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Review article

Adult attachment representations and depressive symptoms: A meta-analysis

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ABSTRACT

Background: Attachment theory has long argued that insecure and disorganized attachment representations are associated with vulnerability to psychopathology in general, and depressive symptoms in particular. However, studies assessing the link between insecure and disorganized attachment and depressive symptoms report inconsistent results. The primary aim of this meta-analysis was to examine the extent to which adult attachment representations are associated with depressive symptoms.

Methods: We conducted a literature search for published studies using PsycINFO, MEDLINE, and ProQuest in March 2017, identifying 55 samples (N = 4,386). Eligible studies assessed depression using a well-validated self-report or clinical diagnostic measure of depression and attachment using the Adult Attachment Interview.

Results: Results demonstrated that insecure individuals had higher levels of depression than secure-autonomous individuals (d = 0.21, 95% CI [0.08–0.33]). Specifically, insecure-preoccupied individuals (d = 0.48, 95% CI [0.30–0.65]), but not insecure-dismissing individuals (d = 0.09, 95% CI [−0.03–0.22]), exhibited significantly more depressive symptoms than the secure-autonomous individuals. Additionally, unresolved adults had higher levels of depression than adults with organized attachment classifications (d = 0.29, 95% CI [0.13–0.44]).

Limitations: Due to the nature of the studies reviewed, causal inferences regarding the links found between adult attachment representations and depressive symptoms may not be drawn. Further, the aggregate effect sizes do not solely reflect the magnitude of the association between attachment representations and clinically-diagnosed major depressive disorder.

Conclusions: The results of this meta-analysis have important conceptual and practical implications for attachment-based prevention and intervention efforts, as they suggest that attachment representations, specifically insecure-preoccupied and unresolved, are associated with depressive symptoms in adulthood. Future research using longitudinal and intervention-based designs should examine the extent to which insecure-preoccupied and unresolved attachment lead to increased depressive symptoms, as well as the mechanisms by which these attachment patterns across the life span may increase vulnerability to depressive symptoms in adulthood.

1. Introduction

1.1. Attachment and depression

The core symptoms of sad mood, diminished interest or joy in daily activities, disrupted sleep routines, disturbed appetite, fatigue, loss of ability to concentrate, and excessive feelings of guilt and worthlessness (American Psychiatric Association, 2013) currently make depression the leading cause of disability in people age 15–44 in the United States (Greenberg et al., 2015). With residual symptoms such as cognitive impairment and social dysfunction, depression is expected to become the leading cause of health loss attributable to disease and injury (i.e., disease burden) worldwide by the year 2030 (Mathers and Loncar, 2006). Given the devastating impact of depression on both the individual and society, it is critical to better understand factors that may be linked to depressive symptoms, as this knowledge may inform clinical assessment, prevention, and intervention efforts.

Individuals with depression often experience a diverse range of social and behavioral difficulties that inhibit their ability to form and maintain relationships (Hames et al., 2013; Tse and Bond, 2004). Given that individual differences in early life attachment patterns are thought to be carried forward and shape our relationships with close others (e.g., peers and romantic partners; Bowlby, 1988; Feeney, 2008; Groh et al., 2014; Holland and Roisman, 2010) and unfamiliar others (Roisman, 2006), attachment theory offers an important framework for understanding the etiology and development of depressive symptoms

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across the life span.

According to attachment theory (Bowlby, 1969/1982), infants develop secure attachments to their primary caregivers when they are met with consistent sensitive responses during times of distress. Securely attached infants and children are able to maintain a sense of safety derived from physical or perceived proximity to caregivers, which provides them with the necessary confidence to freely explore their environment. However, when caregiving is inconsistent, inattentive, and/or characterized by rejection and neglect, infants may develop insecure attachment patterns (Ainsworth et al., 1978/2015), which entail negative representations of self as unlovable and others as unloving. Negative representations of self and others, in turn, may lead to patterns of interacting with others in overly distancing or demanding ways (Kobak and Sceery, 1988), thereby increasing the probability of experiencing real or perceived interpersonal conflicts and reducing the availability of social support. Thus, insecure attachment may set the stage for processing later relational experiences as stressful and unsatisfying, which may confer risk for depression across the life span (Cummings and Cicchetti, 1990; Hames et al., 2013; Hammen, 2000; Lakey and Orehek, 2011; Williams and Riskind, 2004).

1.2. The effect of loss of emotional ties to caregivers on early attachment patterns

From an attachment theory perspective, psychopathology - including depression - is defined as a deviation from a normal developmental pathway in an attempt toward adaption (Carlson and Sroufe, 1995). In the context of early attachment to caregivers, the most common precursor for such deviation toward adaptation is the “loss of the emotional ties” that infants naturally form with their primary caregivers (Bowlby, 1988). Although the loss of emotional ties to caregivers may include the literal absence of the caregiver (e.g., due to death), it may also include the experience of a caregiver who is unresponsive, rejecting, or overinvolved in the context of the infant's signals of distress. In such rearing environments, where attachment figures are perceived to be or are objectively absent, adaptive strategies to regulate one's own emotional distress are developed (Belsky, 1997a; Main, 1981). Early in life, these adaptive responses result in one of two ‘second best’ relational strategies: insecure-avoidant or insecure-resistant (Main, 1990).

In infancy, attachment strategies are assessed with the Strange Situation Procedure (Ainsworth et al., 1978/2015), which involves a series of brief separations and reunions between the infant and his or her caregiver, serving to activate the attachment system. The infant's behaviors upon reunion are coded along a number of scales that reflect the extent to which infants use their caregiver as a means for regulating distress. The insecure-avoidant strategy, which is thought to either serve to maintain proximity to the caregiver while not driving her away (Main, 1981), or avoid proximity altogether (Mikulincer and Shaver, 2012), is characterized by distant, self-reliant behavior when distressed in the presence of the caregiver (Ainsworth et al., 1978/2015; Main, 2000); in other words, insecure-avoidant infants minimize their displays of distress. In contrast, the insecure-resistant strategy, which serves to attain greater proximity to caregivers in order to ensure more consistent attention and care (Cassidy and Berlin, 1994; Main and Solomon, 1986), is characterized by expressing anger or resistance towards the caregiver while simultaneously seeking proximity (Hesse and Main, 2000). Insecure-resistant infants, thus, maintain proximity by maximizing their displays of distress. Along with secure attachment, these insecure strategies reflect “organized” attachment patterns, given that they are developed and consolidated around the caregiver's consistent availability and responsiveness, or lack of thereof.

In contrast to the organized patterns of attachment (i.e., secure, insecure-avoidant, insecure-resistant), some infants develop disorganized attachment patterns exhibited by the absence or breakdown of a regulatory strategy (Main and Solomon, 1990). Often characterized by odd or anomalous behaviors, freezing or stilling for a period of time, or simultaneous displays of avoidance and proximity-seeking during the Strange Situation Procedure (Hesse and Main, 2006), attachment disorganization typically results from parental abuse or neglect, frightening parental behavior, or elevated risk (Cyr et al., 2010; Schuengel et al., 1999). Accordingly, disorganized attachment behaviors are thought to reflect an “unsolvable dilemma,” where infants perceive their caregiver as both a haven of safety (due to the infant's natural disposition to approach caregivers when threatened) and source of threat (Hesse and Main, 2006). As a result, a breakdown in coping strategies reduces the chance for successful adaptation in non-favorable caregiving environments.

1.3. From attachment behavior in infancy to attachment representation in adulthood

Over time, the attachment system is theorized to integrate and consolidate past affective and behavioral experiences into a generalized relational schema that may have a direct effect on adult functioning (Sroufe, 2005; Sroufe et al., 2005a,b). Relational schemas, also referred to as internal working models (Bowlby, 1973, 1982), are thought to guide interpersonal interactions by eliciting emotions, cognitions, behaviors, and expectations (Bretherton, 1991; Bretherton and Munholland, 2008; Main et al., 1985).

A variety of instruments spanning several assessment methods (e.g., self-report, interview) have been developed to measure internal working models in adulthood. In the developmental literature, the semi-structured Adult Attachment Interview (AAI; George et al., 1985) has been routinely administered and is considered the gold standard in adult attachment assessment. The AAI has demonstrated good reliability, stability, and discriminant validity (Bakermans-Kranenburg and van IJzendoorn, 1993; Waters et al., 2000). In addition, the AAI has been linked to the experience of early maternal sensitivity (Haydon et al., 2014), parenting quality with one's own children (Van IJzendoorn, 1995), and romantic relationship functioning in adulthood (Crowell et al., 2002; Holland and Roisman, 2010). The AAI is designed to elicit discourse related to past experiences with one's primary caregivers, including possible trauma or loss events, and how they may have influenced one's development and current personality. Narratives are classified into attachment categories based mostly on the coherence and manner of speech rather than their content (Hesse, 2016), independent of the speaker's verbal ability and general intelligence (Bakermans-Kranenburg and van IJzendoorn, 1993).

