Meta-Analyses of the associations Between Disinhibited Social Engagement Behaviors and Child Attachment Insecurity or Disorganization

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Declarations

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Abstract

Children with disinhibited social engagement disorder show reduced reticence with strangers, do not check back with their caregiver after venturing away, and may willingly leave with an unfamiliar adult. The recent DSM-5 has moved away from an attachment framework to understand disinhibited social engagement behavior (DSEB) due to studies indicating its presence in previously institutionalized children even after these children are adopted and show a selective, more secure attachment with their substitute caregiver (e.g. Chisholm et al. 1998). This meta-analysis aims to clarify the size of the associations between DSEB and attachment insecurity or disorganization and examines whether studies effect sizes differ according to various moderators (e.g., child age, type of attachment and DSEB measures). The results ($k = 21$) showed that the associations between DSEB and attachment insecurity ($d = 0.48$) or attachment disorganization ($d = 0.47$) were of small magnitude. There were no publication biases. As for moderator analyses on both attachment insecurity and disorganization, the effect sizes in studies using DSEB observational measures (respectively $d = 0.63$ and 0.57) were of moderate magnitude and stronger than those in studies not using an observational component (respectively $d = 0.28$ and 0.32). Given these small-to-moderate associations, attachment can be considered a relationship process associated with DSEB, and attachment-informed interventions could be potential tools used to reduce DSEB in children. Nevertheless, given the sizable unshared portion of variance between DSEB and child attachment, future studies should examine other variables related to caregiving and noncaregiving contexts to further understand DSEB.

Keywords: Child attachment, Disinhibited Social Engagement Disorder, Disorganization, Neglect, Maltreatment, Institutionalization

Meta-Analyses of the Associations Between Disinhibited Social Engagement Behavior and Child Attachment Insecurity or Disorganization

A developmental attachment perspective has traditionally been used to understand the etiology of attachment disorders (both the inhibited and disinhibited types) as described in the DSM-IV for children of a developmental age of at least 9 months. However, in 2015, Zeanah and Gleason concluded that disinhibited social behavioral symptoms were distinct from insecure attachment behaviors. Studies have revealed that previously institutionalized children with disinhibited symptoms continued to display such behaviors even after they were adopted or placed in foster care (Chisholm, 1998; Humphreys, Nelson, Fox, & Zeanah, 2017; Rutter et al., 2007). Surprisingly, such behaviors occurred even after the children developed a selective, more secure or organized attachment relationship with their current caregiver. Hence, since the publication of the DSM-5, a shift from an attachment framework has been observed (Lyons-Ruth, 2015) as the inhibited type maintained the reactive attachment disorder (RAD) label, but the disinhibited type was relabeled disinhibited social engagement disorder (DSED).

Such changes, which imply a nonattachment-related etiology, question the meaning of the association found between disinhibited social engagement behavior (DSEB) and child attachment (in)security to parents or preferred caregivers. Moreover, understanding the link between DSEB and child attachment is complicated by the fact that past studies concerning DSEB involved various populations (mostly previously institutionalized children), used various measures to assess DSEB or attachment (e.g., attachment behavior vs. representation), and evaluated children across a wide developmental age range. Thus, building upon previous research investigating children with DSEB, which are sometimes referred as having an attachment disorder of the disinhibited type, indiscriminate attachment, indiscriminate

friendliness or social disinhibition, this study conducted meta-analyses on the associations between child DSEB and attachment insecurity or disorganization to better appreciate the size of these associations.

DSEB and Child Attachment

In the DSM-5, the DSED criteria refer to children with a developmental age of at least 9 months or older who have experienced pathogenic care (extreme neglect) and present at least two of the following patterns of behaviors: reduced or absent reticence with strangers (criteria A1), overly familiar physical or verbal behavior (criteria A2), diminished or absent checking back with an adult caregiver after venturing away (criteria A3), and willingness to leave with an unfamiliar adult (criteria A4) (American Psychiatric Association (APA), 2013).

Maltreated children and previously institutionalized, adopted children who have been presumably exposed to severe neglect are at a greater risk of showing an insecure disorganized attachment during infancy than children in the general population (Cyr, Euser, Bakermans-Kranenburg, & van IJzendoorn, 2010; Van den Dries et al. 2012). In 2003, Van IJzendoorn and Bakermans-Kranenburg suggested that DSEB and disorganized attachment should reveal stronger associations than DSEB and other types of insecure attachments. In support of their hypothesis, many studies have shown significant associations between DSEB and disorganized attachment (Delbarre, 2017; Gleason, Fox, & Drury, 2011; Lyons-Ruth, Bureau, Riley, & Atlas-Corbett, 2009; Minnis et al., 2009; Prichett, Prichett, et al., 2013; Van den Dries et al., 2012). However, a slightly higher number of empirical studies have found significant associations with either secure or insecure organized attachment classifications (Boris, Hinshaw-Fuselier & Smyke, 2004, Chisholm, 1998; Dobrova-Krol, Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2010; Kocovska et al., 2012; Lalande et al., 2012; Lanctôt, 2017; O'Connor et al, 2003;

Pritchett, Rochat, Tomlinson, & Minnis, 2013; Rutter et al, 2007). Moreover, some studies did not reveal any significant associations between DSEB and child attachment (Bruce, Tarullo, & Gunnar, 2009; De Schipper, Oosterman, & Schuengel, 2008; Pears, Bruce, Fisher, & Kim, 2010; Schoemaker et al., 2020; Schröder et al., 2019; Zephyr, Cyr, Monette, Langlois, Cyr-Desautels, & Archambault, 2020). In summary, the results have not converged. A meta-analytic approach could quantitatively summarize the results of the literature to 1) inform on the shared variance between DSEB and attachment insecurity or disorganization and 2) shed light on whether certain samples or methodological characteristics account for the between-study disparities using moderator analyses.

Potential Moderators

The results of studies investigating DSEB and child attachment may not converge due to many reasons. The following moderators may explain some disparities.

Child Attachment and DSEB Measures. The following two types of measures are typically used to assess child attachment: measures relying on observations of a child's behaviors towards the caregiver, such as the Strange Situation Procedure (Ainsworth, Blehar, Waters, & Wall, 1978) and the Attachment Q-Sort (Waters & Deane, 1985), and measures assessing a child's attachment representations, such as self-report questionnaires, story stem narratives and interviews. Observational measures have strong methodological properties because they are usually coded by independent trained observers, are replicable, and rely on objective coding procedures. In the attachment field, observational measures have been largely validated and produce consistent, predictable results. They are considered gold standard measures. However, they are disputable among institutionalized, adopted, and foster care children, who may not have (yet) developed an attachment relationship to the particular caregiver with whom the assessment

is conducted. In comparison, measures of attachment representations capture children's general internalized attachment model and may allow for a more integrated understanding of children's attachment strategies that are not specific to a particular caregiver-child relationship.

