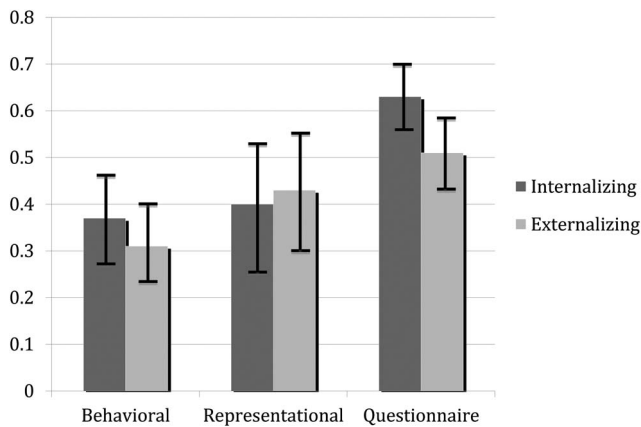


Figure 3. Effect sizes and 95% confidence intervals for the association between attachment and internalizing and attachment and externalizing across behavioral, representational, and questionnaire measures of attachment. The effect size for attachment and externalizing is based on a meta-analysis by Fearon et al. (2010), and attachment and internalizing based on a meta-analysis by Madigan et al. (2013).

tween attachment and internalizing behavior, including child gender, specific attachment figure, clinical status of the child, country of study origin, as well as study quality measures such as dissemination medium (i.e., publication vs. dissertation), research design (i.e., cross-sectional vs. longitudinal), and journal impact factor. None of these moderators were significant in explaining between-study heterogeneity.

### Multiple Meta-Regression Analyses

In the preceding section, we used a bivariate approach to identify individual variables that moderate the association between attachment and internalizing behavior. While an important start to understanding effect size heterogeneity, this approach is limited; it provides no information regarding the *unique* variance explained by each moderator. This is problematic because many of the moderators are methodologically dependent. For example, studies involving high-risk samples are more likely to include families with socioeconomic challenges and minority ethnic groups, such that it is impossible to determine which of these factors (risk status, SES, and ethnicity) actively influence the association between attachment and internalizing behavior. Or again, studies of younger children are more likely to use representational measures of attachment, as opposed to questionnaire measures, and parent and teacher reports of internalizing behavior, as opposed to self-reported difficulties more commonly used in adolescence. Using the bivariate approach of the preceding section, it is impossible to disentangle the effects of each dimension (attachment measure, child age, and informant regarding problem behavior) from the others: Are self-report measures more strongly associated with internalizing behavior because self-report is more valid in relation to internalizing than representational approaches, because samples administered self-report attachment inventories are older than samples administered representational assessments, because third-party assessment of internalizing behavior

is typically used with younger children while self-report is disproportionately used with older samples, or because of some combination of two or all three of these possibilities?

In this section, we combine moderators to assess their *unique* contributions. We conduct two meta-regression analyses: (a) one examining the unique effects of family risk, SES and ethnicity, and (b) another disentangling the effects of attachment measure type, child age, problem informant, and internalizing subtype. Both of these analyses recognize that at the level of the primary study, moderators in each cluster are significantly related to one another, but not to variables in the other cluster. Thus, (a) sample risk status is related to socioeconomic challenge (i.e., within studies, samples rated as high risk also tend to be rated as involving high socioeconomic challenge;  $\chi^2(2 df) = 47.28, p < .0005$ ) and ethnic minority,  $\chi^2(2 df) = 17.74, p < .0005$ , and SES is also related to ethnicity,  $\chi^2(4 df) = 9.76, p < .05$ . Similarly, (b) attachment measure type is related to child age,  $\chi^2(2 df) = 47.24, p < .0005$ , informant of problem behavior,  $\chi^2(3 df) = 39.13, p < .0005$ , and internalizing subtype,  $\chi^2(6 df) = 46.24, p < .0005$ . Child age is related to informant,  $\chi^2(6 df) = 56.72, p < .0005$  and internalizing subtype,  $\chi^2(4 df) = 23.48, p < .0005$ , and informant is related to internalizing subtype,  $\chi^2(4 df) = 46.24, p < .0005$ . Finally, variables within each of the aforementioned clusters were rarely significantly related to one another ( $\chi^2 p$  values linking variables listed in [a] to variables listed in [b] ranged from  $p < .04$  to  $p < .55$ ; 2/12 analyses were significant). To be sure, in 4 of these 12 analyses, expected cell count was less than 5, suggesting that results in those analyses may not be reliable, but the general pattern of results is clear: there are two clusters of variables, each strongly interrelated but largely unrelated to the other. It should be noted that while interrelated, the correlations within clusters were not so high as to raise issues of multicollinearity (Tabachnick & Fidell, 2012). In fact, we found that the proportion of variance shared between these indicators was rather low. Even among variables that had the strongest association (i.e., SES and family risk), 75% of the variance remained unexplained; this association exceeds that considered necessary (i.e., 20%) to avoid error because of multicollinearity (Tabachnick & Fidell, 2012). Thus, the intercorrelations did not raise concerns that chance findings might dictate order of entry. So again, we entered the variables from each of these clusters into separate regression equations in an effort to identify the ones that explained unique variance.

The first meta-regression aimed to disentangle the contribution of risk, SES, and ethnicity. Because of missing data on some moderator variables, the number of studies included in this analysis was 138. Ethnicity (majority White, Black, Hispanic, and diverse) and SES (low, middle/upper, and mixed) had four and three categories, respectively. Majority White and middle/upper were selected as the reference group for these categories. Results revealed that ethnicity remained significant, whereas risk and SES status did not independently moderate the association between attachment and internalizing behavior. Consistent with the bivariate analyses, studies with diverse ethnicities had lower effect sizes compared with Majority White

( $b = -.26, p < .01$ ). Overall, this model explained 11% of the variance.<sup>6</sup>

In a separate multivariate model, we explored the simultaneous moderating effects of child age,<sup>7</sup> attachment measure (i.e., questionnaire, representational, problem informant (self, mixed, parent, or teacher) and type of internalizing behavior (anxiety, depression, and internalizing). For the multicategory variables, namely type of internalizing behavior and problem informant, internalizing and self report were selected as the reference group, respectively. The number of available studies for this analysis was 165.