Similar to secure infants whose behavior is characterized by free exploration of their environment, *secure-autonomous* adults exhibit “free” evaluation of past experiences with their caregivers without becoming emotionally entangled with these experiences. Secure-autonomous discourse during the AAI is therefore characterized by a coherent and collaborative manner of speech (Hesse, 2016). Similar to the insecure-avoidant infants, adults who are classified as *insecure-dismissing* on the AAI exhibit inhibition of emotional arousal and are thought to detach themselves from fully processing potential interpersonal threat or pain (Main, 1981). This representational pattern, commonly referred to as a ‘deactivating strategy’ (Shaver and Mikulincer, 2007), is reflected in the idealization of caregivers, insistence on lack of memory of childhood events, and/or derogation of attachment experiences or relationships (Hesse, 2016). Similar to insecure-resistant infants, adults classified as *insecure-preoccupied* on the AAI exhibit a tendency to exaggerate expressed emotions and become overinvolved in the availability of others. These individuals present with heightened expression of anger towards one or more caregivers, and/or passivity or vagueness regarding attachment relationships (Hesse, 2016), a behavioral pattern commonly referred to as a ‘hyperactivating strategy’ (Shaver and Mikulincer, 2007). Adult attachment representations may be classified as organized (i.e., secure-autonomous, insecure-dismissing, and insecure-preoccupied) or unresolved.

Similar to disorganized attachment in infancy, characterized by disoriented or fear responses when the attachment system is activated, adults who manifest disoriented discourse during discussion about past trauma of loss or abuse are classified as *unresolved* (Hesse and Main, 2006).

1.4. Adult attachment and depression: what is known so far

Although extensive research suggests that insecure and disorganized attachment are associated with internalizing symptoms, including depression symptoms, in childhood (Fearon et al., 2010; Groh et al., 2016), empirical findings supporting this link in adulthood are inconsistent (Stovall-McClough and Dozier, 2016). Some studies have found no significant difference in reported depressive symptoms between adults classified as secure-autonomous and insecure (e.g., Dickstein et al., 2004), whereas other studies have found that adults classified as insecure (both dismissing and preoccupied) have higher levels of depressive symptoms or are more likely to be clinically depressed than those classified as secure-autonomous. For example, McMahon et al. (2006) found that mothers who were insecure were more likely to report having chronic postpartum depression than secure-autonomous mothers. As in the case of attachment insecurity, studies assessing the link between attachment disorganization and depression reported mixed results. Although some studies have found an association between unresolved attachment and depression (e.g., Fonagy et al., 1996), others have not (e.g., Patrick et al., 1994; Rosenstein and Horowitz, 1996).

When comparing the types of insecure attachment (i.e., insecure-dismissing, insecure-preoccupied) to secure-autonomous attachment, results have been mixed. Some studies have found that depressive symptoms are elevated specifically among insecure-dismissing individuals. For example, Ivarsson and colleagues (2010) found that, relative to secure-autonomous and insecure-preoccupied individuals, insecure-dismissing individuals were overrepresented in a depressed outpatient sample. However, other studies found depressive symptoms to be elevated specifically among insecure-preoccupied individuals. In a sample of non-psychotic psychiatric patients, those diagnosed with depression (with or without co-morbid conditions) exhibited significantly more involving anger with parents during the AAI, a hallmark of insecure-preoccupied attachment, than those who were not diagnosed with depression (Fonagy et al., 1996). In addition, another study found that low-risk mothers who were diagnosed with postnatal depression were more likely to be classified as insecure-preoccupied than mothers who were not diagnosed with postnatal depression (Murray et al., 2006). Further, insecure-preoccupied mothers who were incarcerated reported higher severity of depressive symptoms than both insecure-dismissing and secure-autonomous incarcerated mothers (Borelli et al., 2010).

Most of the studies that directly compared depressive symptoms between the two subtypes of insecure attachment found that adults with insecure-preoccupied attachment had higher levels of depression than adults with insecure-dismissing attachment. In a group of psychiatrically hospitalized adolescents, females diagnosed with affective disorders were more likely to be classified as insecure-preoccupied than insecure-dismissing (Rosenstein and Horowitz, 1996). Male adolescents with affective disorders, however, were found to be equally likely to have a dismissing or preoccupied attachment. Likewise, in female college students (Cole-Detke and Kobak, 1996) and low risk adolescents (Kobak et al., 1991), individuals classified as insecure-preoccupied tended to report more depression symptoms than individuals classified as prototypically insecure-dismissing.

To our knowledge, there has been only one meta-analysis that has investigated links between adult attachment representations as measured by the AAI and depression, which demonstrated over-representation of insecure attachments in clinically depressed samples, compared with non-clinical samples (Bakermans-Kranenburg and van IJzendoorn, 2009). Depressed individuals were found no more likely to be classified as unresolved than individuals without depression. However, this meta-analysis was limited by excluding studies that assessed depression in non-clinical populations and that used self-report measures of depression.

1.5. The current study

Overall, research assessing the link between adult attachment state of mind and depression has shown inconsistent findings, and a previous meta-analytic study assessing such links only examined distributions of adult attachment classifications in clinically depressed samples compared to non-clinical samples. In addition, although the prevalent notion has been that insecure-preoccupied attachment is more likely to be linked to internalizing disorders, including depression, than insecure-dismissing attachment (Fortuna and Roisman, 2008), no meta-analysis has directly compared depression between the two insecure attachment patterns.

Thus, in the current meta-analysis, we aimed to examine the magnitude of the association between adult attachment representation and depressive symptomatology across clinical and non-clinical populations. Accordingly, we aimed to examine whether there were significant differences in depression between (a) insecure and secure-autonomous individuals, including comparisons between (b) insecure-dismissing and secure-autonomous individuals, and (c) insecure-preoccupied and secure-autonomous individuals; (d) insecure-preoccupied and insecure-dismissing individuals; and (e) unresolved and organized individuals.

Additionally, we examined gender, socioeconomic status and education, ethnicity, and age as potential moderators of the attachment-depression association, given that increased risk for depression has been observed in females (Goodwin and Gotlib, 2004), individuals with low socioeconomic status (Freeman et al., 2016), minority individuals (Dunlop et al., 2003), and older adults (Andrade et al., 2000). In addition, we considered several methodological factors as potential moderators, including whether individuals' attachment patterns were based on a categorical classifications or a dimensional scores (following debate regarding the underlying structure of adult attachment patterns; Haydon et al., 2012), and whether depression symptoms were measured dimensionally (through self-report) or categorically (through a diagnostic interview).

2. Method

2.1. Search strategy

Peer-reviewed articles and doctoral dissertations investigating the relation between attachment and depression were retrieved in March 2017 by systematically searching PsycINFO, MEDLINE, and ProQuest databases. The keywords attach* or Adult Attachment Interview or AAI were selected and arranged in various combinations with depress*, dysthym*, emotional*, affectiv*, dissociative disorders, psychopatholog*, adolescent psychopathology, mental disorder, mentalization, mood, psychosocial, emotional development, Symptom Checklist-90, Mental Health Inventory, Structured Clinical Interviews, Edinburgh Postnatal Depression Scale, Beck Depression Inventory, Centre for Epidemiologic Studies Depression Scale, and Brief Symptom Inventory. Additionally, the reference sections of relevant research articles were further inspected for studies that may not have been identified via electronic databases. No date or geographical restrictions were applied; however, studies were limited to those published in the English language. With the exception of case studies and qualitative reviews, no methodological restrictions were applied.

2.2. Eligibility criteria

Studies were first selected based on their use of the AAI. This

decision was made in light of research suggesting that attachment styles assessed via self-report measures are only weakly correlated with AAI attachment classifications (Roisman et al., 2007), calling attention to the somewhat different attachment constructs that these approaches assess. Attachment classifications defined by Main and Goldwyn's (1994) AAI classifications and Kobak's (1993) AAI Q-sort prototypes were considered. Although the validity for both approaches has been well-established, preference was given to the traditional Main classification system in cases where both methods were utilized in the same study. When primary attachment classifications were not reported (e.g., only reflective function scores provided), the authors were contacted to try and obtain this information. Importantly, studies using a modified version of the AAI were excluded to encourage meaningful comparison of effect sizes across studies.

Studies were additionally selected if the investigators had administered a validated self-report or clinical diagnostic measure of depression (e.g., the Beck Depression Inventory [BDI; Beck et al., 1961], Structured Clinical Interview Diagnostic [SCID; First et al., 2002]). Given that we included studies of non-clinical samples, self-report measures of depression symptoms were more commonly used than diagnostic interviews; thus, in cases where multiple depression assessments were used, preference was given to self-report measures. When multiple self-report measures were reported, we selected the one that was administered closest in temporal proximity to the administration of the AAI. Importantly, studies were excluded if depression (or attachment) was measured following a treatment/intervention. However, if data could be obtained for a pre-intervention (baseline) assessment, the study was still coded. Studies in which depression was only assessed in samples identified as having concurrent psychopathological disorders (e.g., bipolar disorder, schizophrenia) without a comparative non-clinical control group were excluded.