Several types of DSEB measures are used as follows: semistructured interviews administered to the primary caregiver (e.g., the Disturbances of Attachment Interview; Smyke, & Zeanah, 1999), questionnaires completed by the caregiver (e.g., the Relationship Problems Questionnaire; Minnis et al., 2002), and observational measures generally involving the primary caregiver and a stranger (e.g., the Rating for Infant-Stranger Engagement; Riley, Altlas-Corbett, and Lyons-Ruth, 2005; the Waiting Room Observation; McLaughlin, Espie, & Minnis, 2010). Currently, the field recommends using multiple measures to assess DSEB (Monette et al., 2018; Zeanah, Chesher, Boris & the American Academy of Child and Adolescent Psychiatry, 2016). In addition, O'Connor et al. (2003) indicated that while independent observers may report the DSEB of a child, the child's caregiver may interpret the same behaviors as secure or friendly, erroneously increasing the effect sizes between DSEB and secure or organized attachment. Thus, relying on independent observations could also be preferable for the assessment of DSEB. In the current study, we examined whether the effect sizes of the association between attachment insecurity or disorganization and DSEB varied as a function of whether the children's assessments included an observational component.

Sample Type. To date, most studies concerning DSEB have been conducted with previously institutionalized children. Institution-reared children are exposed to multiple caregivers, and some children have the opportunity to develop a relationship with a preferred caregiver. Chisholm (1998) reported more DSEB among Romanian institution-reared children who were considered favorite children than those not considered favorite children. Children with

DSEB are perceived by caregivers as more affectionate and friendly than other children, which may further consolidate DSEB in institution-reared children (Chisholm, 1998). This finding may explain why previously institutionalized children placed in adoptive or foster families tend to continue to show DSEB after placement, even though their new caregiving environment is much more adequate (Chisholm, 1998; Smyke et al., 2010). Additionally, the extreme structural neglect (e.g., high child:caregiver ratio and rotating shifts) that characterizes institutions greatly differs from intact families in which parental neglect has been substantiated (Van IJzendoorn et al., 2011). The current study examines whether the sample type moderates the study effect sizes.

Child Gender and Age. Individual characteristics, such as the child's gender and age should also be considered moderators. Prichett, Rochat et al. (2013) observed a predominance of boys with DSEB. They had a more indiscriminate approach towards strangers than girls, who were more inhibited (Prichett, Rochat, et al., 2013) and more inclined to develop a secure attachment (Minnis et al., 2009), but these results are based on relatively small samples (n = 38 and 70, respectively). Using more participants (n = 122), Lehmann et al. (2016) did not find any associations between DSEB and the child's gender or age. Some other studies have not tested these associations (Gleason et al., 2011; Prichett, Prichett, 2013). Regarding the child age, studies from the English Romanian Adoptee project and the Bucharest Early Intervention Project (BEIP), which involved adopted and foster children during the preschool and middle childhood periods, identified decreases in DSEB over time (Rutter et al., 2007, Guyon-Harris et al., 2018). These decreases were associated with improvements in caregiving quality (Chisholm, 1998) or child placement into foster care (Guyon-Harris et al., 2018).

Objectives and Hypotheses

To obtain a clearer understanding of the association between DSEB and child attachment, this study examines the combined effect sizes of the associations found between DSEB and 1) attachment insecurity and 2) attachment disorganization among children aged 1-18 years. This study also examines whether studies' effect sizes differed according to the study quality and various moderators (types of DSEB and attachment measures, sample type, child age and gender, country of study, and year of publication). We hypothesized that both attachment insecurity and disorganization would be associated with DSEB. However, due to the mixed findings of past studies, the sizes of these effects were not estimated, and the moderators were explored.

Method

Protocol and Registration

The protocol of this meta-analytic review was not registered.

Eligibility Criteria

For inclusion in the meta-analyses, the studies had to fulfill the following criteria: 1) the studies had to report an empirical association between DSEB (diagnostic classification or continuous score of DSEB) and child attachment (attachment classification or continuous score of (in)security). The studies including children with a diagnosed attachment disorder were kept if at least two-third of the sampled children showed DSEB (i.e. they were diagnosed with a DSED, a reactive attachment disorder [RAD] of the disinhibited type, or a RAD of a mixed profile with both disinhibited and inhibited behaviors). 2) The children had to be aged between 1-18 years. 3) The studies had to be written in English or French; and 4) the data had to be published in a peer-reviewed journal or as a part of a dissertation.

Information Sources and Search

The following three databases were periodically queried from September 2018 to September 2020 using keywords and subjects: PsycINFO, PsyArticles, and Medline. The following keywords were used: “attachment, attachment security, attachment insecurity, attachment disorganization” AND “reactive attachment disorder, attachment disorder, indiscriminate friendliness, disinhibited attachment, disinhibited social engagement disorder”. The reference lists of studies and book chapters were also examined. There was no limit set regarding the date of publication of the studies.

Study Selection and Data Collection Process

Three selection phases were conducted by three research assistants. For these selection phases, we did not conduct any statistical reliability procedures between the three research assistants. Whenever a disagreement about the inclusion of a study occurred, research assistants reached a consensus. At the first phase, the research assistants identified studies through electronic databases using key words. At the second phase, the research assistants independently screened the studies on the basis of the titles and abstracts. For example, reviews, theoretical articles, qualitative studies and case reports were excluded. When necessary, the entire method section was read. At the third phase, the full text of the retained studies was read and assessed for eligibility. When the data used to compute the effect sizes could not be extracted from the articles, the authors were contacted by email. In cases of multiple studies from the same larger project with a similar sample of participants, the study with the most participants was retained to avoid duplicates of children (e.g., McGoron et al., 2012). Moreover, studies were excluded if children with DSEB could not be distinguished from those showing inhibited attachment behavior or a reactive attachment disorder of the inhibited type.

Data Items: Moderators

Extraction of Study Characteristics. Information regarding the sample, methodological characteristics, and study quality was extracted from all selected studies. Based on the available information, the categorical and continuous moderators were as follows: 1) the mean age of the children in the sample; 2) the percentage of boys in the sample; 3) the study sample type, which was categorized as a) currently institution-reared children (CI), b) previously institutionalized children, who are currently adopted or placed in foster care (PI), c) children in intact, high-risk parent-child dyads (maltreatment or high risk; IHR), d) mixed samples of children with no or a low number of children from the general population (MX), and e) children from the general population or mixed samples with a high number of children from the general population (approximately half of the sample, MXG); 4) the type of attachment measure, which was categorized as a) observational measures of attachment behaviors (e.g., SSP or Q-Sort), b) attachment representations measures (i.e., story stems completed by the child), and c) parent-reported measures (e.g., interview or questionnaire completed by a parent or caregiver); 5) the type of DSEB measure, which was categorized as a) observational measures (completed by a professional or trained coder), and b) non-observational measures (e.g., interview or questionnaire completed by a parent or caregiver); 6) country of the study, including a) America (e.g., Canada or the USA), b) Western Europe (e.g., Netherlands or the United Kingdom), and c) other (e.g., Eastern European, African and Asian countries); and 7) year of publication. When multiple measures were administered to assess DSEB or attachment, the observation category was chosen. Additionally, if a study reported different attachment measures, preference was given to the strange situation procedure because this measure has been most widely validated.