This model revealed that type and informant of internalizing behavior, as well as child age independently moderated the association between attachment and internalizing behavior, while attachment measure was no longer a significant moderator. When compared with an internalizing composite, the association between attachment and internalizing behavior was higher in samples examining depression specifically ( $b = .20, p < .01$ ), and lower in samples measuring anxiety specifically ( $b = -.20, p < .05$ ). Compared with self-report, the association between attachment and internalizing behavior was lower in samples using parent ( $b = .47, p < .001$ ) and teacher reports ( $b = .47, p < .001$ ). Moreover, in this model, age became *negatively* associated with effect sizes, demonstrating a decrease in effect sizes as the child aged ( $b = -.22, p < .05$ ). The reversal in effect size valence suggests that the bivariate relation of age and effect size was confounded by variance shared with one or more of the other dependent variables in this equation (attachment measure, type of internalizing, and problem informant). This model explained 37% of the variance ( $R^2 = .37$ ).<sup>8</sup>

### Evaluating Potential Methods Issues Related to Self Report

We conducted two additional specific analyses of interaction effects using categorical data to clarify important methodological issues related to use of self-report measures. The first tackled the question of common method variance and its potential for inflating associations. That is, are studies that use questionnaire methodology for both attachment and internalizing behavior likely to have higher effect sizes because of shared method variance? We tested this possibility statistically by entering attachment measure (i.e., questionnaire measure = 1; representational measure = 0), problem informant (i.e., self-report = 1; other report = 0), and an attachment measure by problem informant interaction term into a meta-regression analysis for internalizing behavior.<sup>9</sup> Consistent with the previous meta-regression results, the main effect of problem informant was significant ( $b = .49, p < .001$ ), whereas the main effect of attachment measure was not ( $b = .05, p < .71$ ). Of most interest, the interaction term for testing common method variance was not-significant ( $b = .04, p < .83$ ), indicating that effects were not stronger when the attachment and behavior problem informants were the same individual (i.e., the child).

The second analysis tested the possibility of an interaction between age and informant of internalizing behavior on the prevalence of internalizing behavior. Older children are more likely to be assessed with self-report measures of problem behavior and, in the analyses above, self report measures were shown to elicit more reports of internalizing behavior. This analysis was conducted by entering child age (i.e., categorized  $\geq 12 = 1$  and  $< 12 = 0$ ) and

problem informant (i.e., self-report = 1, other = 0), as well as an age by problem informant interaction term into a meta-regression analysis. In this analysis, the main effect of problem informant was once again significant ( $b = .53, p < .001$ ), whereas the main effect of age was not ( $b = -.10, p < .32$ ) and the interaction of age by problem informant was not ( $b = .04, p < .81$ ). Thus, self-report measures elicit more evidence of internalizing behavior, regardless of child age.

### Internalizing Behavior: Ambivalent, Avoidant, and Disorganized Attachment

In the next set of analyses, we included studies that reported on the association between any of the three insecure attachment classifications (ambivalent, avoidant, and disorganized) and internalizing behavioral problems. Various terminologies are used to describe the ambivalent (e.g., ambivalent, preoccupied), avoidant (e.g., dismissing), and disorganized (e.g., disoriented, unresolved) constructs of insecure attachment across representational and questionnaire measures of attachment. We collapsed these terminologies for the purpose of the current meta-analysis into ambivalent, avoidant, and disorganized. Consistent with previous meta-analyses, the contrasts for the insecure attachment analyses were as follows: ambivalent versus secure, avoidant versus secure, and disorganized versus organized attachment (Colonnesi et al., 2011; Madigan et al., 2013).

**Ambivalent versus secure attachment.** In these analyses, children classified as ambivalent were compared with those classified as secure. In 15 studies with  $N = 921$  participants, including 13 representation and 2 questionnaire measures of attachment, the combined effect size for internalizing problems was significant,  $d = .40$  (CI [.17–.64]). The funnel plot was symmetrical, showing no evidence of publication bias.

**Avoidant versus Secure Attachment.** Children classified as avoidant were compared with children classified as secure. In 16 studies with  $N = 1,241$  participants, including 13 representation and 3 questionnaire measures of attachment, the combined effect size for internalizing problems was significant,  $d = .20$  (CI [.01–.39]).

**Disorganized attachment.** Children classified as disorganized in this analysis were compared with children classified as

<sup>6</sup> We reran the meta-regression analysis examining the contribution of risk, socioeconomic status (SES), and ethnicity on the association between attachment and internalizing behavior with the HD imputed values for ethnicity and results reported herein remained unchanged. Specifically, studies with diverse ethnicities had lower effect sizes compared with Majority White ( $b = -.17, p < .05$ ). No other moderators emerged as significant in the model.

<sup>7</sup> Because of the large number of cross-sectional studies ( $N = 145$ ), there was considerable overlap between child age at attachment and child age at behavioral problem assessments, and therefore, these variables were highly correlated. As a result, we ran separate models: one with age at attachment and one with age at internalizing assessment. As results were very similar for both age variables, we only include the analyses for age at attachment measure.

<sup>8</sup> The meta-regression analysis included studies with both longitudinal and cross-sectional designs. We ran a parallel analysis that only included studies with concurrent assessments of attachment and internalizing behavior. In this model, with 145 studies included, results were equivalent.

<sup>9</sup> Values for interaction terms were calculated in excel and transferred into CMA.



organized. In 18 studies with  $N = 1,107$  participants, the combined effect size for internalizing problems was significant,  $d = .47$  (CI [.27–.66]). All of the attachment measures used in this analysis were representational. According to the trim-and-fill procedure, there was evidence of publication bias. Six studies were trimmed and replaced, resulting in an adjusted effect size of  $d = .26$  (CI [.16–.37]).

### Attachment and Externalizing Behavior

**Secure versus insecure.** In 116 studies, having a combined total of 24,689 participants, the combined effect size was significant,  $d = .49$  (CI [.42–.56]).<sup>10</sup> These data support the link between attachment and externalizing difficulty. There was no evidence of publication bias using the trim and fill procedure (see Figure 4). The  $Q$  statistic ( $Q = 603.19$ ,  $p < .001$ ) was significant and moderator analyses were conducted to explain this variability.<sup>5</sup>

### Significant Bivariate Moderators

First, we examined all potential moderators of the association between attachment and externalizing behavior (see Table 3) one at a time, with significant moderators discussed in detail herein. Next, we incorporate moderators that emerged as significant, in various combinations, to assess which of them explain unique variance using meta-regression techniques.

**Behavioral, representational, and questionnaire measures.** There was no significant difference between the point estimates for insecure attachment and externalizing problems in questionnaire ( $k = 81$ ,  $d = .51$ , CI [.43–.58]) versus representational measures ( $k = 35$ ,  $d = .43$ , CI [.30–.56]). Next, we compared these overall effect sizes and confidence intervals with those for *early behavioral measures* of attachment, as reported in a meta-analysis by Fearon et al. (2010). As detailed in Figure 3, the combined effect size for the association between attachment and externalizing behavior was higher in questionnaire measures of attachment compared with behavioral measures ( $k = 69$ ,  $d = .27$ , CI [.18–.36]; Fearon et al., 2010). Comparison of the CIs for representational and behavioral measures showed no statistical difference.