2.3. Study selection

Our initial search returned 1406 reports. As expected, we identified partial overlap across searches resulting in the retrieval of 180 duplicate study titles. After identifying and removing duplicate study titles in our database, the titles and abstracts of 1226 reports were screened to determine their eligibility. First, we double-checked that reports were peer-reviewed journal articles (i.e., not case studies, reviews, or book chapters). Next, we determined whether studies (a) collected the AAI and some standardized measure of depression, and (b) met our other eligibility requirements. The remaining 186 full-text articles were then assessed for eligibility using the same criteria. At times, the full text of identified reports was unavailable. In such cases, an effort to obtain copies was made by placing an order through university interlibrary loan services or by writing to the author(s). If two or more studies reported effects from the same sample, the study with the largest sample size was selected and the others were excluded. In the case that equal sample sizes were provided, the study with the most recent year of publication was cited to convenience readers in locating the study. These search parameters resulted in data from 53 research reports (55 samples), which were included in the quantitative analysis (see Fig. 1 for flow chart for study selection and Table 1 for description of included studies).

2.4. Coding procedures

A wide range of study- and sample-level characteristics thought to contribute to variability in the effect size statistic were included in the coding protocol. Source characteristics included (a) year of publication, (b) publication type (i.e., peer-reviewed or dissertation report), and (c) country of data collection.

Sample-level demographics included (a) participant mean age, (b) percent female, (c) percent parent, (d) race, (e) socioeconomic status, and (f) education. Given the rapid onset of depression in adolescence (Andersen and Teicher, 2008), an additional variable was created post-hoc by assigning binary codes to reflect whether samples comprised of mostly adolescents or adults. A cut-off of 18 years of age or younger was used to assign cases to the adolescent group.

We also recorded a number of methodological characteristics. These included (a) type of self-report depression measure, (b) type of AAI coding (i.e., Main classifications or Q-sort), and (c) whether attachment and depression were measured concurrently. A number of studies reported attachment continuously, despite having applied the traditional classification system (Seiffge-Krenke, 2006; Wojniak, 1995; Zajac and Kobak, 2009). To examine whether this would result in any significant differences, we additionally coded whether attachment data were assessed categorically or dimensionally. Given that depression could either have been measured through self-report or diagnostic interview, we also included a variable to assess dimensional versus categorical measurement of depression.

In preparing the coding protocol, several studies served as pilot studies to identify potential gaps or ambiguous items and were subsequently used to train the first and second authors. When reliability was determined to be satisfactory, all eligible studies were coded independently. Throughout the coding phase, the third author conducted a running quality check to identify if discrepant coding trends emerged. Interrater reliabilities were calculated using the intraclass correlation coefficient (ICC) and Cohen's kappa (κ). ICC for continuous moderators and data used in computing the effect size statistic were high (Mean ICC = 0.93 and 0.99, range = 0.80 - 1.0 and 0.90 - 1.0, respectively). Rater agreement for coded categorical moderator variables was also high (Mean κ = 0.77, range = 0.40 - 1.0). All discrepancies were resolved through consensus.

2.5. Data analysis

We conducted five meta-analytic comparisons examining the relation between adult attachment representations and depressive symptomatology. The first three comparisons were designed to evaluate differences in depression between individuals with secure-autonomous versus insecure attachment patterns (secure versus insecure, secure versus insecure-dismissing, secure versus insecure-preoccupied). A fourth comparison was designed to test differences between insecure sub-classifications (i.e., insecure-dismissing versus insecure- preoccupied). For these first four analyses, only the forced primary attachment classification was used, ignoring unresolved status. The fifth and final comparison was designed to evaluate differences between organized and unresolved status, irrespective of primary classification.

Effect sizes were computed using the statistical software R (R Core Team, 2015). Studies reported data in a number of statistical forms, such as means and standard deviations, frequency counts, and correlations. The 'escalc' function which calculates effect sizes and accompanies the 'metafor' package (Viechtbauer, 2010) was used to convert data into the standardized mean difference prior to analysis. For each comparison, we organized the data so that positive effect sizes would indicate higher depressive symptoms among individuals with insecure/unresolved attachment than individuals with secure-autonomous/organized attachment. Because the insecure-dismissing versus insecure-preoccupied comparison included two insecure groups, positive values were computed to reflect that individuals with insecure-preoccupied attachment had higher depressive symptoms than individuals with insecure-dismissing attachment. Meta-analyses were fit to a random-effects model using the restricted maximum-likelihood estimator (see Raudenbush, 2009; Viechtbauer, 2005). Following evaluations of heterogeneity, moderator analyses were conducted under a mixed/random effects model (Viechtbauer et al., 2015; see Table 2 for categorical moderators). Meta-regression techniques were applied for continuous moderators, whereas procedures analogous to analysis of variance (ANOVA) were applied for categorical moderators.

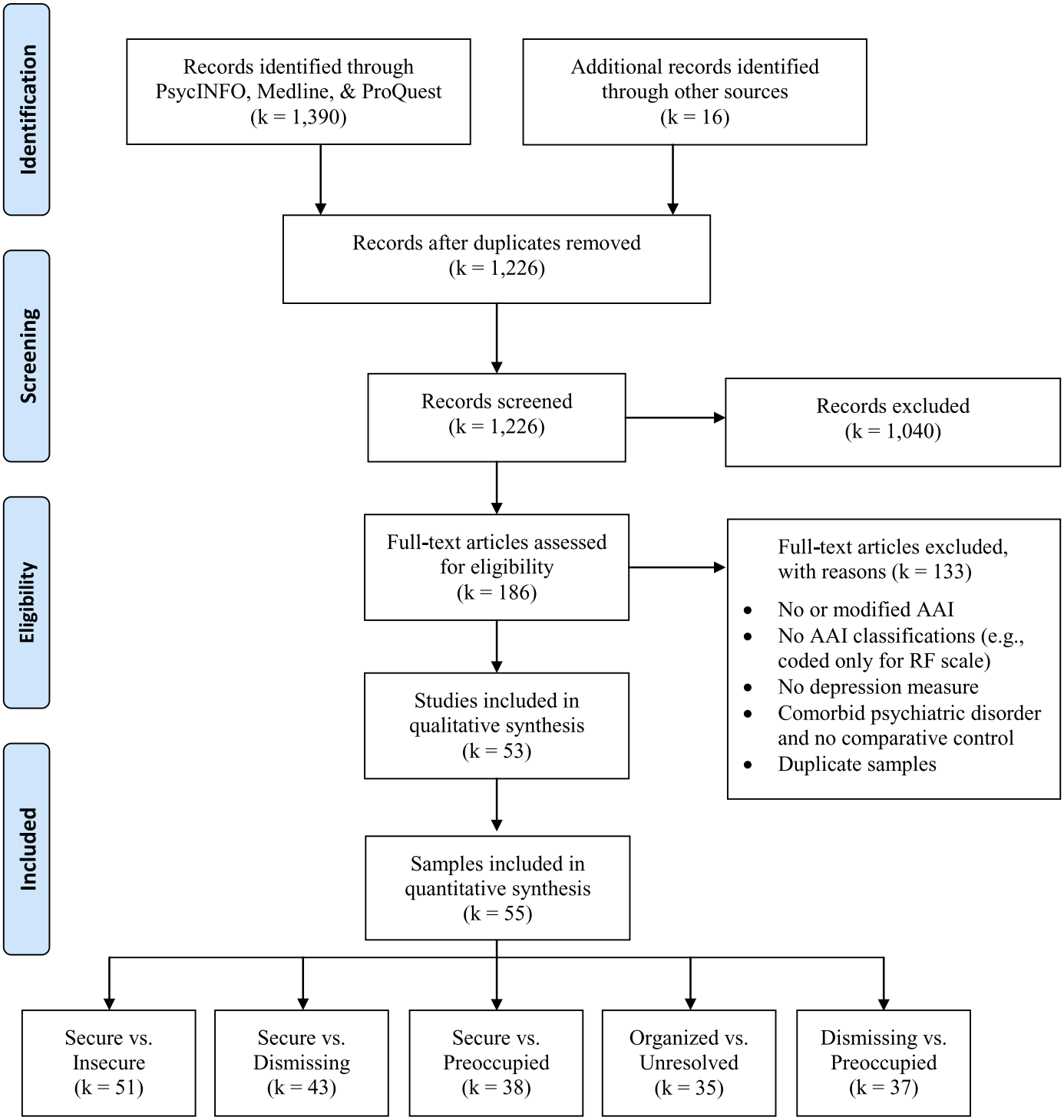

Fig. 1. Flow chart for study selection.