Risk of Bias in Individual Studies. The study quality was assessed using the Mixed Method Appraisal Tool by Hong et al. (2018), which is a checklist designed to evaluate the study quality. From this checklist, the following five items are used to appraise the methodological components of quantitative descriptive studies: 1) "Is the sampling strategy relevant for addressing the research question?"; 2) "Is the sample representative of the target population?"; 3) "Are the measurements appropriate?"; 4) "Is the risk of nonresponse bias low?"; and 5) "Is the statistical analysis appropriate for answering the research question?". Research assistants indicated whether each of these quality criteria was met on a scale ranging from 0% (no criterion was satisfied) to 100% (all criteria were satisfied). Of the 21 studies, 2 studies received a high quality score (100%), 8 studies received a very good quality score (80%), 10 studies were classified as having a good quality score (60%), and 1 study from the grey literature received a low quality score (20%).

Two coders extracted the data items and independently assessed the study quality of all 21 studies. Their interrater reliability scores were good to excellent (*kappa* = 1.00 and r_{icc} between 0.73 and 1.00).

Analytic Plan: Summary of Measures and Synthesis of Results

The effect sizes of the association between DSEB and attachment were computed by the CMA program (version 3; Borenstein, Hedges, Higgins, & Rothstein, 2013) as Cohen's *d* statistic (standardized mean difference). Per Cohen's criteria (1988), $d \geq 0.3$ is a weak effect, $d \geq 0.5$ is a moderate effect, and $d \geq 0.8$ is a strong effect. Each series of meta-analyses (first of the association between insecurity and DSEB and second of the association between disorganization and DSEB) was performed using the random effects model. This model assumes that all selected studies share a common effect size comprising individual effect sizes that may vary from one

study to the next due to sampling characteristics and methods. This model is more conservative than a fixed effects model because it considers sampling errors occurring from two sources of variance, i.e., within and between studies. Additionally, in the random effects model, the studies are weighted according to the inverse of their variance to ensure that all effect sizes are not under- or overrepresented in the summary estimate (Borenstein et al., 2010).

To assess the heterogeneity of the effect sizes, we used the *Q* statistic as a measure of consistency (a higher *Q* indicates higher heterogeneity). A significant *Q* shows that the observed dispersion cannot be attributed to random error and indicates that moderators may explain the heterogeneity. However, moderators may still be present in the case of a nonsignificant *Q* (Israel & Richter, 2011). In addition, we used mixed-effect models to compare subgroups of studies as a function of the moderators and generated a *Q'* statistic. *Q'* indicates whether a subgroup of studies significantly differs from another subgroup of studies based on a specific moderator. To ensure sufficient statistical power, the moderator analyses were conducted when at least three studies per subgroup were available (Tarabulsy et al., 2014). For the continuous moderators, meta-regressions were used (Thompson & Higgins, 2002). These analyses provided a *b*-weight and z-value for each tested continuous variable.

Risk of Bias Across Studies

The presence of publication bias was assessed using the trim-and-fill procedure by Duval and Tweedie (2000) in which an inverted funnel plot is derived to demonstrate the association between the sample size and effect size. If no publication bias is present, the effect sizes are symmetrically displayed around the combined effect sizes. If the funnel plot is asymmetric and fewer studies with weaker effect sizes are represented on the bottom left-hand side of the mean

effect size, the trim-and-fill procedure imputes symmetrical extreme values to balance the funnel plot, and an adjusted mean effect size accounting for publication bias is generated by CMA.

Results

Study Selection and Characteristics

This first phase of selection yielded a total of 5974 different abstracts. At the second phase, all the abstracts were screened and 5913 studies (e.g. reviews, theoretical articles, qualitative studies, case reports) were excluded on the basis of their title or the content of the abstract. This screening phase yielded a total of 61 studies. At the third, eligibility phase, another 40 studies were excluded because of unsuitable data: 1) The results of the association between DSEB and attachment was not specifically reported in 5 studies. Authors of those 5 studies were contacted to obtain more details, but none were able to provide such data. 2) Other excluded studies did not distinguished children with DSEB (or DSED) from those showing inhibited attachment behavior. 3) A total of four studies were duplicate studies (e.g. studies from the BEIP project). The final phase included a total of 21 studies with 24 different effect sizes for attachment insecurity and 17 studies with 18 different effect sizes for attachment disorganization. Following the PRISMA guidelines (Moher, Leberati, Tetzlaff, Altman, & The PRISMA Group, 2009), Figure 1 presents a flow chart of the selected studies at each phase.

The descriptive statistics of the 21 individual studies are presented in Table 1. The sample sizes ranged from 10 to 153 children, and the studies were conducted in 9 different countries between 1998 and 2020. The children's mean age was 57.25 months (*SD* = 29.34) and, on average, 48% of children were boys. The breakdown of the studies per sample type and the type of DSEB and attachment measures used in each study are shown in Table 1.

Synthesis of Meta-analyses Results: Combined Effect Sizes and Moderators

Forest plots (one per meta-analysis) displaying the individual effect sizes of each study are presented in Figure 2. The combined effect sizes and the comparison of subgroups of effect sizes as a function of the moderators for each meta-analysis are presented in Table 2.

Attachment Insecurity and DSEB. The combined effect size of the association between attachment insecurity and DSEB revealed a significant small (close to moderate) effect size (d = 0.48, $p < .001$; CI = 0.34-0.61; k = 24; n =1705). The funnel plot shown in Figure 3 displays a symmetric distribution of study effect sizes. The trim-and-fill procedure did not reveal publication bias (only one missing study effect size was replaced). It would take 463 studies with a null effect for this combined effect to be nonsignificant. The significant Q statistic indicated heterogeneity among the study effect sizes (Q = 38.35, $p < .05$).

The results of the moderator analyses revealed that study effect sizes did not vary as a function of the study quality, type of attachment measures, sample characteristics or country of study (Q between 0.01 and 3.88). The meta-regressions of the continuous variables of year of study and child age and gender were not significant (b between -0.01 and 0.01). The type of DSEB measure was a significant moderator (Q' = 8.14, $p < .05$), indicating that the studies using a DSEB observational measure (d = 0.63) revealed stronger effect sizes than those without an observational component (d = 0.28).