**Informant of behavioral difficulty.** The informant of the child's externalizing behavior was a significant moderator. Self-reports of externalizing behavior yielded significantly larger effect sizes ( $k = 54$ ,  $d = .61$ ,  $p < .001$ , CI [.55–.68]) compared with parent ( $k = 40$ ,  $d = .36$ ,  $p < .01$ , CI [.19–.52]) and teacher ( $k = 13$ ,  $d = .31$ ,  $p < .05$ , CI [.15–.48]) reports. There were no significant differences between self-report and mixed reports of externalizing difficulty.

**Family risk status.** With all eligible studies included, the family risk status moderator was significant. The effect sizes linking attachment and externalizing behavior were significantly larger in studies where children had no family risk factors ( $k = 84$ ,  $d = .53$ ,  $p < .001$ , CI [.46–.61]), compared with studies where participants had one or more indices of family risk ( $k = 32$ ,  $d = .35$ ,  $p < .001$ , CI [.22–.48]).

**Socioeconomic status.** SES status was a significant moderator: larger effect sizes were found for the middle to upper class group ( $k = 13$ ,  $d = .58$ ,  $p < .001$ , CI [.37–.78]) and mixed groups ( $k = 72$ ,  $d = .54$ ,  $p < .001$ , CI [.45–.61]), compared with those in the lower class group ( $k = 31$ ,  $d = .34$ ,  $p < .001$ , CI [.21–.46]).

**Ethnicity.** Ethnicity was a significant moderator of the association between attachment and externalizing behavior. Positive effects were found for studies with participants who were primarily White and ethnically diverse, whereas nonsignificant findings emerged for the majority Black and Hispanic studies. The effect sizes for samples with primarily White participants (i.e., 80% or more of the sample;  $k = 42$ ,  $d = .66$ ,  $p < .001$ , CI [.55–.77]) were statistically greater than samples with ethnically diverse ( $k = 54$ ,  $d = .41$ ,  $p < .001$ , CI [.31–.51]), primarily Hispanic ( $k = 5$ ,  $d = .26$ ,  $p = ns$ , CI [–.05–.57]), and primarily Black participants ( $k = 4$ ,  $d = .32$ ,  $p = ns$ , CI [–.05–.68]). The point estimates for the primarily Hispanic, primarily Black, and ethnically diverse groups were not statistically different from one another.

**Nonsignificant moderators.** Several additional moderators of the association between attachment and externalizing behavior were examined (see Table 3), including child gender, child age at attachment and behavioral problem measure, specific attachment figure, subtype of externalizing behavior, clinical status, country of study origin, as well as study quality measures such as dissemination medium (i.e., publication vs. dissertation), research design (i.e., cross-sectional vs. longitudinal), and journal impact factor. These moderators were not significant in explaining between-study heterogeneity.

### Multiple Meta-Regression Analyses

Similar to the analyses on attachment and internalizing, we used meta-regression to assess the impact of the abovementioned significant and potentially interrelated moderators. Specifically, we conducted a meta-regression to disentangle the contribution of risk, SES, and ethnicity. Again, these analyses recognize that moderators are significantly related to one another. Thus, family risk status is related to low SES,  $\chi^2(2\ df) = 36.32$ ,  $p < .001$  and ethnic minority,  $\chi^2(2\ df) = 11.37$ ,  $p < .001$ , and SES is also related to ethnicity,  $\chi^2(4\ df) = 11.73$ ,  $p < .05$ . Because of missing data on some moderator variables, the number of studies included in this analysis was 105. Ethnicity (majority White, Black, Hispanic, and diverse) and SES (low, middle/upper, and mixed) had four and three categories, respectively. Majority White and middle/upper were selected as the reference group for these categories. Results revealed that ethnicity remained significant, whereas risk and SES status did not three categories, respectively. Majority White and middle/upper

three categories, respectively. Majority White and middle/upper and internalizing behavior. Specifically, studies with diverse eth-

<sup>10</sup> In the current meta-analysis, there were more studies of internalizing problems ( $N = 165$ ) than externalizing problems ( $N = 116$ ), and thus, different samples in the two analyses. However, there were 87 studies that included measures of both internalizing and externalizing behavior problems. We calculated the effect sizes for the association between attachment and internalizing and externalizing within this group, as this within subject comparison would control for differences because of sample, and effect sizes were statistically equivalent. The mean effect size for attachment and internalizing behavior in the full sample was  $d = .61$  ( $N = 165$ , 95% confidence interval [CI] [.55–.67]) and for the 87 overlapping studies, it was  $d = .50$  ( $N = 87$ , 95% CI [.42–.59]). For externalizing, the mean estimate across all 116 studies was  $d = .53$  (95% CI [.47–.59]) and for the 87 studies it was  $d = .50$  (95% CI [.43–.57]). Thus, for both internalizing and externalizing, the mean estimates for the full versus narrower samples of overlapping studies were similar.

## Attachment and Internalizing: Funnel Plot of Standard Error by Hedges's g

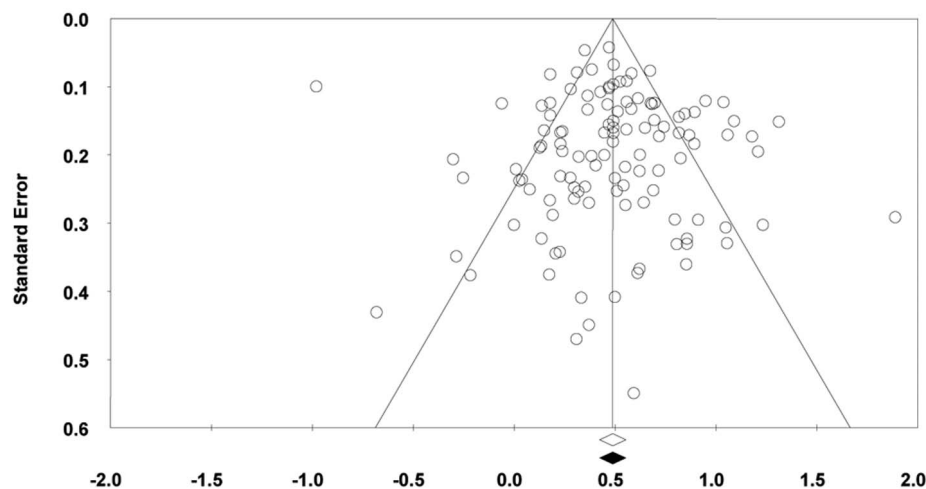


Figure 4. The y-axis on the funnel plot represents the standard error, and the x-axis is Hedge's G. The white diamond represents the observed mean effect size.

nicities had lower effect sizes compared with those with Majority White ( $b = -.23, p < .01$ ). Overall, this model explained 15% of the variance.<sup>11</sup>

### Evaluating Potential Methods Issues Related to Self Report

Parallel to the analyses on attachment and internalizing behavior, we conducted two additional analyses to address potential methods issues. One analysis evaluated the effect of common method variance; the second assessed whether there was an interaction between age and problem informant. We utilized meta-regression on externalizing behavior to test main and interaction effects. In regards to the first analysis, neither the main effects (i.e., attachment and externalizing behavior informant) nor the interaction term ( $b = .23, p < .28$ ) for testing common method variance (i.e., attachment by externalizing behavior) were significant. Thus, there was no evidence that a single informant increased the size of the relation between attachment and externalizing behavior.