3. Results

3.1. Secure versus insecure attachment

Effect sizes for 51 samples with 4074 participants were computed for the meta-analysis examining depression symptoms among secure-autonomous and insecure attachment patterns (see Fig. 2a). There was a wide dispersion of effects, with individual study estimates ranging from −1.79 to 1.65. The aggregate effect size was significant in the predicted direction, such that individuals with insecure attachment had higher depressive symptoms than individuals with secure-autonomous attachment, $d = 0.21$, 95% CI [0.08 − 0.33]. The homogeneity Q statistic indicated a significant amount of variability among effect sizes, $Q(50) = 148.82$, $p < .001$. Thus, moderation was tested among study- and sample-level variables to explore differences in effect sizes more closely. None of the 13 moderators selected for analysis significantly explained the variance of the given effect sizes (all $ps > 0.05$).

3.2. Secure-autonomous versus insecure-dismissing attachment

Effect sizes for 43 samples with 2881 participants were computed for the meta-analysis comparing depression symptoms between secure-

Table 1
Description of studies.

Study	Country	n	Mean age	Female (%)	Parent (%)	Socioeconomic status	Education level	Depression measure	AAI coding	Sample description
Ablow et al. (2013)	United States	53	31.9	100	100	mid/high	Some college or more	BSI	Main	Primiparous women in their third trimester of pregnancy
Adam et al. (2004)	United States	100	34	100	100	mid/high	Some college or more	BDI	Main	Middle class, married mothers of 2-year old children
Allen et al. (2004)	United States	101	15.9	51.48	0	mid/high	High school or less	BDI	Q-sort	Adolescents identified as at-risk due to school difficulties
Ammaniti et al. (2006)	Italy	49	32.5	100	100	mid/high	Some college or more	CES-D	Main	Mothers identified as at-risk for depression and low-risk community controls
Atkinson et al. (2009)	Canada	96	31.89	100	100	mid/high	Some college or more	BDI; SCL-90-R	Main	Middle class, mothers in their third trimester of pregnancy
Babcock et al. (2000)	United States	100	38.53	0	72.2	mid/high	Some college or more	BDI	Main	Domestically violent husbands and maritally distressed but non-violent husbands
Bashe (2000*)	United States	65	28	100	n/a	n/a	n/a	BDI	Main	Women participating in a longitudinal study of adult attachment
Blumberg (1997*)	United States	50	19.97	100	n/a	mid/high	Some college or more	SCL-90-R	Main	College undergraduates attending a university in the United States
Borelli et al. (2013) (Sample 1)	United States	50	19.9	47.1	0	mid/high	Some college or more	BSI-18	Main	College undergraduates attending a north-eastern university in the United States
Borelli et al. (2013)(Sample 2)	United States	46	19.92	0	0	mid/high	Some college or more	BSI-18	Main	College undergraduates attending a University in the western United States
Borelli et al. (2010)	United States	69	28.5	100	100	low	High school or less	CES-D	Main	Incarcerated mothers
Busch et al. (2008)	United States	81	36	100	100	mid/high	n/a	BSI	Main	Women who had experienced at least one significant lifetime loss
Busch and Lieberman (2010)	United States	73	31.84	100	100	low	Some college or more	SCL-90-R	Main	Low-income mothers and their preschool-age children enrolled in a longitudinal intervention study
Caspers et al. (2009)	United States	81	40	52	n/a	mid/high	n/a	BSI	Main	Adults enrolled as part of a large adoption study consisting of adoptees separated from their biological parents at birth
Cole-Detke and Kobak (1996)	United States	30	18.6	100	0	mid/high	Some college or more	BDI	Q-sort	Female college undergraduates
Dagan (2017*) (Sample 1)	United States	35	21.22	86.49	0	mid/high	Some college or more	BSI	Main	Undergraduate college students attending a private university in the inner city
Dagan (2017*)* (Sample 2)	United States	49	20.07	72	0	mid/high	Some college or more	BSI	Main	Undergraduate college students attending a public state university in a suburban area
Davis et al. (2014)	United States	215	45.9	52	n/a	low	High school or less	BDI-II	Main	Socioeconomically diverse adults who were part of a study examining psychosocial influences on physical and mental health
Dawson et al. (2014)	United States	175	14.27	52	n/a	mid/high	High school or less	YSR	Q-sort	Adolescent males and females
DeKlyen (1992*)	United States	50	34.45	100	100	mid/high	Some college or more	BSI	Main	Mothers of preschool boys referred to outpatient clinic for behavioral problems and mothers of non-referred boys
DeOliveira et al. (2005)	Canada	59	18.92	100	100	low	n/a	CES-D	Main	Mothers recruited into a longitudinal intervention study during postpartum hospital stay
Dickstein et al., 2004	United States	74	29.94	100	100	mid/high	Some college or more	BDI	Main	Prenatally assessed expecting mothers
Dollberg and Keren (2013)	Israel	17	43.14	100	100	mid/high	Some college or more	SCL-90	Main	Israeli mothers who had adopted orphans through international adoption agencies
Ehrlich et al., 2011	United States	182	16.5	62.43	0	mid/high	High school or less	CDI	Main	Adolescents from public suburban high schools located in a large metropolitan area

(*continued on next page*)

Table 1 (*continued*)

Study	Country	n	Mean age	Female (%)	Parent (%)	Socioeconomic status	Education level	Depression measure	AAI coding	Sample description
Evans (2008*)	Canada	50	18.92	100	100	low	High school or less	CES-D	Main	Adolescent mothers assigned to a control group as part of a longitudinal intervention study
Finger (2006*)	United States	85	26.82	100	100	mid/high	Some college or more	MCMI-III	Main	Community comparison mothers serving as control group to drug-dependent mothers recruited from methadone clinics
Granqvist et al. (2014)	Sweden	81	29.12	61	n/a	n/a	n/a	CES-D	Main	Adults recruited for their dedicated interest in religious/spiritual matters
Ivarsson et al. (2010)	Sweden	50	15.9	56	0	mid/high	High school or less	DICA; KSADS	Main	Adolescents with current DSM-IV Depressive disorder without comorbid psychopathology and general population adolescent controls
Jones-Mason et al. (2015)	United States	97	19.88	81.2	0	mid/high	Some college or more	BDI-II	Main	Late-adolescents attending a large public university in the western United States.
Kuipers et al. (2016)	Netherlands	20	21.4	95	0	mid/high	Some college or more	SCL-90	Main	Community comparisons serving as control group to patients with diagnosed eating disorders
Lee et al. (2013)	South Korea	40	33.3	100	100	low	High school or less	CES-D	Main	Mother-infant dyads from low-income families newly enrolled in community centers in Korea
Leerkes et al. (2015)	United States	258	25.1	100	100	mid/high	Some college or more	CES-D	Main	Primiparous mothers from the southeastern United States
Madigan et al. (2014)	Canada	36	16.87	100	n/a	n/a	High school or less	BDI-II	Main	Single pregnant adolescent mothers enrolled in a trauma-focused cognitive behavioral therapy RCT
McCarthy and Maughan (2010)	England	34	37	100	n/a	low	n/a	BDI-II	Main	High risk sample of women, all of whom reported negative parenting in childhood
Mehta et al. (2009)	United States	172	36.92	50	100	mid/high	n/a	CES-D	Main	Parenting couples participating in a longitudinal study of families in which the first child was entering elementary school
Murray et al., 2006	England	87	29.6	100	100	mid/high	n/a	EPDS	Main	Adolescent mother-child pairs recruited postnatally
Obsuth et al. (2014)	United States	111	19.9	57.5	0	low	n/a	CES-D	Main	Low-income late adolescents
Pace et al. (2015)	Italy	30	51.47	100	100	mid/high	Some college or more	SCL-90-R	Main	Adoptive mothers recruited though international adoption agencies
Reiner et al. (2016)	Germany	85	30.1	100	n/a	mid/high	High school or less	SCID-I/ DSM-IV	Main	Clinically depressed patients from a psychosomatic inpatient unit, and healthy controls
Riggs (2000*)	United States	188	30.44	50.42	100	mid/high	Some college or more	CES-D	Main	First-time mothers and fathers during the first trimester of pregnancy
Santona et al. (2015)	Italy	60	31.5	100	100	mid/high	Some college or more	SCID-5	Main	Mothers diagnosed with Major Depression and healthy controls
Scharf et al. (2004)	Israel	85	17.5	0	0	mid/high	High school or less	MHI	Main	Israeli male adolescents assessed during their senior year of high school
Scharf et al. (2011)	Israel	119	17.5	100	0	mid/high	Some college or more	MHI	Main	Late-adolescent girls in Israel who were planning to start compulsory military service
Scheidt et al. (2012)	Germany	31	35.2	100	58.1	mid/high	High school or less	HADS	Q-sort	Women prospectively assessed after perinatal loss
Schuengel et al., 1999	Netherlands	85	31.4	100	100	mid/high	Some college or more	EPDS	Main	Non-clinical middle-class mothers who had experienced a loss
Seiffge-Krenke (2006)	Germany	112	21.09	57.14	n/a	mid/high	High school or less	SCL-90-R	Main	Adolescents and emerging adults assessed for stress and coping as part of a longitudinal study
Smith-Nielsen et al. (2015)	Denmark	55	30.48	100	100	mid/high	Some college or more	EPDS	Main	Nonclinical women recruited during pregnancy
Tarabulsy et al. (2005)	Canada	64	17.4	100	100	low	High school or less	CES-D	Q-sort	Adolescent mothers recruited from a major birthing hospital in Canada
van Hoof et al. (2015)	Netherlands	56	15.54	86	0	mid/high		CDI	Main	Clinically depressed adolescents and non-clinical controls

