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A Meta-Analysis of the Distribution of Preschool and Early Childhood Attachment as Assessed in the Strange Situation Procedure and its Modified Versions

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Abstract

The Cassidy-Marvin Preschool Attachment Coding System and the Main-Cassidy six-year-old system have extended scholars' capacity to measure differences in the developing child-parent attachment relationship, and its sequelae, beyond the infancy period. Research using these observational measures of attachment relationships has proliferated in the past few decades; however, the global distribution of the attachment categories in these systems, and potential factors influencing this distribution, remain unknown. This meta-analysis, which synthesized the distribution of attachment classifications as coded with the Cassidy-Marvin Coding System and the Main-Cassidy Coding System, included 97 samples comprising a total of 8,186 children (55% boys). The vast majority of samples (89%) were drawn from North American or European populations, with an average of 76% of individuals identifying as White. Results indicated that the global distribution of child-mother attachment was 53.5% secure, 14.0% avoidant, 11.0% ambivalent, and 21.5% disorganized/controlling. Moderator analyses showed that rates of security were lower, and rates of disorganization were higher in samples of at-risk families, specifically when children were exposed to maltreatment. Variations in the procedure also moderated the distribution. The discussion calls for greater unity around methodological practices and identifies critical avenues for future research using these observational measures of attachment.

Keywords: preschool attachment; early childhood; meta-analysis; child-mother attachment; child-father attachment

A Meta-Analysis of the Distribution of Preschool and Early Childhood Attachment as Assessed in the Strange Situation Procedure and its Modified Versions

Attachment theory is an important conceptual framework within child development, spanning thousands of studies focused on the origins and sequelae of secure versus insecure child-parent attachment. The Strange Situation Procedure (SSP), a roughly 20-minute lab-based paradigm to assess the quality of infants' attachment relationships to their caregivers (Ainsworth et al., 1978), has been instrumental in deriving this knowledge. The expectation that attachment relationships would be influential from "the cradle to the grave" (Bowlby, 1969/1982), served as the impetus to adapt the SSP and its coding parameters for children at later developmental periods. These efforts culminated into several adaptations, including the Cassidy-Marvin Preschool Attachment Coding System (PACS; Cassidy et al., 1992), Main-Cassidy system (Main & Cassidy, 1988), Preschool Assessment of Attachment (Crittenden, 1992), and Cummings' felt security scale (Cummings, 1990). Here we focus on the two most commonly used coding systems: the Cassidy-Marvin system, typically used for children aged 2.5-4.5 years, and the Main-Cassidy system, used for 6-and-7-year-olds. These two systems are hereafter collectively referred to as SSP-M[odified].

The SSP-M systems have been used in nearly two hundred articles, dissertations, and book chapters. Despite their widespread use, there is no published standard for the distribution of attachment classifications coded in the SSP-M. Distribution standards are important for the field as they provide a metric for future studies to compare and contrast their sample distributions with the "average" distribution. Thus, the current study sought to synthesize the distribution of child-parent attachment relationships in the SSP-M based on the available body of literature available

globally across caregivers and risk-contexts, and identify variations in the distribution based on sample and study characteristics.

Child-Parent Attachment Relationships

Attachment theory proposes that infants are biologically primed to form strong affective bonds to their caregivers, and that these ‘attachment relationships’ promote their survival (Bowlby, 1969/1982). Infants who experience their caregiver as available in times of need (a ‘safe haven’) and dependable for their exploration (a ‘secure base’) are expected to develop a secure attachment relationship with their caregiver. Such perceptions of the caregiver are facilitated by sensitive caregiving, in which caregivers attend to the infant’s signals, interpret these signals accurately, and respond to the signal in an appropriate and timely manner (Ainsworth, 1969). Infants who experience insensitive caregiving are more likely to develop an insecure attachment relationship with the caregiver. A recent meta-analysis of 20,720 infants ($k = 285$ studies) that participated in the SSP revealed the following global distribution of attachment relationships: 51.6% secure, 14.7% avoidant, 10.2% resistant, and 23.5% disorganized (Madigan, Fearon, et al., in press). The distribution of attachment relationships varied as a function of risk (specifically maltreatment, socio-demographic risk, parental psychopathology, and adopted/fostered samples) and regions.

Commensurate with the initial theorizing of Bowlby and Ainsworth, much of the early scientific literature on attachment focused on the formation of attachment relationships in the infancy period. However, it is now well-established that attachment relationships continue to be of relevance long after the infancy period (Cicchetti et al., 1990). For example, preschoolers and children have increased autonomy compared to infants, but they still remain dependent on their caregivers for comfort and safety, for help and support in daily activities, and for help in

emotional regulation. However, the qualities of attachment relationships are not set in stone in infancy. A recent meta-analysis estimated that across 9 studies (720 children), the stability of attachment relationships from infancy to the preschool years was weak ($\kappa = .26$, 95% CI [.05, .44]) (Opie et al., 2021). Thus, attachment relationships formed in infancy are only moderately predictive of attachment relationships formed with the same caregivers in the preschool period, which provides further need to distinguish the distributions of attachment in the infancy from the preschool and middle childhood periods.