Second, we tested the possibility of an interaction between age and informant of externalizing behavior. In this analysis, the main effect of problem informant was significant ( $b = .38, p < .001$ ), while the main effect of age was not ( $b = .06, p < .57$ ) and the interaction of age by problem informant was not ( $b = -.14, p < .36$ ). Thus, similar to internalizing behavior, self-reports of externalizing behavior were associated with larger effects regardless of the age of assessment.

### Externalizing Behavior: Ambivalent, Avoidant, and Disorganized Attachment

**Ambivalent attachment.** In 10 studies with  $N = 578$  participants, the combined effect size for externalizing problems was not significant,  $d = .18$  (CI  $[-.12-.48]$ ). In this analysis, there were

eight representational and two questionnaire measures of attachment.

**Avoidant attachment.** In 12 studies with  $N = 885$  participants, the combined effect size for externalizing problems was not significant,  $d = .18$  (CI  $[-.03-.39]$ ). In this analysis, there were nine representational and three questionnaire measures of attachment.

**Disorganized attachment.** In 13 studies with  $N = 765$  participants, the combined externalizing problem effect size was significant,  $d = .58$  (CI  $[.42-.74]$ ). All of the attachment measures used in this analysis were representational.

### Discussion

The main goals of the current study were to examine the magnitude of the associations between children and adolescents' attachment security and their internalizing and externalizing behavior problems. Spanning decades of research and cutting across the continuum of childhood, we synthesized effect sizes from 165 studies of the association between representational and questionnaire measures of attachment and internalizing behavior, and 116 studies of similar associations between attachment and externalizing behavior. Consistent with Bowlby's (1969) theoretical contentions, findings demonstrated that children with insecure attachment evidence more internalizing ( $d = .58, 95\% \text{ CI } [.52-.64]$ ) and externalizing behavior ( $d = .49, \text{ CI } [.42-.56]$ ) than children with secure attachment. The likelihood that children with insecure attachment had internalizing and externalizing problems were 2.9

<sup>11</sup> We reran the meta-regression analysis examining the contribution of risk, socioeconomic status (SES), and ethnicity on the association between attachment and externalizing behavior with the HD imputed values for ethnicity and results reported herein remained unchanged. Specifically, studies with diverse ethnicities had lower effect sizes compared with Majority White ( $b = -.18, p < .05$ ). No other moderators emerged as significant in the model.

Table 3  
*Results of Categorical and Continuous Moderators for the Associations Between Insecure Attachment and Externalizing Problems*

Categorical moderators	<i>k</i>	Total <i>N</i>	<i>d</i>	95% CI	Homogeneity <i>Q</i>	<i>p</i> -value
Gender					2.69	.10
Girls	12	2,878	.70***	.29-.65		
Boys	13	2,608	.47***	.49-.91		
Attachment measure type					.94	.33
Questionnaire	81	21,920	.51***	.43-.58		
Representational	35	2,769	.43***	.30-.56		
Questionnaire measures					.04	.84
IPPA	69	20,513	.51***	.43-.59		
Security scale	15	1,502	.49***	.30-.67		
Representational measures					.01	.96
AAI/CAI	7	1,099	.45***	.23-.66		
Story stem <sup>a</sup>	23	1,411	.44***	.25-.63		
Attachment figure					1.63	.45
Both parents	78	18,243	.48***	.39-.56		
Mother	21	3,295	.58***	.41-.75		
Mother or father	12	2,910	.45***	.31-.58		
Informant					16.75	.001
Mixed informants	7	1,435	.58***	.31-.85		
Parent	40	2,622	.36**	.19-.52		
Self	54	18,690	.61***	.55-.68		
Teacher	13	1,845	.31*	.15-.48		
Behavioral problems					.04	.99
Aggression	20	7,736	.49***	.34-.65		
Conduct problems	11	2,880	.49***	.29-.64		
Externalizing	85	14,073	.49***	.41-.57		
Socioeconomic status					7.54	.03
Low	31	4,557	.34***	.21-.46		
Middle to upper	13	2,079	.58***	.37-.77		
Mixed	72	18,053	.54***	.46-.61		
Risk status					5.86	.02
No risk	84	20,470	.53***	.46-.61		
Risk	32	4,219	.35***	.22-.48		
Ethnicity					13.98	.01
Diverse	54	13,431	.41***	.32-.51		
Majority Black	4	483	.32	-.03-.68		
Majority Hispanic	5	845	.26	-.05-.56		
Majority White	42	8,840	.66***	.55-.77		
Clinical					1.53	.22
Nonclinical	112	24,516	.50***	.43-.56		
Clinical	4	173	.23	-.17-.64		
Dissemination medium					.08	.78
Publication	71	18,835	.49***	.43-.55		
Dissertation	45	5,854	.47***	.30-.64		
Research design					.49	.49
Cross-sectional	97	20,781	.48***	.41-.55		
Longitudinal	19	3,908	.54***	.38-.71		
Country of origin					.03	.99
Canada	14	4,042	.48***	.36-.60		
Europe	20	6,694	.50***	.38-.62		
United States	78	11,896	.49***	.39-.59		

Continuous moderators	<i>k</i>	<i>N</i>	Slope	<i>SE</i>	<i>z</i> -value	<i>p</i> -value
Age at attachment	116	24,689	.007	.010	.66	.51
Age at behavioral problem	116	24,689	.001	.001	1.59	.07
Percent of males in sample	116	24,689	-.002	.001	-1.48	.14
Time between assessments	116	24,689	-.001	.003	-.15	.88
Year of publication	116	24,689	.011	.008	1.46	.15
Impact factor	67	16,289	-.006	.024	-.25	.81

*Note.* IPPA = Inventory of Parent and Peer Attachment; AAI/CAI = Adult Attachment Inventory/Child Attachment Inventory; *Q* indicates the heterogeneity across studies; *k* = number of studies; CI = confidence intervals. Contrasts were only tested for subgroups with four or more studies.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

and 2.4 times greater compared with their secure counterparts. By way of comparison, effect sizes reported herein are stronger in magnitude than meta-analyses examining the association between *behavioral measures of attachment primarily in infancy* and internalizing ( $d = .37$ , 95% CI [.27–.46]; Madigan et al., 2013) and externalizing ( $d = .31$ , 95% CI [.23–.40]; Fearon et al., 2010) problems. More important, however, these findings need to be considered in light of several familial, contextual, and methodological factors that moderated these associations. In the discussion to follow, we first address results that were similar for both internalizing and externalizing behavior. Second, we summarize and discuss the results that were unique to internalizing behavior. Third, we discuss the analyses pertaining to ambivalent, avoidant, and disorganized attachment specifically. Finally, strengths, limitations, and future directions are addressed.