(*continued on next page*)

Table 1 (*continued*)

Study	Country	n	Mean age	Female (%)	Parent (%)	Socioeconomic status	Education level	Depression measure	AAI coding	Sample description
Ward et al. (2006)	United States	36	29.2	100	100	mid/high	High school or less Some college or more	SCID-I/ DSM-III-R	Main	Mothers of young children who had participated in a larger study examining the effects of childhood malnutrition and failure-to-thrive
Wojniak (1995*)	United States	50	34.1	0	100	mid/high	Some college or more	CES-D	Main	Fathers participating in a larger longitudinal study on the transition to parenthood
Yaseen et al., 2016	United States	26	24.5	100	n/a	mid/high	Some college or more	BDI-II	Main	Clinically depressed and non-depressed healthy controls
Zaccagnino et al. (2014)	Italy	94	33.5	100	80	mid/high	High school or less	CES-D	Main	Predominantly middle-class mothers from Northern Italy
Zaccagnino et al. (2015)	Switzerland	63	32.6	100	n/a	mid/high	Some college or more	EPDS	Main	Expecting mothers attending ante-natal classes in Switzerland
Zajac and Kobak (2009)	United States	159	n/a	97	100	low	n/a	BDI	Q-sort	Economically disadvantaged mothers with adolescent children

Note. BDI-II = Beck Depression Inventory II; BSI = Brief Symptom Inventory (depression subscale); CDI = Children's Depression Inventory; CES-D = Center for Epidemiological Studies-Depression Scale; DICA = Diagnostic Interview of Children and Adolescents; EPDS = Edinburgh Postnatal Depression Scale; HADS = Hospital Anxiety and Depression Scale; KSADS = Kiddie Schedule for Affective Disorders and Schizophrenia; MCMI-III = The Millon Clinical Multiaxial Inventory III; MHI = Mental Health Inventory (depression subscale); SCID-5 = Structured Clinical Interview for DSM-5; SCID-I = Structured Clinical Interview, Axis I Disorders; SCL-90-R = Symptom Checklist-90 Revised (depression subscale); Q-sort = AAI Q-sort (Kobak et al., 1993); Main = AAI classification system (Main & Goldwyn, 1998); * = Dissertation

autonomous and insecure-dismissing attachment classifications (see Fig. 2b). There was a wide dispersion of effects, with individual study estimates ranging from −0.78 to 1.28. The effect was small in magnitude and nonsignificant, $d = 0.09$, 95% CI [−0.03 − 0.22]. Effect sizes were heterogeneous nevertheless [$Q(42) = 90.68$, $p < .001$], so moderation analyses similar to those implemented in the secure versus insecure analysis were applied. Only categorical versus dimensional structure of data assessed by the AAI significantly moderated the effect size, $Q(1) = 4.16$, $p = .04$. In particular, the association between attachment representations and depressive symptoms was greater when attachment data were coded dimensionally than categorically ($d = 0.42$ and *0*.04, respectively). Thus, in studies in which attachment was coded dimensionally, individuals with insecure-dismissing attachment had higher depressive symptoms than individuals with secure-autonomous attachment.

3.3. Secure-autonomous versus insecure-preoccupied attachment

Effect sizes for 38 samples with 2,079 participants were computed for the meta-analysis comparing depression symptoms between secure-autonomous and insecure-dismissing attachment (see Fig. 2c). There was a wide dispersion of effects, with individual study estimates ranging from −0.67 to 2.13. Results suggested a medium and significant effect, such that individuals with insecure-preoccupied attachment had higher depressive symptoms than individuals with secure-autonomous attachment, $d = 0.48$, 95% CI [0.30 − 0.65]. A significant amount of heterogeneity was identified across effects, $Q(37) = 71.90$, $p < .001$, but moderation analyses revealed no significant moderators (all $ps > 0.05$).

3.4. Insecure-dismissing versus insecure-preoccupied attachment

Effect sizes for 37 samples with 1285 participants were computed for the meta-analysis examining depression symptoms among insecure-preoccupied and insecure-dismissing attachment patterns (see Fig. 2d). There was a wide dispersion of effects, with individual study estimates ranging from −0.60 to 1.54. Results revealed a small to medium size effect such that individuals with insecure-preoccupied attachment had higher depressive symptoms than individuals with insecure-dismissing attachment, $d = 0.34$, 95% CI [0.19−0.50]. The homogeneity statistic revealed only a moderate amount of variability across effect sizes [$Q(36) = 47.65$, $p = .09$]. Given assumptions about random sampling and variability in data collection and assessment procedures, moderation was nevertheless examined under a mixed/random effects model. However, no evidence of moderation was found (all $ps > 0.05$).

3.5. Organized versus unresolved attachment

Effect sizes for 36 samples with 3074 participants were computed for the meta-analysis examining depression symptoms with respect to organized (i.e., secure-autonomous, insecure-dismissing, and insecure-preoccupied) and unresolved attachment status (see Fig. 2e). There was a wide dispersion of effects, with individual study estimates ranging from −0.47 to 1.51. Results suggested that individuals classified as unresolved in their attachment had higher depressive symptoms than individuals classified as organized in their attachment, $d = 0.29$, 95% CI [0.14 − 0.44]. A significant amount of heterogeneity was identified across effects, $Q(35) = 69.63$, $p < .001$, but moderation analyses revealed no significant moderators (all $ps > 0.05$).

Outlier and influential case diagnostics were evaluated for each of the five meta-analytic comparisons following recommendations by Viechtbauer and Cheung (2010). Specifically, externally standardized residuals (studentized deleted residuals) and covariance ratios were assessed for each effect size using widely accepted thresholds. Studentized deleted residuals above or below 2 may indicate outliers and covariance ratio values below 1 can be used to determine percent

Table 2
Categorical Moderators.

	Secure vs. *Insecure*					*Secure* vs. *Dismissing*				
Variable	*k*	*N*	*d*	*Q*	*p*	*k*	*N*	*d*	*Q*	*p*
Country				0.96	.33				1.51	.22
United States	27	2,566	.15			23	1,793	.02		
Other	24	1,508	.28			20	1,088	.19		
Publication type				1.26	.26				1.38	.24
Peer-reviewed	43	3,502	.24			38	2,657	.12		
Dissertation	8	572	.04			5	224	−0.13		
Race				0.08	.78				.62	.43
> 60% White/European	35	2,564	.20			28	1,640	.12		
< 60% White/European	13	1,310	.16			13	1,134	.01		
SES				0.21	.65				1.04	.31
Mid/high	39	3,064	.20			34	2,197	.07		
Low	9	824	.28			7	593	.24		
Education				1.70	.19				1.38	.24
High school or less	15	1,395	.31			12	1,015	.16		
Some college or more	27	1,830	.11			24	1,306	−0.02		
Adolescent vs. Adult				.00	.96				.09	.76
≥18	42	3,206	.21			36	2,234	.09		
<18	9	868	.21			7	647	.14		
Concurrent assessment				0.01	.91				.00	.98
Concurrent (≤ 1 month)	24	1,646	.21			19	1,028	.10		
Non-concurrent (> 1 month)	12	1,153	.20			12	944	−0.06		
AAI coding system				1.55	.21				3.65	.06
M. Main classification	46	3,673	.18			40	2,654	.06		
AAI Q-sort	5	401	.44			3	227	.54		
Attachment data structure				3.60	.06				4.16	.04*
Categorical	45	3,528	.16			38	2,496	.04		
Dimensional	6	546	.52			5	385	.42		
Depression data structure				3.34	.07				1.22	.27
Dimensional	45	3,575	.17			37	2,543	.07		
Categorical	6	499	.54			6	338	.29		