Changes in attachment classification from infancy to preschool and early childhood may occur due to various factors. The child's developmental maturation can affect the dynamics of the child-caregiver relationship, which can be 'recast' by the child increasing cognitive, linguistic, and emotional capacities (Ainsworth & Bowlby, 1991). Preschoolers desire increased autonomy and begin to interact with others more intently and intensively, as their perspective-taking and communication skills mature. These changes may alter children's and caregivers' reactions and behaviors towards one another (Cicchetti et al., 1990). Changes in caregiving environments may also alter children's attachment behaviors from one period to the next. For example, life events including the loss or serious illness of a family member, the birth of a sibling, or the separation of parents may change the caregiver's capacity to provide a safe haven and affect a child's capacity to derive comfort and safety from the caregiver (see Moss et al., 2005; Volling et al., 2021). Sensitive caregiving behavior from infancy to early childhood is also only moderately stable (Mesman & Emmen, 2013), although more stable than attachment relationship classifications. Taken together, the distribution of the SSP-M may differ from that of the SSP and deriving distributions for the coding of the SSP-M provides important information pertaining to preschool and early childhood attachment relationships.

Assessing Attachment Relationships in the Preschool Years and Early Childhood

Coding Systems and their Psychometric Properties

Most adaptations of the SSP to later developmental periods assume that although specific behaviors may change from one period to another based on developmental maturation, the function of attachment behaviors remains similar. For instance, while infants may raise their arms to be picked up, older children have access to more sophisticated methods to seek the availability of the caregiver (Ainsworth, 1985). For example, they may do so through speech, or looking behavior, such as looking for a reassuring smile from the caregiver. As a result, the attachment system may require a higher threshold for activation, and children may not express the same intensity of distress in comparison to infancy (Marvin, 1977). The core function of attachment in the SSP-M, remains, nonetheless, to seek the availability of the caregiver.

The most commonly used systems validated for preschool and early childhood attachment, the Cassidy-Marvin (1992) system and the Main and Cassidy (1988) system, respectively, maintain consistency with the original SSP while accounting for maturational changes (Solomon & George, 2016). These systems are the focus of this review.

The first post-infancy adaptation was that of Main and Cassidy (1988), which was based on the identification of lawful continuities in children who had completed an SSP as infants. Cassidy and Marvin (1992), along with the McArthur Attachment Working Group (which included Mary Ainsworth and Mary Main), then adapted the Ainsworth Strange Situation upwards and the Main-Cassidy six-year-old system downwards, to create a system applicable to children aged 2.5 to 4.5 years old (Cassidy et al., 1992). It is worth noting that the Cassidy-Marvin system has been used beyond the bounds of preschool-aged children in the last 25 years

(up to children aged 6 years old; e.g., see Moss, Cyr, et al., 2004), given that there has been no accredited training for the Main-Cassidy system until 2021.

Many studies support the psychometric properties of the Main-Cassidy and Cassidy-Marvin systems. The Main-Cassidy system has demonstrated convergent validity with five procedures assessing children's attachment representations (e.g., Barone & Lionetti, 2012; Solomon et al., 1995). Classifications under this system are also associated with core variables such as the quality of child-mother interactions (George & Solomon, 1990, 1996, 2000) and mothers' Adult Attachment Interview classifications (Behrens & Kaplan, 2011). In terms of predictive validity, the Main-Cassidy system is associated with children's socioemotional competence (Cassidy et al., 1996; Easterbrooks et al., 2000; Solomon et al., 1995; Wartner et al., 1994).

Similarly, the Cassidy-Marvin system shows convergent validity with the AQS (Moss et al., 2006; van IJzendoorn et al., 2004) and attachment representations (Bretherton et al., 1990; Moss et al., 2006). It is associated with several key correlates, such as parental sensitivity (De Wolff & van IJzendoorn, 1997; O'Neill et al., 2021), maternal wellbeing (Badovinac et al., 2018; Manassis et al., 1994; Moss, Bureau, et al., 2004), and the quality of child-mother interactions (Barnett et al., 1998; Moss, Bureau, et al., 2004). The Cassidy-Marvin system also holds predictive validity for children's socioemotional adaptation (Badovinac et al., 2021; Bureau et al., 2017; O'Connor et al., 2011). In the NICHD sample, preschool attachment as assessed with the Cassidy-Marvin system was more strongly related to child outcomes than 15-month attachment assessed using the SSP and 24-month attachment assessed using the Attachment Q-sort (McCartney et al., 2004; McElwain et al., 2003; NICHD Early Child Care Research Network, 2001). These psychometric characteristics support the Cassidy-Marvin system as a

measure of individual differences in attachment in the preschool years, and the Main-Cassidy system for early childhood (see Solomon & George, 2016).