### Internalizing and Externalizing Behavior: The Importance of Informant

Multiple informants are desirable from a methodological perspective, as they provide convergent evidence of relations and may hint at contextual influences on socioemotional behavior and development (De Los Reyes et al., 2015). In the current study, we examined whether the problem informant (i.e., parent, teacher, or child) moderated associations between attachment and behavioral problems. For both internalizing and externalizing behavior, studies where the informant of the problem behavior was the child yielded larger effect sizes than studies that relied on parent or teacher reports of behavioral problems. Because there can be methodological dependence among moderators, we also examined the contribution of problem informant while controlling for other significant moderators of effect size (i.e., *internalizing*: child age, attachment methodology, and type of internalizing). Meta-regression analyses revealed that problem informant emerged as a consistent and robust moderator of effect size, even after controlling for other potential covariates.

Reports of children's behavior reliably vary with informant (Achenbach et al., 1987; De Los Reyes & Kazdin, 2005). Therefore, it is important to explore possible explanations for why associations between attachment and internalizing and externalizing behavior are stronger when the problem informant is the child. Meta-analytic findings by Achenbach et al. (1987) indicate a correlation of .28 between different types of informants (i.e., parents, teachers, or self-reports) in the judgment of behavior problems. However, this association was moderated by age, with greater informant discrepancy in adolescents compared with younger children. Achenbach et al. (1987) suggested that younger children may be more overt in their symptomatology, so that symptoms are more observable at a younger age. In addition, the behavior of young children may be more cross-situationally consistent, which may increase informant agreement (De Los Reyes & Kazdin, 2005). Younger children are also more likely to spend significant amounts of time with their parents, who are also often the problem informant, whereas adolescents' time allocation is more typically divided between parents, peers, and school, potentially decreasing parent-adolescent agreement. Finally, it has been suggested that as children's cognitive capacity for understanding their own internal states and behaviors increases, their reports of internalizing behavior become increasingly more accurate than

their caregiver reports. In the current study, the finding that problem informant moderated effect sizes remained even after controlling for child age. Thus, independent of children's age, the effect size representing the relation between attachment and behavior problems was higher for children when they self-reported problem behavior.

In addition, children are the most reliable informants of their emotions and behaviors, especially in regards to internalizing behavior (e.g., Schniering, Hudson, & Rapee, 2000). Children may have better access to their internal states and motivations for behavior than teachers or parents. This proposition is corroborated with research demonstrating that exclusive reliance on adult reports of children's internalizing behavior may underestimate children's true symptomatology (Lagattuta, Sayfan, & Bamford, 2012). Given the strength of these child reports across ages, further work is needed to explore the factors that might affect the validity of child reports of behavior problems, such as family stress or particular types of child psychopathology.

It has also been suggested that parental reports of children's problem behavior can be biased by parents' own mental health status or level of stress (Briggs-Gowan, Carter, & Schwab-Stone, 1996; Frick, Silverthorn, & Evans, 1994). For example, in a sample of 394 male adolescents, caregivers, and teachers, agreement among informants (i.e., self, caregivers, and teachers) on individual profiles of symptoms was quite low and, in addition, as caregiver depressive symptoms and reported stress increased, degree of disagreement widened between caregivers' reports of behavioral problems and the reports of adolescents or teachers (Youngstrom, Loeber, & Stoutharmer-Loeber, 2000). We were unable to assess parental mental health and stress as potential moderators of the association between attachment and behavior problems, but this issue does warrant attention in future research. Indeed, it may well be important to covary parental mental health in studies of attachment and parent-reported child behavior.

### Internalizing and Externalizing Behavior: The Importance of Ethnicity

Ethnicity also proved to be a significant moderator for both internalizing and externalizing behaviors. In the bivariate analysis, effect sizes linking attachment security to internalizing and externalizing behavior was higher in studies with majority White samples, compared with ethnically diverse and majority Hispanic and majority Black samples. Notably, the White samples are more likely to be northern European, given the predominance of studies in the current meta-analyses originating from the United States, Canada, Northern Europe, and Australia. It is important to note here that country of origin did not moderate the association between attachment and behavioral problems; thus, our finding of ethnicity as a moderator pertains to the division of ethnicities within a particular country. Furthermore, an important caution before a further discussion of this finding is that the number of studies in the primarily Hispanic and Black groups were small ( $k = 6$  and 4, respectively) suggesting less precision in effect size estimates (Borenstein et al., 2011). With these caveats in mind, it is also important to point out that when additional moderators (i.e., SES and family risk) were entered into the meta-regression analyses, ethnicity consistently accounted for variance in effect sizes (although in the meta-regression analyses, significant differences

between ethnicities were only found between majority White and Diverse groups).

The validity and universality of attachment as a cross-cultural construct has received considerable attention in the literature (van IJzendoorn & Sagi-Schwartz, 2008). In his writings, Bowlby (1969, 1973) strongly emphasized the “species-specific” and universal nature of attachment behavior. However, methods for assessing attachment were initially developed on ethnically homogeneous samples that primarily included those of European decent, which has prompted researchers to call into the question the cross-cultural applicability of attachment (e.g., Rothbaum, Weisz, Pott, Miyake, & Morelli, 2000). Notably, the cross-cultural relation between maternal sensitivity and security of infant attachment has been shown to be robust (Emmen, Malda, Mesman, Ekmekci, & van IJzendoorn, 2012; Mesman, van IJzendoorn, & Bakermans-Kranenburg, 2012). However, this debate has not yet focused on the more verbal forms of assessment that predominate in childhood and adolescence. Findings from the current study suggest a need for future studies to explore the construct validity of more verbally dependent attachment assessments (i.e., representational and questionnaire measures) in racially diverse samples, in relation to such key attachment correlates as maternal sensitivity and observed child attachment behaviors.

In addition to the research on attachment, the preponderance of research on internalizing behavior has been conducted on White, middle class samples. Higher rates of internalizing behavior have been noted in minority populations (Anderson & Mayes, 2010). There is, however, limited understanding as to what factors place minority youth at risk for internalizing difficulty. The current meta-analysis suggests that the quality of attachment may play a significant role on the development of internalizing behavior in most ethnic groups. However, its influence is comparatively less dominant in minority and more ethnically diverse samples compared with majority white samples. If minority status increases cultural stress, the quality of the attachment relationship may be a less effective buffer for minority individuals.