Attachment Disorganization and DSEB. The combined effect size of the association between disorganized attachment and DSEB revealed a significant small (close to moderate) effect size (d = 0.47, $p < .001$; CI = 0.36–0.59; k = 18; N = 1238). The funnel plot shown in Figure 3 displays a symmetric distribution of study effect sizes and the trim-and-fill procedure did not indicate publication bias, with no missing effect sizes to replace. It would take 283

studies with a null effect for this combined effect to be non-significant. The *Q* statistic indicated that there is no heterogeneity among the study effect sizes (Q = 16,46, p = .49). Still, given that a nonsignificant *Q* may indicate heterogeneity, we further conducted moderator analyses.

The results of the moderator analyses revealed that the study effect sizes did not vary as a function of the study quality, type of attachment measures, sample type or country of study (*Q* values between 0.04 and 0.86). None of the meta-regressions of the continuous variables of year of study and child age and gender were found to be significant (*b* between -0.02-0.01). The only significant moderator was the type of DSEB measure (Q' = 4.18, $p < .05$), indicating that the studies using a DSEB observational measure (d = 0.57) revealed stronger effect sizes than those without an observational component (d = 0.32).

Discussion

This study examined the combined effect sizes of the associations between DSEB and attachment insecurity or disorganization. Our search yielded 21 studies with 24 effect sizes. Several moderators were examined to better understand these associations, which were analyzed in an overall set of good- to high-quality studies with only one study being of low quality. The studies' effect sizes did not vary as a function of the study quality.

First, the results of our review indicate that both attachment insecurity (d = 0.48) and disorganization (d = 0.47) were weakly (closed to being moderately) associated with child DSEB. Additionally, given that the confidence intervals of these effect sizes overlapped, the results indicate that children with DSEB were as likely to show insecure attachment as they were to display disorganized attachment. Moreover, there were no publication bias. Thus, consistent with previous findings (e.g. Lyons-Ruth, Bureau, Riley, Atlas-Corbett, 2009; Minnis et al., 2009; O'Connor & Zeanah, 2003), we found that the two distinct concepts of DSEB and attachment

were related, indicating a shared variance of approximately 5-6%. Due to the predominance of cross-sectional designs in the individual studies, the results of the current meta-analyses cannot confirm the direction of this relationship but may help resolve some discrepant views currently found in the literature regarding the extent to which DSEB is associated with attachment. Precisely, given the association found between DSEB and attachment, this study supports the hypothesis that caregiving processes usually related with attachment could be involved in the emergence of DSEB (Lyons-Ruth et al., 2009). However, one needs to acknowledge that this association is weak. As suggested by Allen (2011), the problematic social behavior of children with disinhibited behavior may not primarily result from the child's not possessing a discriminated or selective attachment figure.

Hence, because the magnitude of the combined effect sizes is small, this study further suggests that additional factors other than attachment insecurity and disorganization, or presumably other caregiving processes usually associated with attachment, have yet to be discovered to enhance our understanding of child DSEB. Given that not all children exposed to neglect or raised in institutions develop DSEB, it is likely that certain potential precursors of DSEB are biologically driven and might render some children more susceptible to the detrimental effects of neglect or pathogenic care (Zeanah & Gleason, 2015). In particular, a growing body of literature suggests a strong genetic influence on the development of DSEB, with males showing higher heritability (Minnis et al., 2007). Another study by Bruce et al. (2009) suggested that inhibitory control, which is a highly heritable component of executive functioning (Friedman et al., 2008), is moderately associated with DSEB and could partly explain DSEB. As limited studies concerning genetic or biological risk factors are available, clearly more research is needed in this promising area.

None of the tested moderators, except for the type of DSEB measure, significantly explained the heterogeneity of study effect sizes. This general lack of findings strengthens the idea that DSEB and attachment are related concepts regardless of the child's age or gender or the country of study. Additionally, given that the year of publication was not related to the study effect sizes, the DSEB measures used over the years may reflect the same trauma-related issues in children, thereby increasing our confidence in the existing DSEB measures. However, higher effect sizes were found in studies with observational measures of DSEB. Children with elevated levels of DSEB were more likely to show insecure or disorganized attachment behaviors when their DSEB symptoms were assessed with an observational measure than when using assessments that did not rely on observations (e.g., questionnaire). This result may be reinforced by the fact that both observational measures of DSEB and attachment rely, at least to some extent for DSEB measures, on the observation of children's behavior towards the primary caregiver. Furthermore, DSEB measures with an observation component may better target familiarity and proximity-seeking behaviors towards a stranger in disorganized children, who tend to show subtle and contradictory behaviors. Additionally, independent observers might find it easier to notice DSEB behaviors than parents or caregivers, who may normalize otherwise rare behaviors if they have cared for other children with similar difficulties (Prichett et al., 2013). Hence, the results of our study support the use of observational measures to assess DSEB. To date, no study has provided an exhaustive review of DSEB measures or a thorough analysis of their strengths and limitations in terms of their validity. The changes applied in the transition to the DSM-5 currently leave the field with incomplete guidelines regarding how DSEB should be assessed. As Lehmann and colleagues (2018) argued, there are very few validated instruments based on the complete updated set of DSM-5 criteria, except for the RADA assessment interview

(Lehmann et al., 2018) and the Early TRAuma-related Disorders Questionnaire (ETRADQ; Monette et al., 2020). The validity of all existing DSEB measures has not been properly established, which may have led to disparities between the study effect sizes.

The lack of a moderation effect by the sample type variable suggests that the phenomenon of DSEB (in relation to attachment behavior) in children involved in intact parent-child dyads (high risk or general population) is fundamentally similar to that observed in previously institutionalized children, although initially, the children in these two groups have experienced very different early caregiving conditions. Children raised in institutions are not exposed to the nurturing or stimulating environments (e.g., they are exposed to multiple caregivers in rotating shifts, high child:caregiver ratios, and reduced psychological care) necessary for normal psychological development (Van IJzendoorn et al., 2011). Given that high-risk children in intact parent-child dyads do not experience such structural neglect, we expected a difference between these children and those who experienced institutionalization. Therefore, we suggest that the etiologic factors of DSEB identified in previously institutionalized children should be investigated in the early psychological neglectful experience of some children living with their biological parents (e.g., parents who are emotionally disengaged or minimally interactive with the child). Many maltreated children are placed in foster families, and such (repeated) separations from their primary caregivers may increase their exposure to multiple caregivers, thereby enhancing the experience of parental disengagement. It is possible that the subjective experience of very young children in these two types of early deprived environments is similar, leading to the same type of symptoms (DSEB) or even full-fledged DSED.