	Secure vs. *Preoccupied*					*Dismissing* vs. *Preoccupied*					*Organized* vs. *Unresolved*				
Variable	*k*	*N*	*d*	*Q*	*p*	*k*	*N*	*d*	*Q*	*p*	*k*	*N*	*d*	*Q*	*p*
Country				1.73	.19				.72	.40				2.58	.11
United States	21	1,318	.38			20	711	.29			19	1,898	.20		
Other	17	761	.62			17	574	.42			17	1,112	.45		
Publication type				.13	.72				.53	.47				.22	.64
Peer-reviewed	33	1,899	.49			32	1,151	.32			32	2,791	.31		
Dissertation	5	180	.39			5	134	.50			4	219	.19		
Race				.78	.38				3.13	.08				.05	.83
> 60% White/European	24	1,216	.51			24	770	.42			22	1,691	.27		
< 60% White/European	12	803	.34			11	432	.14			12	1,184	.30		
SES				.21	.65				2.95	.09				.11	.74
Mid/high	31	1,735	.51			29	900	.45			27	2,135	.29		
Low	5	276	.40			6	320	.14			7	758	.35		
Education				1.09	.30				.00	.96				3.45	.06
High school or less	10	637	.61			9	369	.35			8	735	.60		
Some college or more	22	1,035	.40			22	608	.36			20	1,414	.23		
Adolescent vs. Adult				.01	.91				.12	.73				.37	.54
≥18	32	1,597	.48			31	1,044	.36			31	2,567	.28		

(*continued on next page*)

Table 2 (*continued*)

	Secure vs. Preoccupied					*Dismissing vs. Preoccupied*					*Organized vs. Unresolved*				
Variable	*k*	*N*	*d*	*Q*	*p*	*k*	*N*	*d*	*Q*	*p*	*k*	*N*	*d*	*Q*	*p*
<18	6	482	.45			6	241	.28			5	443	.43		
Concurrent assessment				.56	.45				.44	.51				3.58	.06
Concurrent (≤ 1 month)	15	579	.61			16	453	.46			15	1,301	.51		
Non-concurrent (> 1 month)	12	748	.44			11	478	.32			8	724	.19		
AAI coding system				1.28	.26				n/a	n/a				n/a	n/a
M. Main classification	35	1,850	.44			35	1,224	n/a			36	3,010	n/a		
AAI Q-sort	3	229	.78			2	61	n/a			0	0	n/a		
Attachment data structure				1.96	.16				.00	.95				n/a	n/a
Categorical	33	1,712	.42			34	1,159	.35			34	2,801	n/a		
Dimensional	5	367	.74			3	126	.33			2	209	n/a		
Depression data structure				.81	.37				.00	.97				.84	.36
Dimensional	32	1,778	.44			31	1,098	.34			30	2,511	.27		
Categorical	6	301	.68			6	187	.35			6	449	.46		

Note. n/a denotes cases having less than 3 coded samples in a given cell (i.e., level), and for which moderator analyses were not computed.

increase in precision with the removal of particular effect sizes. No problematic cases were identified following leave-one-out procedures provided by the 'metafor' package (Viechtbauer, 2010).

3.6. Publication bias

When assessing the robustness of meta-analytic results, it is important to consider the likelihood and extent of publication bias. Several well-validated procedures for detecting bias were applied. Duval and Tweedie's trim and fill procedure (Duval and Tweedie, 2000a, 2000b) is an iterative corrective test that yields an adjusted effect size estimate for funnel plot asymmetry. In the graphical output, observed effect sizes are plotted against a measure of precision (e.g., standard error) and missing values are imputed on either the left or right side of the distribution. The visual inspection of effect sizes imputed toward the bottom-left section of the funnel plot represent trivial or near zero estimates that may be missing as a result of publication bias. In the current datasets, distributions were mostly symmetrical, though several effect sizes to the left of the summary effect could be "filled" for the secure-insecure and organized-unresolved comparisons to achieve a symmetrical distribution (see Fig. 3).

In addition to the trim and fill procedure, we applied Rosenthal's fail-safe N (Rosenthal, 1979), a statistical procedure that quantifies the number of unpublished (or unretrieved) studies averaging null results that would reduce the summary effect to a level of non-significance ($p > .05$). Results from the fail-safe N indicated that effects were robust to Type I error, as file-drawer studies across comparisons ranged from 36 to 815 (all $ps < 0.05$). As an additional robustness check, fail-safe N calculations using the more conservative Orwin approach (Orwin, 1983) were applied. Rather than relying on significance testing, Orwin's approach estimates the number of missing studies averaging null results that would reduce the unweighted average effect size to some user-specified target criteria (typically 50% of the observed summary effect). Results remained robust, with file-drawer studies ranging from 36 to 51 across the five meta-analytic comparisons.

4. Discussion

The primary aim of this meta-analysis was to examine the extent to which adult attachment representations are associated with depressive symptoms. Individuals with insecure attachment (combining both preoccupied and dismissing subtypes) had higher levels of depression than secure-autonomous individuals and unresolved individuals had higher levels of depression than individuals with organized attachment classifications, with these associations showing small to medium effect sizes. When examining the insecure attachment subtypes, insecure-preoccupied, but not insecure-dismissing individuals, exhibited higher depression than the secure-autonomous individuals. When comparing the two adult insecure attachment types with one another, insecure-preoccupied individuals exhibited higher depression than insecure-dismissing individuals.

4.1. Secure-autonomous versus insecure attachment

Our finding that insecure attachment is associated with increased depressive symptoms fits with a developmental psychopathology framework of the etiology of depression. That is, relational patterns in infancy, while adaptive in some particular rearing contexts, may become maladaptive in adulthood when the corresponding relational representations are applied in other interpersonal contexts. Hence, infants who develop insecure attachments may be at risk for depression later on.

Although our analyses do not examine the specific pathways by which insecure attachment may lead to depression, theory and research broadly suggest that individuals with insecure attachments may process and experience relational information in ways that make them more

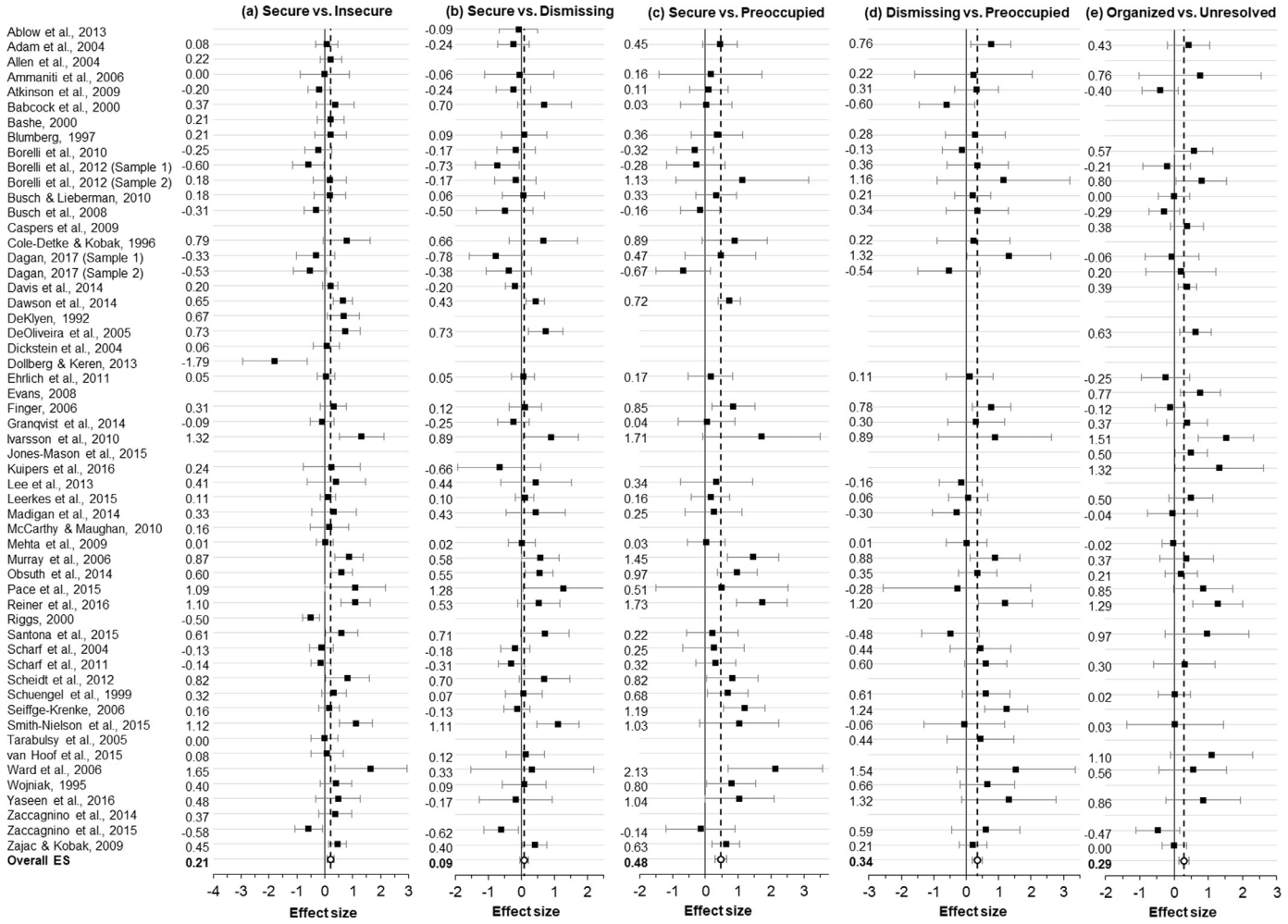

Fig. 2. Effect sizes (Cohen's d) for the association between attachment classification and depression symptoms for each comparison. Error bars represent 95% CIs. Positive effect sizes indicate that depression was higher in (a) insecure than secure, (b) dismissing than secure, (c) preoccupied than secure, (d) preoccupied than dismissing, and (e) unresolved than organized individuals. The dashed line reflects magnitude of the overall effect size.