### Internalizing and Externalizing Behavior: The Importance of SES and Family Risk

Unexpectedly, low SES and high family risk was associated with lower effect sizes in the relations between attachment security and internalizing behavior, as well as attachment security and externalizing behavior, while the same relation was stronger in samples characterized as having middle to upper SES and no family risk. Neither SES nor contextual risk moderated the association between attachment insecurity and behavior problems in prior meta-analyses of studies using behavioral assessments of attachment (Fearon et al., 2010; Groh et al., 2012; Madigan et al., 2013). However, it is important to note that when we controlled for ethnicity, which can contextually overlap with risk and SES, the meta-regression revealed that risk and SES did not contribute to the statistical model over and above the effect of ethnicity. Thus, these effects are likely to be an artifact of the associations between these factors and ethnicity. However, in keeping with previous meta-analyses, we briefly discuss below other possible explanations for the effects of contextual risk and SES as moderators that emerged from the bivariate analyses.

First, it is possible that methods of assessing attachment are better suited to low risk populations. Attachment measures have traditionally been developed in low risk homogenous samples, and may, therefore, be less well-calibrated to capture the variations in insecure attachment seen among high-risk children. In addition, attachment measures rely more strongly on the child’s verbal communication skills and these skills may be more highly developed in more socioeconomically advantaged samples (e.g., Hart & Risley, 1995). Second, SES and its associated risk factors (e.g., neighborhoods) explain a significant proportion of the variance in psychopathology (Zahn-Waxler et al., 2008), and children in high-risk environments are exposed to many more risks that lead to psychopathology. It is possible that attachment per se does not account for a significant amount of variance over and above those contextual and sociodemographic risks. Future studies using behavioral methods in childhood and adolescence should explore whether the unexpected direction of effect for SES and risk found here is a function of the reliance on verbal report assessments or whether it represents a more fundamental finding regarding attachment and risk that is common to behavioral, representational, and questionnaire measures of attachment alike. Finally, it is also possible that there are more complex interactions that affect the association between attachment and behavior problems, such that this relation is only amplified by contextual risk in some subgroups children. For example, in a large longitudinal cohort study, Fearon and Belsky (2011) found that the association between attachment and externalizing behavior was moderated by cumulative socio-contextual risk, with a significant effect only for boys with disorganized attachment. Studies of more complex interactions, such as the study by Fearon and Belsky (2011) represent an important avenue of research on attachment and psychopathology.

### Internalizing Behavior: The Importance of Age

Bivariate analyses revealed that effect sizes varied as a function of children’s age at the time of attachment and the time of the behavioral problem assessment, with the association between insecure attachment and internalizing behavior increasing as the child aged. However, when we ran the meta-regression analysis with age as a predictor and controlled for other significant moderators of the association between attachment and internalizing behavior (i.e., problem informant and attachment measure), a different pattern of findings emerged. With all significant moderators in the model, age of the child at the attachment assessment and the behavioral problem assessment became negatively associated with attachment and internalizing behavior. This negative association suggests that the effect sizes decreases as children age. These results suggest that child age shares variance with problem informant and type of behavioral measure (i.e., anxiety, depression), both of which are related to internalizing behavior. Specifically, older children are more likely to be administered self-report measures of internalizing behavior and questionnaire measures of attachment, and both these assessment methods are more strongly related to effect size than alternate assessments. As long as variance contributed by age remains confounded by these measurement factors, then age appears positively related to effect sizes linking attachment and internalizing behavior. Once the variance contributed by these factors is extracted from age, however, it is possible that age itself is negatively related to the effect sizes

linking attachment and internalizing behavior; as age increases, effect sizes decrease. In addition to the substantive contribution of these findings for the literature, discussed below, these results also highlight the methodological importance of examining multiple moderators simultaneously in meta-analytic models.

It has been suggested that the quality of the child–parent attachment can have a differential impact on behavioral adjustment at various points in development (DeKlyen & Greenberg, 2008). The meta-regression analysis suggests that, when controlling for other predictors, attachment may have a weakened influence in the latter stages of adolescence. It is possible that adolescents may encounter more stress outside of the family context related to their attractiveness to peers or other aspects of success in their peer cultures, that cannot be buffered by a secure attachment, at least not to the same extent as a secure attachment can buffer stresses in childhood.

As noted above, reports of internalizing symptoms may be more accurate as children mature and gain greater cognitive sophistication and understanding. Similarly, children become more verbally fluent as they emerge into adolescence, which may in turn be reflected in their ability to comprehend, perceive, and represent the subtleties and nuances of their relationships with their primary attachment figures. These more refined understandings of internal states and behavior may assist in not only providing more specific detail regarding the nature of the attachment relationships with their caregivers, but also a more accurate depiction of their internal experiences of that attachment.

### Internalizing Behavior: The Importance of Attachment Measurement

Bivariate moderator analyses of the association between attachment and internalizing behavior revealed that attachment questionnaires ( $d = .67$ ) had the largest effect sizes and representational measures ( $d = .40$ ) had a significant, but comparatively smaller combined effect size. There were no differences in effect sizes between the various types of questionnaires (e.g., IPPA vs. Security Scale) or representational measures (AAI vs. Story Stem). Thus, findings are specific to the global comparison between representational versus questionnaire measures of attachment. It is important to point out that although attachment measurement type was significant in the bivariate moderator analysis, it was not a unique predictor in the meta-regression analysis that also included child age, problem informant, and internalizing subtype. Thus, attachment measurement type was not a unique source of heterogeneity after accounting for the shared influence of other moderator variables. Therefore, the results of the bivariate moderator analysis with regards to attachment measurement (representational versus questionnaire) should be interpreted with caution.

When we compared the effect sizes and confidence intervals of the representational and questionnaire measures of attachment assessed here with those from Madigan et al. (2013) and Fearon et al.'s (2010) meta-analyses on behavioral measures of attachment and internalizing and externalizing behavior, respectively, the mean effect sizes of the behavioral observation meta-analyses were significantly lower than the effect sizes for the questionnaire measures of attachment. The effect sizes for the representational and behavioral measures of attachment were statistically equivalent. There are several possible explanations for these findings.

First, the majority of children (60%) who completed self-report questionnaires of attachment also completed self-report questionnaires of behavioral symptoms. This raises the concern about shared variance, because effect sizes can be inflated when the same method or informant has been used to assess all variables (i.e., monomethod bias; Spector, 2006). We tested this possibility statistically by entering an attachment measure by problem informant interaction term in a meta-regression analysis. If common method variance were indeed a factor, one would expect that the cell representing both child self-report of attachment and child self-report of internalizing problems to be inflated relative to other cells in which the child did not self-report both variables. However, the interaction term was not significant, so results failed to support this hypothesis. Of course, one cannot interpret null findings within a Fisherian framework, but the results do not give reason to suspect that common method variance played a substantial role in inflating effect sizes between attachment and behavior problems. Second, secure and insecure attachment status on questionnaire measures are based on continuous scores, whereas representational and behavioral measures most often use dichotomized classifications of secure versus insecure. Statistically, the dichotomization of variables typically results in loss of power and misclassification (Dawson & Weiss, 2012). This could explain the observed differences in effect sizes between behavioral and questionnaire measures.