Procedures to Measure Preschool and Early Childhood Attachment

Procedures to assess attachment using the SSP-M are less uniform compared to the SSP, with some procedures adjusting the assessment to make it more readily applicable to older children. Disparate procedures of the SSP-M have been noted in the coding manual for the Cassidy-Marvin system, and four main differences are observed.

The first difference is the presence of a stranger. The adapted version of the SSP recommended in the Cassidy-Marvin manual recommends against having a stranger in the procedure (Cassidy et al., 1992). For many preschoolers, strangers are no longer a ‘natural cue to danger’ (Marvin, 1977), and may instead be friendly playmates and a source of reassurance. Several SSP-M studies, however, apply the infant SSP procedure as-is with a stranger.

The second difference is the number of separations and reunions in the procedure. The recommended Cassidy-Marvin procedure involves two separations and reunions. In contrast, the standard Main-Cassidy procedure involves a single separation and reunion, although the benefits of cutting one separation-reunion are unclear beyond logistical reasons. Across the literature, the number of separations and reunions is not necessarily congruent with the choice of coding system and may rather be pragmatic.

The third difference across SSP-M procedures is the length of separations and reunions. Some studies continue to use the infant SSP length of 3 minutes per stage, while others follow the recommended Cassidy-Marvin length of 5 minutes. In contrast, the Main-Cassidy procedure typically involves a long separation, typically ranging from 45 to 60 minutes, during which the child is with an examiner and typically completes other study tasks (e.g., cognitive assessments,

questionnaires). This separation is typically followed by a 1-3 minute period where the child is alone, and a 3-5 minute reunion.

The fourth difference among procedures is their total length. The SSP-M lasts approximately 20 to 25 minutes when using the SSP or Cassidy-Marvin recommendations. The SSP-M may last a few hours when using multiple long separation-reunions or segmenting the procedure into other tasks.

These four differences have been raised as a methodological concern in the past (Solomon & George, 2016), as their impact on the activation of the attachment system and the assigned classification are unknown. The current meta-analysis is uniquely situated to examine the role of procedural approaches on the distribution of child-caregiver attachment.

Attachment Classifications

Four primary classifications are observed in the SSP-M: secure, avoidant, ambivalent, and disorganized/controlling. Secure, avoidant, and ambivalent attachment relationships in the SSP-M are conceptually similar to secure, avoidant, and resistant attachment relationships observed in infancy in the SSP, respectively. Children whose attachment relationship is classified as *secure* in the SSP-M display a calm enjoyment of the caregiver's presence. They maintain a goal-corrected partnership that considers the caregiver's perspectives and ideas and use the caregiver as a secure base to explore. Children with an *avoidant* attachment try to maintain neutrality during their interactions with the caregiver (Cassidy-Marvin) and/or direct attention away from attachment-relevant cues (Main-Cassidy). They may try to limit opportunities for interactions by focusing on toys or exploration. These children may respond to a caregiver's request or bid for attention, but they usually do so through brief, neutral responses. Children whose attachment relationship is classified as *ambivalent* (the equivalent of the resistant infant

classification) appear to be overly dependent upon the caregiver, to the detriment of exploration (Cassidy-Marvin) and/or direct attention toward attachment-relevant cues. Some children with an ambivalent attachment exaggerate their distress and seek close physical contact to the parent. Other children who are classified as ambivalent engage in conflictual interactions with the caregiver. These interactions are marked by frustration and resistance.

In contrast, it is expected that only a minority of infants whose attachment relationship was classified as disorganized will continue to exhibit disoriented, contradictory, and apprehensive behaviors toward their caregiver as they grow into the preschool years and beyond. These children show what was later coined “behavioral disorganization,” a disorganization of the attachment system itself, which may manifest itself through overt displays of fears and disorganized behaviors similar to those observed in infancy. The rest of the infants with a disorganized attachment are expected to develop controlling attachment (or role reversal) toward their caregiver in the preschool years (Macfie et al., 2015; Main & Cassidy, 1988; Moss et al., 2004, 2005, 2011). It is theorized that role reversal allows children to have more control with an otherwise unpredictable caregiver who may be frightening (Solomon et al., 1995). Conceptually, the child is less likely to experience fear when they direct the caregiver’s attention and organize the caregiver’s actions. Children exhibiting controlling behaviors may have advantages compared to behavioral disorganization; however, controlling attachments may be maladaptive for long-term adaptation (e.g., O’Connor et al., 2011).

The SSP-M systems recognize two primary forms of controlling behaviors: (1) a controlling-caregiving attachment based on the provision of care to the parent (i.e., direct the caregiver’s attention and behaviors through cheery, entertaining actions and demeanor), or a (2) controlling-punitive attachment based on humiliating or being hostile toward the parent (i.e.,

direct the interaction through punitive, threatening, humiliating, and hostile commands and behaviors). Although less commonly used, some coders also choose to code controlling-general when there is clear evidence of role-reversal without a dominating form of control. Although both SSP-M systems recognize the different types of control, they are only commonly coded and/or reported in studies that used the Cassidy-Marvin system. Main-Cassidy publications typically refer to a single controlling-disorganized group, while it is common for Cassidy-Marvin studies to separately report distributions for behavioral disorganization, controlling-caregiving, and controlling-punitive (although they might be grouped due to small N's for analyses). The importance of distinguishing these disorganized/controlling classifications is supported by a study of children in the NICHD sample (O'Connor et al., 2011), which found that children classified as controlling-punitive exhibited the highest levels of mother-reported disruptive behaviors, internalizing behaviors, and externalizing behaviors at 36 months.