Clinical Implications

Albeit of a small magnitude, the results of this study show an association between child attachment and DSEB. This suggests that attachment-informed interventions focusing on enhancing parental caregiving to alleviate DSEB represent a sensible approach, but may not be sufficient to fully address DSEB. For example, interventions targeting the social cognitive schemas of children (Zeanah & Gleason, 2015) could be beneficial in addressing children's broader representational model of relationships and affiliative behavior with others.

Strengths and Limitations

This study relied on a rigorous method to produce an empirical synthesis that was both impartial and replicable. We were able to summarize and integrate results from a small but sufficient number of individual studies that alone may not provide enough statistical power to draw firm conclusions. Another strength is that we examined publication bias and study quality, which increases the validity of our findings.

Despite these strengths, limited information was available in individual studies to compute moderators. Some moderators (e.g., age at adoption) were not consistently reported and should have been tested given that the heterogeneity of the effect sizes was not fully explained. Additionally, in some studies, various groups of children were mixed, limiting the comparison of clearly defined samples. Hence, further research concerning DSEB and attachment is needed, and studies providing more specific details of the participants and methods are required. Also, longitudinal studies are necessary to document the evolution of DSEB over time according to attachment types. Further research investigating caregiving processes associated with DSEB should consider how such factors interact with children's individual factors, such as their genetic makeup or temperament. Intervention studies are ideal designs to test if the positive effects on DSEB are moderated by children's individual characteristics. Also, this study's protocol was not

registered prior to conducting the study. As more meta-analyses are being published, registration is recommended to avoid the duplication or overlapping of research questions.

Conclusion

This study indicated that children with more DSEB were more likely to display insecure or disorganized attachment. Yet, these associations were of small magnitude. No publication biases were found. The study effect sizes did not vary as a function of the moderators, with the exception that insecure and disorganized children showed higher levels of DSEB when DSEB was assessed with an observational measure. The study's results may orient future research questions and inform intervention efforts with children showing DSEB. To further our understanding of the associations between DSEB and attachment, future studies should examine genetic and biological risk factors, and rely on longitudinal and intervention designs.

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*Articles with an asterisk are included in the meta-analyses.

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Table 1

Descriptive Statistics for Individual Studies

Study	*N*	Mean Age in months	Gender (% boys)	Country of study	Sample type[a]	DSEB measure[b,d]	Attachment to Caregiver measure[c,d]	Study Quality
Boris et al. (2004)[e]	55	32	46	USA	**MX**: FC, IHR	**O:** ITW and O	**O:** SSP	Good
Bruce et al. (2009)	120	82	25	USA	**MX**: PI, FC, GEN (33%)	**O:** Unknown	**PR:** ITW	Good
Chisholm (1998) gr1	46	55	46	Canada	**PL**: PI	**Non-O:** ITW	**O:** SSP	Very Good
Chisholm (1998) gr2	30	54	47	Canada	**PL**: PI	**Non-O:** ITW	**O:** SSP	Very Good
Chisholm (1998) gr3	46	54	46	Canada	**MXG**: GEN	**Non-O:** ITW	**O:** SSP	Very Good
Delbarre (2017)[e]	30	56	69	Canada	**IHR**	**O:** RISE	**O:** SSP modified	Good
De Schipper et al. (2008)[e]	59	57	37	Netherlands	**PL**: FC	**Non-O:** ITW	**O:** SSP	Very Good
Dobrova-Krol et al. (2010) gr1[e]	29	52	50	Ukraine	**PL**: CI	**Non-O:** ITW	**O:** SSP	Good
Dobrova-Krol et al. (2010) gr2[e]	35	50	50	Ukraine	**IHR**	**Non-O:** ITW	**O:** SSP	Good
Gleason et al. (2011)[e]	123	42	50	USA	**MX**: CI, FC	**O:** SD	**O:** SSP	High
Kočovská et al. (2012)[e]	65	113	53	UK	**MXG**: PI, GEN (49%)	**O:** WRO	**R:** MCAST	Very Good
Lalande et al. (2012)[e]	117	15	43	Canada	**IHR**	**O:** RISE	**O:** SSP	Very Good
Lanctôt et al. (2017)[e]	10	64	70	Canada	**PL**: FC	**Non-O:** Q	**O:** Separation-Reunion	Low
Lyons-Ruth et al. (2009)[e,f]	75	18	37	USA	**IHR**	**O:** RISE	**O:** SSP	Good
Minnis et al. (2009)[e]	70	78	67	UK	**MXG**: FC, PI, GEN (65%)	**O:** WRO	**R:** MCAST	Good
O'Connor et al. (2003)[e]	129	48	52	UK	**PL**: PI	**Non-O:** ITW	**O:** Separation-Reunion	Good
Pears et al. (2010)	153	53	53	USA	**MX**: FC, IHR	**Non-O:** ITW	**PR:** PAD	Very Good
Prichett, Prichett et al. (2013)[e]	22	84	59	UK	**MX**: FC, IHR	**O:** WRO	**R:** MCAST	Good
Pritchett, Rochat et al. (2013)[e]	38	118	50	South Africa	**IHR**	**O:** WRO	**R:** MCAST	Very Good
Rutter et al. (2007)[e]	116	72	45	UK	**PL**: PI	**O:** Investigator Impression	**O:** SSP	Very Good
Schoemaker et al. (2020)	60	44	45	Netherlands	**PL**: FC	**O:** SD	**O:** SSP	High
Schröder et al., (2019)[e]	135	84	63	Germany, Switzerland	**MX**: IHR, FC, GEN (25%)	**Non-O**: ITW	**R:** GASCP	Good

Van den Dries et al. (2012)[e]	92	15	0	Netherlands	**PL**: PI	**Non-O:** Q	**O:** SSP	Very Good
Zephyr et al. (2020)[e]	67	34	58	Canada	**IHR**	**O:** RISE	**O:** SSP	Good

Note. [a]**Type of sample**: *CI* = Currently Institutionalized, *PI* = Previously institutionalized children and currently adopted or in foster care, *FC* = Children in foster care, *IHR* = Intact high-risk dyads, *GEN*= General population, *PL: Placed children; MXG* = Mixed samples with a high percentage of children from the general population. *MX* = Mixed Samples. [b]**Type of DSEB measures**: *Q* = Questionnaire, *SD* = Stranger at the door, *RISE* = Rating for Infant-Stranger Engagement, *WRO* = Waiting Room Observation, *ITW* = Interview. [c]**Type of attachment to caregiver measure:** *AQS*=Attachment Q-Sort, *SSP* = Strange Situation Procedure, *MCAST*=Manchester Attachment Story Task, *GASCP*= German Attachment Story Completion Procedure, *PAD* = Parent Attachment Diary, *ITW* = Interview. [d]**Category of measures:** *O* = Observational measure, *Non-O* = Non-observational measure, *R* = Representational attachment measure. [e]Included data on attachment disorganization. [f]For analyses on attachment disorganization, there was a lower number of participants than for attachment insecurity.