vulnerable to depression (Dykas & Cassidy, 2011). For example, insecurely attached individuals have been found to attend to negative affective information more quickly than securely attached individuals (Maier et al., 2005). Dysfunctional information processes may prevent individuals with insecure attachment patterns from employing appropriate attentional and behavioral strategies to cope with interpersonal distress (Main et al., 1985). Narrow attention to negative affective information exhibited by insecurely attached adults when interacting with close others may therefore lead to a persistent interpretation of others' behavior as hostile, rejecting, unreliable, or unresponsive (Dykas & Cassidy, 2011). As a result, insecure individuals may experience problems in developing and maintaining relationships, and deriving effective social support (Pietromonaco and Beck, 2015; Weinfield et al., 2008). Given that chronic interpersonal stress has been shown to predict depression over and above non-interpersonal stressors (Sheets and Craighead, 2014; Vrshek-Schallhorn et al., 2015), insecure attachment patterns are likely to play a key role in the development and reoccurrence of depressive symptoms.

We also found that the approach to measuring adult attachment moderated the association between attachment and depressive symptoms. Individuals with insecure-dismissing attachment had more depressive symptoms than securely attached individuals in studies that coded attachment dimensionally than in studies that coded attachment categorically ($d = 0.42$ and 0.04, respectively). This finding is particularly interesting given the longstanding tradition of describing *patterns* of attachment behavior (Ainsworth et al., 1978/2015). In fact, many have debated whether individual differences in attachment representations measured by the AAI are better reflected categorically or dimensionally (Haltigan et al., 2014; Haydon et al., 2012; Roisman et al., 2007). At least with respect to insecure-dismissing attachment, our findings suggest that dimensional coding systems may better capture the variability in attachment security when it comes to predicting depressive symptoms. This moderating effect should be interpreted with caution, however, due to the limited number of studies using dimensional assessments of adult attachment (see Table 2).

4.2. Insecure-dismissing versus insecure-preoccupied attachment

When examining the association between each type of insecure attachment and depressive symptoms, insecure-dismissing individuals did not significantly differ in depressive symptoms from secure-autonomous individuals, but those who were classified as insecure-preoccupied did. This suggests that collapsing dismissing and preoccupied classifications into a single insecure group may have attenuated the link between adult attachment security and depressive symptoms, and that the effect was primarily driven by individuals who were classified as insecure-preoccupied. Our results suggest that insecure-preoccupied adults may be more likely to experience elevated depressive symptoms than dismissing individuals, consistent with the broader literature theorizing about the link between adult attachment representations and psychopathology (e.g., Dozier et al., 1999; Fortuna and Roisman, 2008; Stovall-McClough and Dozier, 2016).

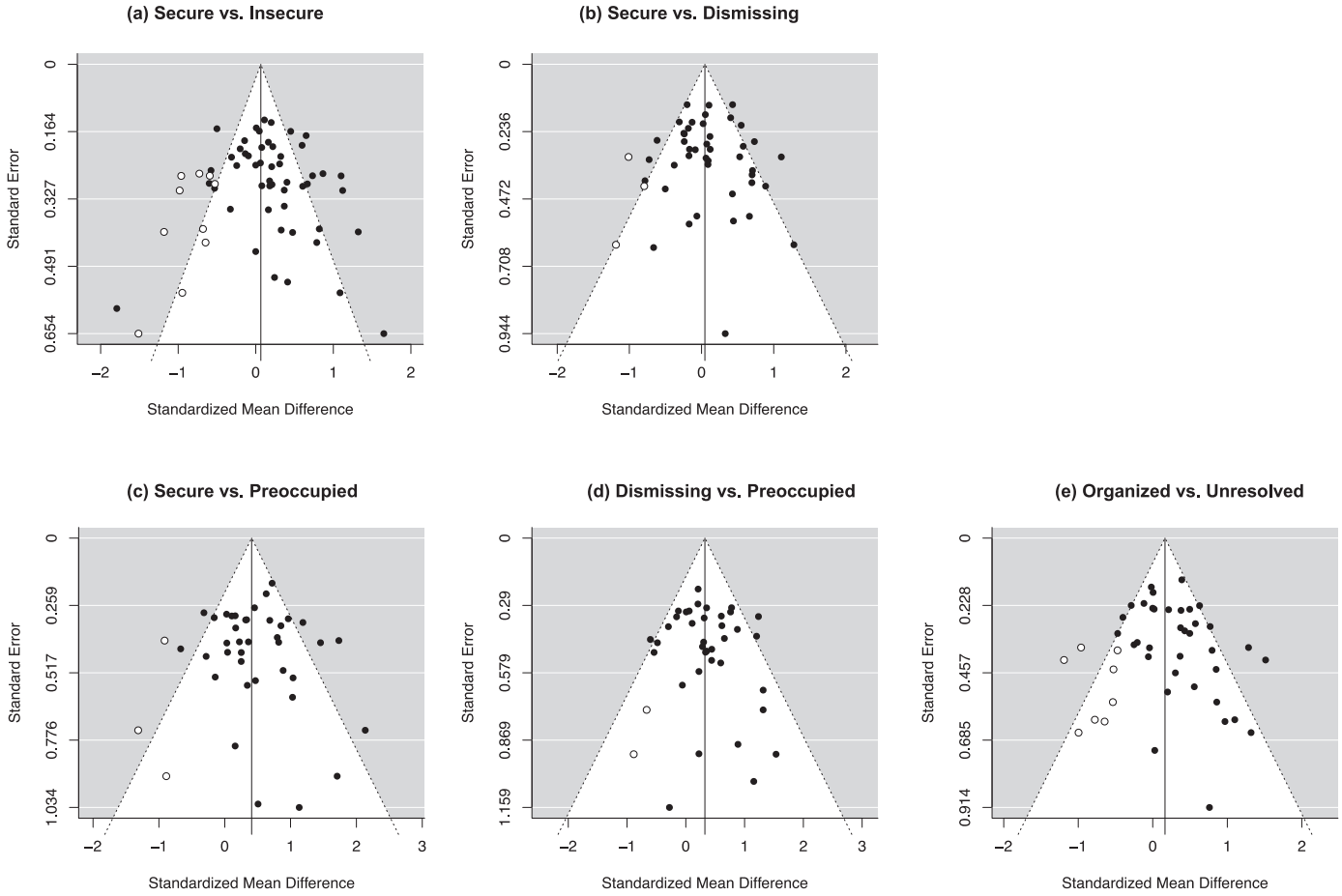

Fig. 3. Funnel plots reflecting effect size precision as a function of standard error. Effect sizes for all comparisons are computed as the standardized mean difference (Cohen's d). Solid black circles represent observed effect size estimates; Open white circles represent effect size estimates imputed to adjust for funnel plot asymmetry. (a) Secure versus Insecure, (b) Secure versus Insecure-Dismissing, (c) Secure versus Insecure- Preoccupied, and (d) Insecure-Preoccupied versus Insecure-Dismissing, and (e) Resolved versus Unresolved.

Insecure-dismissing and insecure-preoccupied individuals engage in different strategies when experiencing distress in relational contexts, which may explain why they differ in their risk for depression. Insecure-dismissing individuals may deactivate the attachment system in times of interpersonal distress. In doing so, they may encode less emotional information in order to avoid emotional arousal (Fraley et al., 2000; Shaver and Mikulincer, 2007). Reduced negative affective information encoding may, in turn, prevent painful experiences that could result from negative interpersonal interactions; thus, a deactivating strategy may decrease the magnitude of depressive symptoms, or prevent them altogether. In contrast, insecure-preoccupied individuals' hyper-activating strategies involve increased and repetitive involvement in negative experiences with close others (Hesse, 2016). Chronically turning excessive attention to one's own negative experiences, including interpersonal experiences such as threats, losses, injustices to self, or rejections, leads to prolonged involvement with events which are distressing. This pattern of repetitive thinking, generally referred to as rumination, may also interfere with effectively eliciting social support (Nolen-Hoeksema et al., 2008; Smith and Alloy, 2009).