### Internalizing Behavior: The Importance of Problem Behavior Measurement

Effect sizes also varied based on the type of internalizing problem under investigation. Effect sizes were significant across all three moderator levels (i.e., internalizing, depression, and anxiety); however, the magnitude of associations differed significantly. Specifically, we found significantly larger effect sizes in studies examining the association between attachment and depression compared with those examining both broadband internalizing behavior and anxiety specifically. This finding remained after controlling for all other significant moderators.

As far as we know, this is the first study to report on differences within the internalizing spectrum. Studies that have addressed relations between attachment and specific internalizing symptoms have not formally compared attachment–depression and attachment–anxiety correlations (e.g., Irons & Gilbert, 2005; Mikulincer, Florian, & Weller, 1993; Muris, Meesters, van Melick, & Zwambag, 2001). Thus, at present, we can only speculate on what might contribute to this difference. One difficulty in interpreting the current findings is the complexity of the varied subtypes of both anxiety and depression (Atkinson, Paglia, et al., 2000). Depression and anxiety are very general symptoms that appear in a variety of psychiatric configurations. Thus, other correlated difficulties or contextual factors may be contributing to this difference. For example, Levitan and colleagues found that individuals with atypical major depressive disorder (characterized by mood reactivity) reported more anxious-ambivalent attachment and less secure attachment than individuals with classic, melancholic depression (characterized by anhedonia and lack of mood reactivity; Levitan et al., 2009). Depression characterized by mood reactivity is particularly characteristic of individuals with borderline personality disorder, and a large literature now supports the relation of

this disorder to insecure ambivalent and disorganized forms of attachment (Agrawal, Gunderson, Holmes, & Lyons-Ruth, 2004; Gunderson & Lyons-Ruth, 2008; Levy, 2005; Lyons-Ruth, Bureau, Holmes, Easterbrooks, & Brooks, 2013). Thus, the stronger relation of depression to attachment may reflect, in part, the contribution of attachment relationships to broader personality disturbances that include reactive depression.

Anxiety symptoms are also configured in varied ways (e.g., phobia, panic disorder, obsessive-compulsive disorder), which make broad generalizations difficult. However, as these anxiety diagnoses indicate, anxiety disorders are more strongly related to specific environmental triggers (traumatic events, combat, or frightening stimuli) that may weaken the relative influence of attachment relationships on anxiety symptoms, relative to other environmental events. Future work, including both individual studies and meta-analytic research, should be aimed at unraveling the complicated relations among attachment, depression, and anxiety.

### Ambivalent and Avoidant Attachment and Internalizing and Externalizing Behavior

The associations between ambivalent ( $k = 15$ ,  $N = 921$ ;  $d = .40$ ) and avoidant ( $k = 16$ ,  $N = 1,241$ ,  $d = .20$ ) attachment and internalizing behavior were significant. These results provide support for several theorists' contentions that insecure attachment, which arises when children repeatedly experience uncertainty about caregivers' responses to attachment-related needs, promotes internalizing symptoms (Carlson & Sroufe, 1995; Solomon & George, 1999). However, it is important to note that although the effect sizes were significant, the sample sizes were low, and thus, we recommend caution in interpreting it.

Neither ambivalent, nor avoidant attachment, were associated with children's externalizing behavior. In 10 studies with 578 participants, the point estimate for ambivalent attachment and externalizing problems was not significant ( $d = .18$ ). However, this analysis was underpowered, and thus, may not be a reliable finding. Based on 12 studies and 885 participants, the mean effect size for avoidant attachment and externalizing was also small and nonsignificant ( $d = .18$ ). In contrast, Fearon et al. (2010) reported a small but significant effect size between behavioral measures of attachment and externalizing behavior based on 34 studies and 3,675 participants. The finding of no association between avoidant attachment and externalizing behavior in the current study was notable, because it has been hypothesized that avoidant children's self-reliance, reduced regard for others' needs, and anger in the attachment relationships predisposes them to externalizing difficulties across the childhood period (Carlson & Sroufe, 1995; Finnegan et al., 1996).

### Disorganized Attachment and Internalizing and Externalizing Behavior

Consistent with Brumariu and Kerns' (2010) narrative review, children classified as disorganized demonstrated higher levels of internalizing problems compared with children classified as organized ( $d = .47$ ). This finding is in contrast to the meta-analyses by Groh et al., (2012) and Madigan et al. (2013), which did not find an association between behavioral measures of disorganized attachment and children's internalizing behavior, after adjusting for

publication bias. In the current meta-analysis, disorganized attachment was also related to externalizing behavior ( $d = .58$ ), a finding consistent with Fearon et al.'s (2010) meta-analysis on behavioral measures of disorganized attachment and children's externalizing problems.

The broad relations of disorganized attachment to both internalizing and externalizing symptoms in childhood and adolescence, as well as to externalizing behavior in early childhood, are consistent with a large body of data indicating that disorganized attachment is the most problematic form of attachment insecurity (Lyons-Ruth & Jacobvitz, 2008). Disorganized attachment is associated with more severe contextual risks and with more problematic forms of child-parent interaction than organized forms of insecurity (Atkinson, Paglia, et al., 2000; Madigan et al., 2006; van IJzendoorn et al., 1999). The disorganized infant is exposed to more frightened, frightening, or atypical caregiver behavior, including more extreme caregiver withdrawal or hostility, than infants with organized attachment strategies (Madigan et al., 2006). The disorganized behavior itself is thought to convey an inability to organize a consistent way of approaching the caregiver for comfort (Main & Solomon, 1990) and has been associated with increased cortisol responses to stressors in infancy (Hertsgaard, Gunnar, Erickson, & Nachmias, 1995; Spangler & Grossmann, 1999; Spangler & Zimmermann, 2014). The degree of disturbance evident in the primary relationship in infancy, as well as the repeatedly demonstrated associations with concurrent and later behavioral disorders, has led to a call for disorganization to be included in psychiatric diagnostic systems as a disorder of early childhood (see Lyons-Ruth & Jacobvitz, 2008).

### Strengths, Limitations, and Future Research

This study represents the most comprehensive examination of attachment and behavior problems to date. While several meta-analyses have been conducted on the topic previously, they have isolated only one aspect of psychopathology, limited the meta-analysis to one developmental time period, only utilized a select group of attachment methodologies, and/or failed to examine multiple moderators simultaneously or interactively. Moreover, the sample size for the secure versus insecure contrast in the current study was large (194 independent studies) and, accordingly, our statistical power provides more precise estimates of effect sizes than previous meta-analyses. However, it is important to acknowledge several limitations as well.