Table 2

Combined Effect Sizes (*d*) and Moderators for the Association Among Disinhibited Social Engagement Behavior and Attachment Insecurity and Disorganization.

	Attachment Insecurity					Attachment Disorganization				
Variables	*k*	*n*	*d*[b]	95% CI	*Q* or *Q*'	*k*	*n*	*d*[b]	95% CI	*Q* or *Q*'
Total number of studies	24	1705	0.48***	0.34-0.61	38.35*	18	1238	0.47***	0.36-0.59	16.46
Country of studies					0.69'					0.86'
America	12	863	0.54***	0.34-0.74		7	456	0.54***	0.34-0.73	
Western European	9	740	0.44***	0.21-0.67		8	680	0.48***	0.29-0.66	
Other	3	102	0.37	-0.04-0.79		3	102	0.38*	1.00-0.66	
Sample type[a]					5.67'					0.02'
PL	9	571	0.38***	0.21-0.55		6	435	0.43***	0.24-0.63	
IHR	6	355	0.66***	0.44-0.89		6	341	0.45***	0.25-0.65	
MX	6	598	0.35*	0.07-0.63		4	383	0.44*	0.15-0.73	
MXG	3	181	0.75*	0.24-1.25		2[c]	135			
Attachment measure					0.01'					0.04'
Observational	17	1112	0.52***	0.37-0.66		13	916	0.48***	0.34-0.61	
Representational	5	322	0.51*	0.03-1.00		5	322	0.51***	0.22-0.81	
Parent-reported	2[c]	271				---				
DSEB measure					8.14'*					4.18'*
Observational	13	941	0.63***	0.44-0.81		11	749	0.57***	0.42-0.71	
Non-Observational	11	764	0.28***	0.13-0.42		7	489	0.32***	0.14-0.51	
Study Quality					0.27'					0.19'
Very good to high	12	945	0.53***	0.27-0.78		7	610	0.51***	0.35-0.66	
Low to good	12	760	0.45***	0.31-0.60		11	628	0.45***	0.26-0.64	

	Meta-Regressions for Continuous Variables											
	k	*n*	*b*	*SE*	95% CI	z-value	*k*	*n*	*b*	*SE*	95% CI	*z*-value
Child Age	24	1705	-0.01	0.01	-0.01-0.00	-0.50	18	1238	0.01	0.01	-0.00-0.00	0.47
Child gender	24	1705	0.01	0.01	-0.00-0.02	1.44	18	1238	0.01	0.01	-0.00-0.01	0.79
Year of publication	24	1705	-0.01	0.01	-0.03-0.02	-0.68	18	1238	-0.02	0.01	-0.05-0.00	-1.84

Note. *k*=Number of studies; *n*=Number of participants in studies; *CI*=95% Confidence interval; *Q* = Heterogeneity coefficient; *Q'* = Coefficient for study comparison; [a]PL = Placed children in adoptive or foster care families, whether previously institutionalized or not, *IHR* = Intact high-risk dyads, *MXG* = Mixed samples with a higher percentage of children from the general population. *MX* = Mixed

Samples. [b]Low effect size = $d \geq 0.3$; Moderate effect size = $d \geq 0.5$; Large effect size = $d \geq 0.8$ (Cohen, 1988). [c]Given that there are too few studies in this group (< 3), it was not compared to other groups. * $p < 0.05$; *** $p < 0.001$.