Usefulness of Estimating the Global Distribution of the SSP-M

For several reasons, it is important to provide estimates of the distribution of child attachment in the SSP-M. First, newly collected samples are often compared and contrasted with baseline estimates to determine if distributions are consistent or inconsistent with expected distributions (subject to expectable differences in the caregiving context; e.g., Archer et al., 2015; Behrens et al., 2007; Bureau et al., 2017; Mooya et al., 2016; Zreik et al., 2017). In the absence of distributions specific to the preschool years, scholars most often compared their SSP-M distributions against the infant SSP distribution, which is problematic given the expected protocol and coding differences across the SSP-M and SSP.

Second, establishing the SSP-M attachment distribution and examining factors that may alter this distribution are informative when considering the similarities and differences in

attachment processes between infancy and later developmental periods. On a conceptual level, it is assumed that the organized classifications are functionally similar in the preschool years and early childhood to infancy, while the disorganized classification goes through significant changes. While the SSP and SSP-M share many procedural and coding similarities, the SSP-M also has notable differences from the SSP, such as having a stranger-less procedure and coding controlling attachment behaviors. There are also significant differences in the maturational capabilities of infants compared to older children, which may change the nature of child-parent interactions. Despite the widespread use of the SSP-M, the relative similarity of the SSP and SSP-M systems has not been tested. By estimating a prevalence specific to the SSP-M, we can get a sense of whether classifications are still observed during the preschool years and early childhood, and whether they are observed at similar rates as infancy.

Finally, the moderator analysis can help identify lawful differences in the distribution of the SSP-M across different contexts (e.g., at risk or not, type of risk, child age). The identification of moderators has important practical and conceptual implications. Practically, it is important to identify settings that are most challenging for children in the preschool years and early childhood (e.g., samples with the lowest rates of security or the highest rates of disorganization) so that targeted interventions may be implemented to assist these children. Conceptually, identifying key moderators in the distribution (e.g., lower security in a maltreatment context) is a sort of validation for the SSP-M in replicating findings from the SSP with different coding criteria. Indeed, this allows testing whether attachment in the SSP-M is associated with key variables as expected based on the core theoretical tenets of attachment theory.

As such, estimating the prevalence of the SSP-M will be useful in offering a comparison base for future studies in order to show the representativity of their sample. Additionally, this endeavor also offers important information concerning the validity of the SSP-M by showing a similar distribution and similar moderators, despite changes in the procedure and coding criteria.

Examining Factors that Affect the Prevalence of Attachment in the SSP-M

The current study examines the following moderators to determine if differences in sample characteristics or methodological choices are systematically linked to fluctuations in the distributions in the SSP-M. Hypotheses listed below are based on results of the meta-analysis on the SSP distribution in infancy (Madigan et al., 2021) and other meta-analyses in the attachment field (e.g., Opie et al., 2021). As well as providing useful information regarding sources of variation in attachment distributions in this age group, moderator analyses provide important validation of these tools, given strong a priori expectations about security of attachment in conditions of high psychosocial risk.

Child Characteristics

Child Sex. There is little empirical evidence to support a difference in attachment distribution based on child sex (Madigan et al., 2021). Some scholars have, however, suggested that attachment may develop in sex-specific ways later in childhood (Del Giudice & Belsky, 2010), thus, this is a possibility that we will test.

Child Age. We do not expect child age to drive differences in attachment distributions. However, in individual studies in the preschool years, some researchers have observed an increase in ambivalence in the early preschool years (Moss et al., 2005), a period where children may be especially likely to push for increased autonomy (Bureau et al., 2019).

Temporal and Regional Differences

Temporal Differences. The year of publication, often used as a proxy for year of data collection, is typically used in meta-analyses to examine if temporality plays a role in explaining differences across studies. Temporal differences were identified in infancy (lower rates of avoidance over time; Madigan et al., 2021). Although there is no definitive answer on the reason for such decrease, the study authors have speculated that research practices, populations studied, or secular trends in parenting may account for the decrease in avoidance. We examine if similar temporal trends are also observed in the SSP-M.

Regional Differences. Many studies conducted in infancy have supported the universality of attachment across different cultural and ethnic groups (Mesman et al., 2016), but minor variations can be observed in the SSP across continents. Scholars have only just started coding attachment in later developmental periods in different settings, and it is unknown if the distributions of attachment vary across regions. Given that regional differences do not provide information about the experience of marginalized groups, we also considered if the percentage of participants who identify as a minority impacts the distribution of attachment.