First, although we endeavored to include studies that included clinical diagnoses, and had hoped to explore relations between attachment and clinical diagnoses of childhood and adolescence, there were too few studies that included clinically diagnosed groups (those included in the meta-analysis are: Amble, 2011; Armsden et al., 1990; Cuhna, Soares, & Pinto-Gouveia, 2008; Defilippo et al., (2000); Diamond et al., 2002; Ivarsson et al., 2010; Jent & Niec, 2006; McLewin, 2010). Based on our findings, we cannot conclude that insecure attachment is related to diagnosable levels of psychopathology. However, differential associations were found between specific forms of internalizing behavior (i.e., anxiety and depression), underscoring the importance of examining attachment and diagnostic forms of internalizing behavior. The limited prior research based on participant data suggests that insecure attachment may place children at risk for internalizing

*psychiatric diagnoses*. For example, in a sample of 100 adolescents, Ivarsson, Granqvist, Gillberg, and Broberg (2010) found that dismissing attachment as assessed in response to the AAI was overrepresented in adolescents with obsessive-compulsive disorder and major depressive disorder. To our knowledge, there is no study to date examining whether insecure attachment assessed by representational or questionnaire measures is overrepresented among children with specific externalizing psychiatric diagnoses. Thus, it will be important for future research to address the role of attachment in relation to particular diagnoses such as oppositional defiant disorder and conduct disorder. Another question of interest is which subtypes of insecure attachment are most relevant for particular psychiatric diagnoses. This issue has been addressed in the adult attachment literature (see Bakermans-Kranenburg & van IJzendoorn, 2009, for a review), but not yet in the childhood attachment literature.

Second, to date, the majority of research focusing on attachment and behavior problems has emphasized the quality of attachment in the mother-child relationship. This is primarily because of the continuing societal role of mothers as the primary caretakers of children. Accordingly, several attachment measures have not been validated with fathers (de Wolff & van IJzendoorn, 1997). Nonetheless, following the contemporary shift toward men and women sharing more equality in parenting responsibilities, there has been a recent surge of research focused on father-child attachment, as well as its influence on children's adaptation. The breadth of this research, however, is still limited compared with research focused on the quality of attachment to the mother. Third, representational and questionnaire measures vary in whether they focus exclusively on one caregiver-child relationship. Some of these methodologies assess the mother-child relationship only. Others instruct children to select either their mother or the father when completing the assessment, although their selection of attachment figure is not necessarily specified. Others measure derive separate scores for mothers and fathers. Still others provide combined scores across caregivers. Thus, there is significant variability in how children's relationships with attachment figures are assessed during childhood and adolescence. Although we were able to test whether the designated attachment figure (i.e., mother, both parents, or unspecified mother or father) was a moderator of effect sizes, there were too few studies examining fathers exclusively to include fathers alone as a separate level in the moderation analysis. Thus, the generalizability of our findings to fathers is limited and additional research in this area should be prioritized. Despite our unreserved support for the assessment of fathers as a separate source of attachment security, research on the development and validation of father-child attachment assessments should likely precede research on the antecedents and correlates of the father-child attachment relationship, so that studies addressing fathers as attachment figures are grounded in well-validated assessment techniques.

Fourth, the current meta-analysis did not include an assessment of the association between attachment and co-occurring internalizing and externalizing problems. Although generally conceptualized as being distinct psychopathological domains, a growing body of research demonstrates that internalizing and externalizing problems often co-occur at every point in development across both clinical and nonclinical samples (Gilliom & Shaw, 2004). Research has also demonstrated that such co-occurring behavior

problem profiles have earlier ages of onset as well as more chronic and disruptive developmental trajectories. This pattern of comorbidity has led many researchers to search for common etiological processes. Although common genetic factors likely influence these two broadband dimensions of behavioral adaptation, so too do other individual and environmental risk factors which likely include parent-child attachment, as well as other psychosocial factors such as family SES, maternal depression, negative home environment, difficult child temperament, and child cognitive deficits (Fanti & Henrich, 2010; Gjone & Stevenson, 1997). It will be important in future research on comorbid internalizing and externalizing problems to examine the unique, additive and/or interactive effects of children's temperamental characteristics, the contextual environment, parental behavior, and children's attachment in the development and maintenance of both "pure" and comorbid internalizing and externalizing problems. This research endeavor will be particularly important for furthering understanding of the mechanisms and processes underlying these behavioral profiles.

Finally, although the large sample size in the current study allows for precise estimates of effect sizes and enables an extensive assessment of moderator variables, meta-analyses of nonexperimental data do not yield conclusions about causality, nor do they address more complex causal processes. Although research on attachment and child behavioral problems is vast, as summarized herein, there is a paucity of studies with longitudinal or randomized intervention designs, especially when assessments of attachment take place beyond the infancy (and early childhood) period. Cross-sectional designs, which are largely correlational in nature, examine attachment and children's internalizing and externalizing behavior at the same point in time, and thus, cannot determine the causal ordering of associations between attachment and behavioral problems. One advantage of longitudinal research is the opportunity to rigorously control for earlier levels of internalizing and externalizing behavior. Moreover, longitudinal studies enable researchers to examine the influence of within-subject variability over time. This is important, as at least one study has shown that the quality of attachment decreases over the adolescent period (Buist, Deković, Meeus, & van Aken, 2004).

Randomized experimental designs are particularly advantageous as they manipulate putative mechanisms of adverse outcome and causally assess the impact of that manipulation. Results from randomized controlled trials do indeed support a causal role for responsive parenting in children's behavioral adaptation. For example, Moss et al. (2011) examined the effectiveness of an 8-week home visiting program designed to enhance responsive parenting in a sample of caregivers who had been involved with child protection agencies because of inadequate care of their children. Results from this and other intervention trials (Van Zeijl et al., 2006) have shown a positive intervention effect on parental sensitivity and a concurrent positive effect on promoting secure attachment relationships and decreasing internalizing and externalizing problems in children. Additional randomized controlled trials are needed to assess whether changes in secure attachment, and/or parental responsiveness, do indeed causally mediate changes in children's behavior problems.

In conclusion, findings from the current study suggest that an important social determinant of children's socioemotional and behavioral development is the quality of the attachment relationships they form with their caregivers. Indeed, effect sizes from the



current study are similar or larger in magnitude to other purported environmental determinants of children's internalizing and externalizing behavior, such as parental psychopathology (Connell & Goodman, 2002), interparental conflict (Buehler et al., 1997), exposure to domestic violence (Evans, Davies, & DiLillo, 2008), and parenting behavior (Hoeve et al., 2009; McLeod, Weisz, & Wood, 2007; McLeod, Wood, et al., 2007). Thus, our findings lend considerable scientific weight to the contention that quality of attachment with primary caregivers influences children's behavioral outcomes in childhood and adolescence.

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