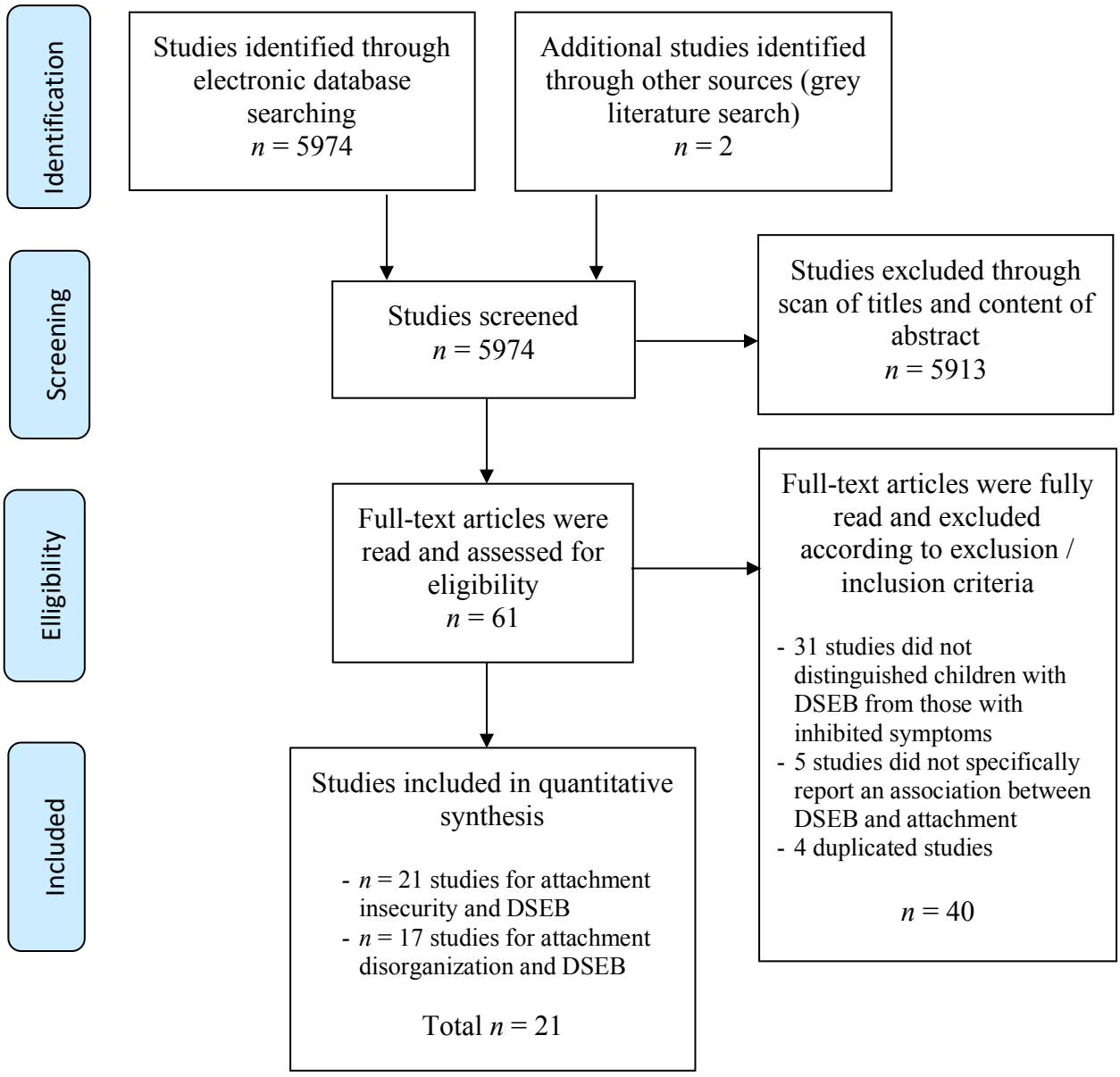


Figure 1. Flow Chart of the Literature Search and Study Selection

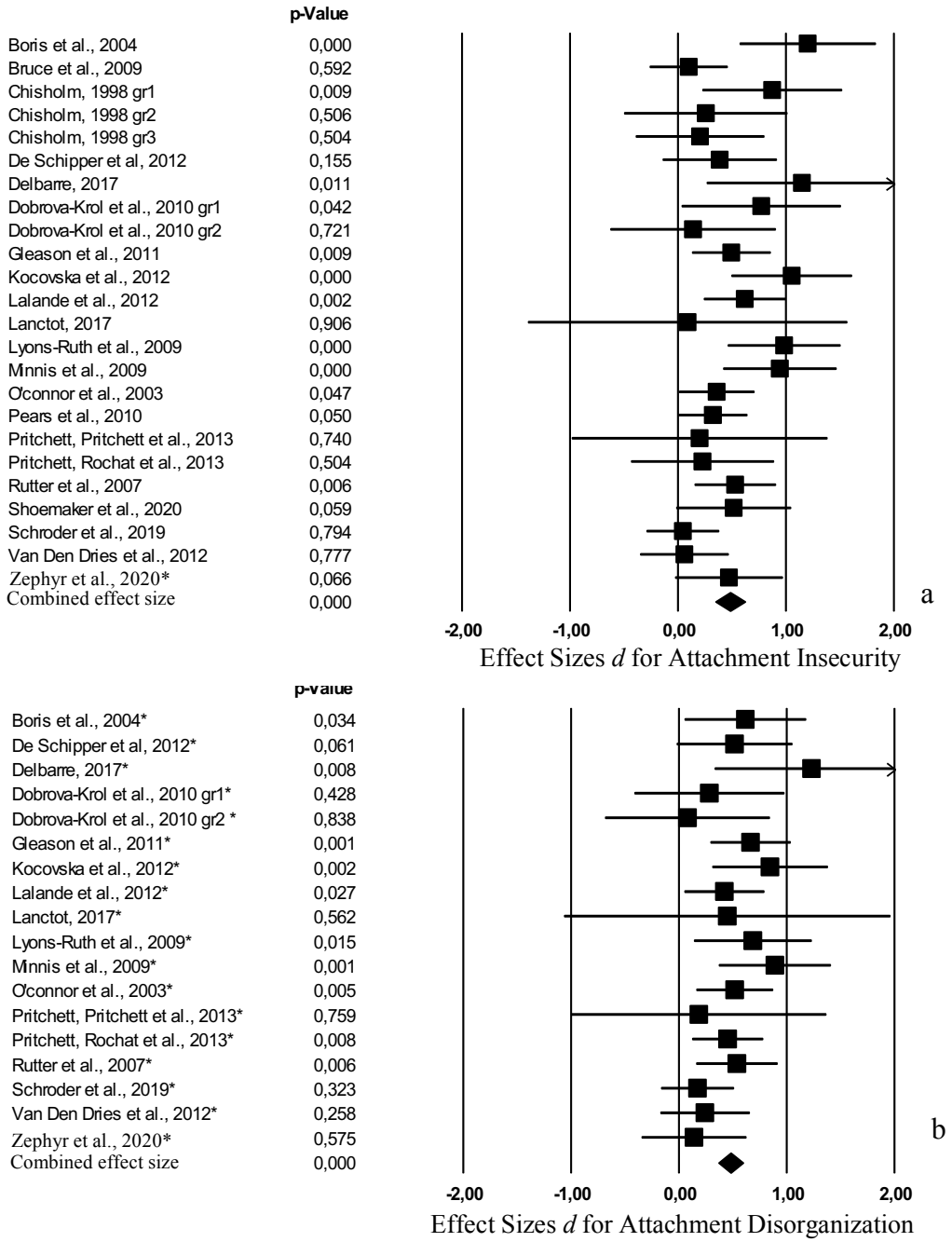
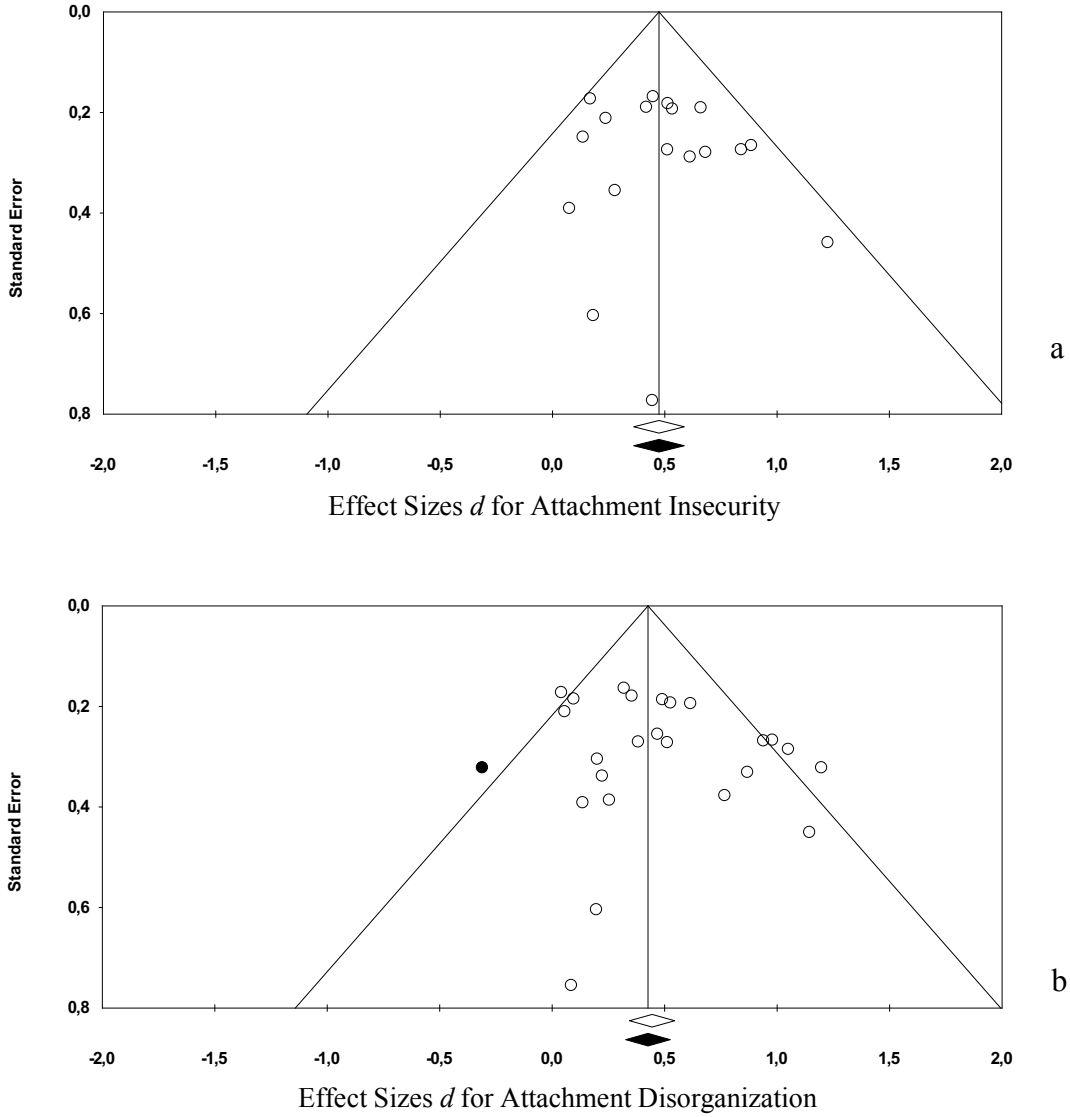