Indicators of Risk

Much empirical research on attachment has been concerned with the formation of attachment relationships in children who experience various forms of risk, including family-related risks (e.g., sociodemographic risk, foster/adoptive families) or child-related risk (e.g., maltreatment, medical, and psychopathological risk). Infants exposed to risks are less likely to form a secure attachment (Madigan et al., 2021). Infants who experienced risk in infancy may continue to do so in the preschool years and beyond, and such risks could continue to interfere with the formation of a secure attachment relationship.

Child Maltreatment. Samples of infants who experienced maltreatment presented higher rates of disorganization than samples of non-maltreated infants (Madigan et al., 2021). Parents who enact maltreatment, which includes physical, sexual, and emotional violence as well as neglect, would necessarily be frightening to a child, and may thereby contribute to the child considering their caregiver as a source of alarm, even whilst disposed by the attachment system to seek them in times of need. We may expect that suffering maltreatment would result in similar distributions in the SSP-M.

Child Medical and Psychopathological Risk. Medical (e.g., premature birth, chronic medical illnesses) or psychopathological risk (e.g., disruptive behavior disorder) was not influential in the distribution of infant attachment (Madigan et al., 2021). It is unknown if these risks also play little role in influencing the formation of a secure or insecure attachment in the SSP-M.

Family Sociodemographic Risk. Samples of infants that were exposed to sociodemographic risk (e.g., low socioeconomic status, adolescent mother, single parenthood; Verhage et al., 2020) presented higher rates of avoidance and disorganized attachment (Madigan et al., 2021). We may expect that sociodemographic risk, which may bring a number of stressors on the family such as financial stress and community violence, would have a similar impact on the distribution of attachment in the SSP-M.

Foster/Adopted Children. Adopted or fostered infants presented lower rates of avoidant attachment and higher rates of disorganization (Madigan et al., 2021). It is possible that these children experienced transitory caregivers, structural neglect, or even maltreatment, which may hinder children's capacity to trust and rely on caregivers when they are older. Alternatively,

compared with infants, preschoolers may have had more time to build a relationship of trust and form a secure attachment relationship with their caregiver.

Methodological Characteristics

Coding System. The Cassidy-Marvin and Main-Cassidy coding systems share the same core definitions of attachment avoidance, security, ambivalence, and disorganization/control. This has led authors to use them interchangeably, but empirical support is still needed to show consistency in the distribution of these coding systems.

Procedural Choices. As presented above, there are many different variations applied to the SSP-M procedure, and it is unclear if these decisions have an impact on children's behaviors, and thus on the distribution of attachment classifications. Thus, we examine whether the distribution varies as a function of 1) inclusion of a stranger like in the infant procedure, 2) number of separations and reunions, 3) length of separations and reunions, and 4) total length of the procedure.

Current Study

Although less widely used than the SSP, the numbers of studies and dyads examined in the modified SSPs for the preschool and early childhood years are impressive. Specifically, the SSP-M has been used in close to 200 studies and across more than 8,000 dyads to date, however, mostly in North American and European samples. There are three main objectives of the current meta-analysis. First, based on the available literature, we provide a synthesis of the distribution of the four main attachment classifications: secure, avoidant, ambivalent, and disorganized/controlling. Second, we test for various moderators that may influence the distribution of attachment, namely sample characteristics (e.g., child age and sex, presence of risk), and measurement choices (e.g., coding system, presence of stranger). Finally, we conduct a

sub-analysis of the distribution of six-way attachment classifications amongst available studies: secure, avoidant, ambivalent, behaviorally disorganized, controlling-caregiving, and controlling-punitive.

Method

Search Strategy

The current meta-analysis followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Moher et al., 2009) standards. Data included in this meta-analysis were drawn from the *Child Attachment Studies Catalogue and Data Exchange* (CASCADE; Madigan, 2020). This catalogue includes all studies that have assessed behavioral measures of child-parent attachment. The systematic search to populate CASCADE was conducted in August 2020 by a science librarian. The search for published and unpublished studies spanned five databases: PsycINFO, MEDLINE, Embase, Web of Science, and Dissertation Abstracts International. The databases were searched with database-specific headings and text word fields using the keywords “strange situation,” “q-sort,” and “attachment;” these keywords were combined with the Boolean operator “OR.” In addition, the search was limited to children under the age of 12 using the Boolean operator “AND.” There were no restrictions on language or type of publication. This search identified 24,980 non-duplicate records, which were screened for inclusion in CASCADE (Figure 1).

-----Insert Figure 1 about here-----

This figure details the systematic review steps for the selection of eligible studies. In addition to the automated database search, we contacted 38 scholars who recently attended a preschool attachment coding training with [redacted] for additional studies (in September and October

2021) and consulted past meta-analyses on preschool attachment (Badovinac et al., 2018, 2021; O'Neill et al., 2021), which led to the identification of 20 additional records.