Another possible explanation for the difference in depression between insecure-preoccupied and insecure-dismissing individuals may be differential symptom reporting. Insecure-dismissing individuals tend to deny negative experiences during the AAI (Dozier and Kobak, 1992; Roisman et al., 2004; Roisman, 2007), and express low levels of distress during interactions with both familiar individuals (Fortuna et al., 2011) and unfamiliar individuals (Roisman, 2006b). Thus insecure-dismissing individuals may under-report depressive symptoms, consistent with a deactivating strategy (Kobak and Sceery, 1988; Pianta et al., 1996). In contrast, insecure-preoccupied individuals tend to use hyperactivating strategies in interpersonal contexts, such as heightened emotional activation during the AAI (Roisman et al., 2004) and heightened self-reported distress (Roisman et al., 2004; Tarabulsy et al., 2012); hence, their endorsement of heightened depressive symptoms may reflect over-reporting of their symptoms as a way of maximizing their attachment needs (e.g., a crying for help).

4.3. Organized versus unresolved attachment

Lastly, results indicate that individuals classified as unresolved in the AAI experience higher depressive symptoms than organized individuals. These results are consistent with research in infants, showing that early disorganized attachment patterns are associated with increased risk for internalizing disorders later in childhood (Fearon et al., 2010; Groh et al., 2012). Unresolved individuals, whose coping strategies may collapse in the face of perceived interpersonal threat, have difficulty disengaging attention from negative social stimuli (Atkinson et al., 2009; Dykas and Cassidy, 2011), and exhibit heightened neurophysiological reactivity to subtle cues of loss (e.g., cemetary images; Bahm et al., 2017). Thus, elevated depression among unresolved individuals may reflect both limited capacity to regulate their affect in face of relational stress and sensitivity to stimuli associated with negative emotions.

Importantly, although our findings supported an association between unresolved attachment and depressive symptoms, we were

limited in examining whether unresolved individuals' secondary classification influenced depressive symptomatology. Given the low number studies reporting on secondary classifications and small cell sizes within those studies, comparisons within the unresolved group would be underpowered and results inconclusive. Future research should examine to what extent secondary classifications influence the overall association between unresolved attachment and depressive symptoms.

4.4. Clinical implications

Our results suggest that attachment representations are important when considering risk for depression. Given that attachment patterns are developed early in life and become increasingly stable as individuals approach adulthood, attachment-based interventions aimed at improving the attachment relationship in infancy may reduce risk for later psychopathology. A number of attachment-based interventions have been found to reduce rates of insecure and disorganized attachment in early childhood (Bakermans-Kranenburg et al., 2003; Facompré et al., 2017), but no studies have yet examined whether these changes in attachment, in turn, reduce risk for depression.

In adulthood, some cognitive behavioral approaches are informed by attachment theory, such as schema-focused therapy (Young et al., 2003) and compassion-focused therapy (Gilbert, 2010), but enhancing attachment security has still not been explicitly integrated into these modalities as a treatment goal (Bosmans, 2016). However, one attachment-based therapy that has been developed specifically for depressed individuals is attachment-based family therapy (ABFT; Diamond et al., 2014; Diamond et al., 2003). ABFT is designed for depressed and suicidal adolescents. The main goal of treatment is to reduce both depressive symptoms and suicidal behavior and ideation by restoring secure parent-child attachment relationships as a mechanism of therapeutic change. Thus far, ABFT has shown promising outcome results, showing that the intervention is highly effective not only in enhancing attachment security (Shpigel et al., 2012), but also in reducing depressive symptoms (Diamond et al., 2010; Diamond et al., 2002). Our meta-analytic results suggest that attachment may be an important target of clinical intervention for depression.

4.5. Limitations and recommendations

We acknowledge several limitations of this meta-analytic study. Most importantly, one cannot draw causal inferences regarding the links we found between adult attachment representations and depressive symptoms. Although we propose that insecure attachment is a potential risk factor for depression, it is also possible that individuals who are at risk for depression are also more likely to develop insecure attachments. In order to determine the direction of causation, it would be ideal to conduct longitudinal studies that measure attachment and depression repeatedly over time to establish temporal precedence. Additionally, attachment-based intervention studies that randomly assign participants to a treatment condition aimed to enhance secure attachment or a control condition may offer experimental evidence regarding the effect of attachment on depression.

Of note, given that we included studies that examined non-clinical as well as clinical samples, our aggregate effect sizes do not solely reflect the magnitude of the association between attachment representations and *clinically-diagnosed* major depression disorder. Further, the majority of studies we included did not assess other psychopathological symptoms (e.g., anxiety and personality disorder features). It is possible, then, that these meta-analytic results do not reflect pure associations between attachment representations and depression. However, given that comorbidity between depression and other psychological disorders is highly prevalent in the real world, and that disorder-specific symptoms rarely appear in isolation (Caspi et al., 2015; Hasin and Kilcoyne, 2012; Kessler et al., 2005; Newman et al., 1998), including studies that did not assess, screen, or otherwise account for other disorders may reflect an ecologically valid approach to examining depressive symptoms in the general population.

Lastly, we restricted our inclusion criteria to consider only studies that assessed adult attachment using the AAI. It is important to note, however, that adult attachment has also been widely assessed using self-report measures such as the Relationship Scales Questionnaire (RSQ; Griffin and Bartholomew, 1994) and the Experiences in Close Relationships scale (ECR; Brennan et al., 1998). Though beyond the scope of the current investigation, it would be interesting to examine whether similar associations between attachment and depression would emerge in meta-analyses including self-report assessments of attachment. Additionally, future studies that assess attachment using both the AAI *and* self-report measures may shed light on how different aspects of interpersonal tendencies in significant relationships (e.g., general versus romantic; Roisman et al., 2007) are associated with vulnerability to depressive symptoms.

Future research examining the association between adult attachment patterns and depressive symptoms should examine mediators and moderators in more depth than possible in the current study. Attachment is likely best conceptualized as one etiological factor that interacts with many contextual and individual factors influencing risk for depression later in life (Belsky, 1997b; Cummings and Cicchetti, 1990; Rosen and Rothbaum, 1993; Sroufe et al., 2005a,b; Wolff and van IJzendoorn, 1997). As such, the association between adult attachment and depressive symptoms may be mediated by cognitive, behavioral, relational, physiological, and affective processes (e.g., emotion regulation; Malik et al., 2015). Identifying these mechanisms may offer novel targets for the treatment of depression. Further, although we were able to examine a number of study-level moderators of the association between attachment representation and depression, there are a number of potential moderators that occur at the individual-level (e.g., genetic factors, personality traits) that would be important to consider in future studies.

Finally, given that our findings are based on studies that assessed depressive symptoms and adult attachment representations, we are unable to draw conclusions about longitudinal trajectories by which attachment experiences may exacerbate risk for depressive symptoms across development. Meta-analyses assessing infants' and children's attachment relationships and internalizing symptoms in early- and middle-childhood have similarly found elevated rates of depression in insecurely attached individuals (Brumariu and Kerns, 2010; Groh et al., 2012; Madigan et al., 2013; Madigan et al., 2016). However, the pattern of results differed from our findings among adults. Specifically, children classified as insecure-avoidant as infants had higher internalizing symptoms than children classified as secure, whereas children classified as insecure-resistant did not differ from those classified as secure in internalizing symptoms. This stands in contrast to our results, which demonstrated that insecure-preoccupied individuals, but not insecure-dismissing individuals, had higher depressive symptoms than secure-autonomous individuals. In addition to focusing on a different age range, the meta-analytic studies of children had other methodological differences from our study, including the examination of internalizing symptoms broadly (i.e., both depressive symptoms and anxiety), and reliance on parent- and teacher-report of symptoms. Future research that examines the association between attachment patterns and depressive symptoms longitudinally would help clarify whether and how the nature of the association changes over time (see Duggal et al., 2001).

5. Conclusion

In conclusion, the current study is the first to meta-analytically examine the association between depressive symptoms and adult attachment patterns as assessed by the AAI across a diverse range of non-clinical and clinical samples. The results suggest that individuals with

insecure-preoccupied and unresolved attachment patterns, but not insecure-dismissing patterns, are likely to experience more depressive symptoms than those who are secure-autonomous. Thus, future research should aim to characterize the mechanisms by which insecure and disorganized attachment across the life span increases vulnerability to depressive symptoms in adulthood.

Conflict of interest

The authors have no conflicts of interest to report.

Role of funding sources

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Contributors

Dagan, Facompré and Bernard designed the study. Facompré conducted the systematic literature search and Dagan and Facompré completed the coding, under the supervision of Bernard.

Facompré conducted the statistical analyses. Dagan, Facompré and Bernard wrote the first draft of the manuscript and all authors contributed to and have approved the final manuscript.

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