Figure 2. Forest Plots of Individual and Combined Effect Sizes (*d*) with *p* Values for each Individual Studies on the Association between DSEB and Attachment Insecurity (a) and Disorganization (b).



Note. The darker diamond (combined effect size) and darker dots (studies) are those after the trim and fill procedure.

Figure 3 Funnel Plots with Individual and Combined Effect Sizes (*d*) for the Association between DSEB and Attachment Insecurity (a) and Disorganization (b).

Supplement Tables

Table 1. Statistics Included in the Meta-analyses for Attachment Insecurity

	Statistics Retrieved of Computed from the raw data of the Studies					Statistics computed with CMA	
Study	*n*	*p value*	*r*	X^2	Means (SD) *n*	*d* effect sizes	CI
Boris et al. (2004)	55			14.59[a]		1.20***	0.57-1.84
Bruce et al. (2009)	118		.05			0.10	-0.27-0.47
Chisholm (1998) gr 1	46		.40			0.87**	0.22-1.53
Chisholm (1998) gr 2	30	.50				0.26	-0.50-1.02
Chisholm (1998) gr 3	46	.50				0.21	-0.40-0.81
De Schipper et al. (2012)	59		.19			0.39	-0.15-0.92
Delbarre (2017)	29		.49			1.15*	0.26-2.04
Dobrova-Krol et al. (2010) gr 1	35		.36			0.77*	0.03-1.51
Dobrova-Krol et al. (2010) gr 2	29		.07			0.14	-0.63-0.91
Gleason et al. (2011)	123			7.09[a]		0.50**	0.13-0.86
Kočovská et al. (2012)	65			14.13		1.05***	0.49-1.62
Lalande et al. (2012)	117			10.25[a]		0.62**	0.24-1.00
Lanctôt et al. (2017)	10			0.02		0.09	-1.39-1.57
Lyons-Ruth et al. (2009)	69				Insecure: 5.17 (2.20) *n* = 46 Secure: 3.13 (1.79) *n* = 23	0.98***	0.46-1.51
Minnis et al. (2009)	70			12.75		0.94***	0.41-1.47
O'Connor et al. (2003)	129			4.02		0.36*	0.00-0.71
Pears et al. (2010)	153		.16			0.32	-0.00-0.65
Prichett, Pritchett et al. (2013)	14			0.14		0.20	-0.99-1.39
Pritchett, Rochat et al. (2013)	38	.50				0.23	-0.44-0.89
Rutter et al. (2007)	116			7.62		0.53**	0.15-0.91
Schoemaker et al. (2020)	60		.25			0.52	-0.02-1.05
Schröder et al., (2019)	135			0.07		0.05	-0.30-0.39
Van den Dries et al. (2012)	92		.03			0.06	-0.36-0.48
Zephyr et al. (2020)	67		.23			0.47	-0.03-0.98

Note. When nonsignificant findings were reported without accompanying statistical information, a *p* value of .50 was entered in CMA (Rosenthal, 1995). All *r* coefficients were retrieved directly from the articles. For the meta-analysis on attachment insecurity, a positive *r* indicates an effect in line with study hypotheses, that is, greater symptoms of DSEB are related to a higher scores of attachment insecurity. X^2 coefficients were computed from the raw data provided in the article or as indicated directly in the article.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$

Table 2. Statistics Included in Meta-analyses for Attachment Disorganization

	Statistics Retrieved of Computed from the raw data of the Studies					Statistics computed with CMA	
Study	*n*	*r*	X^2	Means (SD) *n*	*t*-test	*d* effect sizes	CI
Boris et al. (2004)	55		4.78			0.62*	0.05-1.19
De Schipper et al. (2012)	59	.25				0.52	-0.03-1.06
Delbarre (2017)	29	.52				1.23**	0.33-2.13
Dobrova-Krol et al. (2010) FR	35	.14				0.28	-0.42-0.98
Dobrova-Krol et al. (2010) IR	29	.04				0.08	-0.69-0.85
Gleason et al. (2011)	123		12.25			0.67***	0.29-1.04
Kočovská et al. (2012)	65		9.84			0.85**	0.31-1.39
Lalande et al. (2012)	117		5.00			0.42*	0.05-0.80
Lanctôt et al. (2017)	10		0.48			0.45	-1.07-1.97
Lyons-Ruth et al. (2009)	55			Disorg.: 4.56 (2.27) *n* = 32 Organized: 3.13 (1.79) *n*=23		0.69*	0.14-1.24
Minnis et al. (2009)	70		11.58			0.89***	0.37-1.42
O'Connor et al. (2003)	129		8.11			0.52**	0.16-0.88
Prichett, Pritchett et al. (2013)	14		0.12			0.19	-1.00-1.37
Pritchett, Rochat et al. (2013)	38				-2.79	0.45**	0.12-0.79
Rutter et al. (2007)	116		7.83			0.54**	0.16-0.92
Schröder et al. (2019)	135		1.00			0.17	-0.17-0.52
Van den Dries et al. (2012)	92	.12				0.24	-0.18-0.66
Zephyr et al. (2020)	67	.07				0.14	-0.35-0.63

Note. When nonsignificant findings were reported without accompanying statistical information, a *p* value of .50 was entered in CMA (Rosenthal, 1995). All *r* coefficients were retrieved directly from the articles. X^2 coefficients were computed from the raw data provided in the article or as indicated directly in the article.

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$