Study Inclusion and Exclusion Criteria

Records were assessed for inclusion in CASCADE if they measured child-parent attachment using an observational measure (e.g., SSP, SSP-M, AQS) and 2,431 records were included. The CASCADE catalogue was then screened for studies meeting the eligibility criteria for this specific meta-analysis, which included:

1. They assessed attachment using the Cassidy-Marvin PACS (Cassidy et al., 1992) or the Main and Cassidy (1988) six-year-old coding system.
2. They reported on the categorical distribution of 4-way attachment (secure, avoidant, ambivalent, and disorganized/controlling), at a minimum.
3. The assessment of attachment was conducted with mothers, fathers, or adoptive/foster caregivers.
4. The publications were written in English, French, or Spanish (the languages spoken by our coding team).

Studies were excluded if they only reported on post-intervention attachment classifications. When studies did not report on the distribution breakdown ($n = 25$), we contacted authors directly to get the distribution (56% provided this information). Some samples combined infants coded with the SSP and the SSP-M, without disentangling the reported distributions for both measures. In such cases, we contacted authors directly to ascertain the distribution among preschoolers only ($n = 10$; information was provided in 10% of cases). Records were excluded when authors did not respond or were not able to provide the information (e.g., no access to

data). After applying these criteria, 192 studies (emerging from 97 non-overlapping samples) were eligible for inclusion in this study.

Data Extraction

Extraction was conducted using a standard coding form developed by the research team. The form allowed for extraction of the attachment distributions and moderator variables.

Attachment Distribution

All included studies underwent extraction for their distribution and moderators. Three coders extracted attachment distributions and reliability was excellent ($ICC > .96$). If studies reported children's attachment at multiple time points using the SSP-M, we extracted the earliest time point, which was likely to include a larger number of participants. The distribution was extracted in two ways.

- (1) We extracted the 4-way distribution (secure, avoidant, ambivalent, and disorganized/controlling), which applies to cases coded with both the Cassidy-Marvin (1992) and Main-Cassidy (1988) systems.
- (2) When available, we extracted the subtypes of disorganization that were coded with the Cassidy-Marvin (1992) system (which commonly distinguishes between them, unlike the Main-Cassidy system), namely behaviorally disorganized, controlling-caregiving, controlling-punitive, controlling-general, controlling-mixed), and insecure-other (IO). When the breakdown of disorganized subtypes was not provided ($n = 37$), we reached out to authors to obtain this information. Among these, 10 provided the requested information, 9 responded that they did not code subtypes, and 4 responded that they no longer had access to the data. The rest of contacted authors did not respond.

Moderators

We extracted the following information to test for moderators: (1) publication year; (2) continent where the study was conducted; (3) child age in months at the time of the attachment assessment; (4) child sex as recorded by the parent (% males); (5) race/ethnicity coded as the % of participants who identified as a minority; (6) child-related risks (coded as yes or no if at least 80% of the sample experienced) related to (i) sociodemographic risk (faced poverty, had low SES, were single parents, or adolescent mothers), (ii) foster/adopted family versus biologically related, (iii) maltreated (physical, emotional, sexual violence, neglect); (iv) psychopathology (e.g., samples of children consulting outpatient or psychiatry clinics for behavioral and emotional difficulties), (v) medical risk (e.g., cleft lip and palate, prematurity); (7) parent-related risk related to (i) parental psychopathology and (ii) history of being maltreated; and (8) methodological factors, including (i) coding system used (Cassidy-Marvin vs. Main-Cassidy; studies that used a mix of both were excluded from this analysis), (ii) stranger in the SSP-M for separation and reunion (yes or no), (iii) length of procedure (in minutes including pre-separations, separations, and reunions), (iv) length of separations/reunions (coded as short if <5 minutes, coded as long if > 5 minutes) and (v) number of separations or reunions. A subset of 20% of moderators were double-coded and reliability was excellent for both continuous (ICC > .92) and categorical variables (> 90% agreement).

Data Synthesis

Overlapping Samples

Among the 192 studies eligible for inclusion, a large proportion reported on samples of overlapping participants. Twenty-six samples were represented across multiple publications ($k = 142$). For example, over 30 studies relied on data from the NICHD sample. Identification of overlapping samples relied on multiple safeguards. First, characteristics pertaining to the sample

(e.g., name of the sample) were noted at the extraction phase. Second, clear overlap between samples was noted in the CASCADE database. Third, the first and last names of authors were cross-referenced to identify potential overlaps. Fourth, the authors, who are well-versed in the SSP-M literature, examined the study list for potential overlaps.

We ensured that each sample would only be represented once in the analysis. Among overlapping peer-reviewed publications and dissertations, the study selected: (a) provided the most complete distribution information; (b) provided the most readily extractable information; (c) provided the largest sample size or; (d) was peer-reviewed. If the selection could not be made based on the four criteria above, studies with earlier publication dates were prioritized. Detailed information on the choice of studies for overlapping samples is reported in Supplemental Table 4, and references of studies included are in Supplemental Table 5. Following this selection, our meta-analysis included 76 studies, reporting on 97 samples. Of these, four samples (Deneault et al., 2020; George et al., 2010; Main & Cassidy, 1988; Troutman, 2016) reported the distribution for both child-mother and child-father attachment, and two samples (DeKlyen et al., 1998) reported only on child-father dyads. Given that this small number would preclude the independent analysis of child-father attachment, the main analysis focused on child-mother dyads ($k = 76$, 95 samples). The overall distribution for child-father dyads is also reported ($k = 5$, 6 samples).

Analytical Strategy

The analytical strategy applied in this study is drawn from a similar study estimating the distribution of attachment classifications in infancy via the SSP (Madigan et al., 2021). Data analysis was conducted in Stata version 17.0 using the package GLLMM. This package allows for the estimation of generalized linear mixed models with random effects. Individual data points

were nested within studies, consistent with the hierarchical linear modelling framework. Between-study variability in outcomes was estimated using random effects (Higgins et al., 2009), which can be applied to polytomous data through the use of a multinomial logit model with random intercepts (Skrondal & Rabe-Hesketh, 2003). Consistent with this approach, between-study variability was estimated using $k-1$ random intercepts, which reflects variance in the contrast between a category (in this case, avoidant, ambivalent, or disorganized attachment) and a reference category (in this case, security). Maximum likelihood estimation with the Newton-Raphson algorithm and adaptive quadrature were used. Random effects of $k-1$ were assumed to correlate. We gradually increased the number of iterations and points of integrations to ensure stability of the estimates. Final estimates were used, along with their 95% confidence intervals (CI). Given that many contrasts were conducted, we set the p -value at $p < .01$. Publication bias was not tested given that this analysis is not recommended for proportion meta-analyses (Barker et al., 2021).

We also tested for moderators of the distribution of attachment classifications. Continuous moderators were added to the multilevel model for each insecure classification. Each contrast was estimated relative to the secure category. Categorical moderators were tested individually in a generalized multinomial random intercept model with fixed effect covariates. Results are presented as the difference in the rates of the insecure classification and the reference secure classification as a function of a 1-unit change in the moderator. When significant differences were identified, proportion-based meta-analyses using the logistic-normal random-effects model were tested for each insecure group (Nyaga et al., 2014). Each insecure group was compared to all other groups (e.g., avoidant vs. not avoidant) so as to include all cases and for consistency with past meta-analyses (e.g., Madigan et al., 2021). The data and code used in this

study are available on OSF:

https://osf.io/cu9sd/?view_only=caa927f3a028477c9a47b5a7cb49f59d

Results

Study Characteristics

The 97 samples included in this meta-analysis included a total of 8,186 children (see Supplemental Table 1). Sample sizes ranged from 2 to 1,140 children (median: 51 children). Children were on average 52.0 months old at the assessment of attachment, with a range of 25.1 to 96 months (median: 50.9 months). Samples overall comprised a similar number of boys and girls, with a mean of 55% of boys (range: 34–100%, median: 50%). Most studies were conducted in North America (65%) or Europe (24%), with the remainder conducted in Australia/New Zealand (6%), Africa (2%), Asia (2%), and the Middle East (1%). Samples comprised a mean of 24% of participants who identified as a minority where the study was conducted (range: 0–100). The publication year ranged from 1988 to 2021.

Parents were on average 34.4 years old at the assessment of attachment (range: 18.2–51.4; median: 34.3). In terms of sociodemographic characteristics, 22% of samples had a low socioeconomic status (SES), 34% a mid-high SES, and 20% a mixed SES. Approximately half of the samples (55.7%) had an indicator of child-related risk. Notably, 5.2% of samples included children who experienced maltreatment, 8.2% samples of children with a medical risk, 7.2% samples of children with a psychological risk, 14.4% samples of children who were adopted or in foster care (some of these children experienced foster or institutional care prior to international adoption, while others were adopted domestically), and 23.7% samples of children who experienced family sociodemographic risk.

In terms of methodology, the majority of studies used the Cassidy-Marvin system (80%). The rest used the Main-Cassidy system (17.5%) or a mix of both systems (2.5%). Most studies (69.1%) included a stranger in their procedure. The number of reunions varied from 1 to 3, with 28.9% of studies using a single separation, 68.0% using two separations, and 3.1% using three separations. The length of the whole procedure varied from 16 to 318 minutes, with a mean of 40 minutes (median: 24 minutes).

Global Distribution of 4-way Attachment Classifications in Child-Mother Dyads

The estimation of the global distribution of child-mother attachment in the SSP-M involved 95 samples and 8,076 children (log likelihood = -8860.47). The child-mother distribution was estimated as 53.5% secure (95% CI [49.7%, 56.8%]), 14.0% avoidant (95% CI [12.1%, 15.9%]), 11.0% ambivalent (95% CI [9.8%, 12.4%]), and 21.5% disorganized/controlling (95% CI [18.3%, 25.5%]). Substantial variance was identified in the proportions across studies for all three contrasts (A versus B: = -1.44, se = .094; C versus B = -1.61, se = .070; D versus B = -1.11, se = .125).

Continuous Moderators of Attachment Prevalence in Child-Mother Dyads

Child Sex and Age. When comparing each insecure classification in relation to the secure reference category, none of the three contrasts relating to sex were statistically significant (Avoidant relative to Secure: $B = -.004$, $SE = .006$, $p = .54$; Ambivalence relative to Secure: $B = .007$, $SE = .005$, $p = .15$; Disorganized relative to Secure: $B = -.000$, $SE = .007$, $p = .97$). None of the age contrasts were statistically significant (Avoidant relative to Secure: $B = .011$, $SE = .006$, $p = .046$; Ambivalence relative to Secure: $B = -.005$, $SE = .004$, $p = .25$; Disorganized relative to Secure: $B = -.002$, $SE = .007$, $p = .79$).

Race/Ethnicity. We tested whether the percentage of the sample that identified as a minority moderated the attachment distribution. Compared to security as a reference category, none of the contrasts were statistically significant (Avoidant relative to Secure: $B = .008$, $SE = .003$, $p = .02$; Ambivalent relative to Secure: $B = .001$, $SE = .003$, $p = .82$; Disorganized relative to Secure: $B = .002$, $SE = .005$, $p = .69$).

Temporal Trends. We tested the distribution of each attachment classification over time via fitted linear time trends to the multinomial multilevel model. A negative linear trend was identified for avoidance relative to security ($B = -.223$, $SE = .088$, $p = .01$; see Supplemental Figure 1). No trend was identified for ambivalence ($B = .032$, $SE = .068$, $p = .64$) and disorganization ($B = .011$, $SE = .122$, $p = .93$).

Methodological Variations. We tested whether the length of the SSP-M had an influence on classifications. Relative to security, the length of the SSP-M did not appear to moderate the distribution of avoidant ($B = .002$, $SE = .002$, $p = .46$), ambivalent ($B = .002$, $SE = .001$, $p = .24$), and disorganized attachment ($B = .003$, $SE = .003$, $p = .36$).

Categorical Moderators of Attachment Prevalence in Child-Mother Dyads

For all moderators, distributions of child-mother attachment across levels of categorical moderators are presented in Table 1.

-----Insert Table 1 about here-----

This table helps visualize the percentage of children classified in each classification across different levels of the moderators. Results of the multilevel multinomial analyses to compare moderator effects are presented in Supplemental Table 2.

Global Risk. Rates of disorganization were statistically larger in samples that presented at least one indicator of risk (27.2%, 95% CI [22.7%, 32.1%]) compared to samples that presented

no indicator of risk (16.0%, 95% CI [13.1%, 20.0%], $Q = 6.33$, $p = .01$). Rates of security were smaller in samples with some risk identified (47.9%, 95% CI [43.4%, 52.3%]) compared to samples with no identified risk (59.6%, 95% CI [54.6%, 63.1%], $Q = 6.58$, $p = .01$). Differences in avoidance (risk: 14.3%, 95% CI [11.9%, 17.0%]; no risk: 13.1% 95% CI [10.8%, 15.7%]) and ambivalence (risk: 10.6%, 95% CI [9.0%, 12.4%]; no risk: 11.4%, 95% CI [9.5%, 13.3%]) were not statistically different. In order to identify specific sources of risk that might account for these differences, we tested whether the distribution varied as a function of specific risks.

Child Maltreatment. Rates of disorganization were statistically larger in samples with child maltreatment (47.3%, 95% CI [32.1%, 62.1%]) compared to samples without maltreatment (19.2%, 95% CI [16.4%, 22.5%], $Q = 6.04$, $p = .01$). Rates of security were smaller in samples with child maltreatment (25.0%, 95% CI [15.7%, 37.3%]) than samples with no maltreatment (55.7%, 95% CI [52.4%, 58.6%], $Q = 12.38$, $p < .001$). Marginal differences in avoidance were observed, with higher rates in maltreatment samples (21.2%, 95% CI [12.0%, 33.7%]) than samples without child maltreatment (13.8%, 95% CI [11.8%, 15.7%], $Q = 4.95$, $p = .03$). Rates of ambivalence were not reliably different, although confidence intervals were large in the maltreatment samples (maltreatment: 6.6%, 95% CI [3.4%, 11.9%]; non-maltreatment: 11.3%, 95% CI [10.1%, 12.7%]).

Child Medical Risk. There were no reliable differences between samples with medical risk and without medical risk for avoidance (risk: 9.2%, 95% CI [5.1%, 14.5%]; no risk: 14.4%, 95% CI [12.3%, 16.5%]), security (risk: 59.5%, 95% CI [49.2%, 68.6%]; no risk: 53.0%, 95% CI [49.5%, 56.3%]), ambivalence (risk: 11.6%, 95% CI [7.6%, 16.6%]; no risk: 11.0%, 95% CI [9.7%, 12.5%]), and disorganization (risk: 19.7%, 95% CI [12.3%, 31.0%]; no risk: 21.6%, 95% CI [18.3%, 25.4%]).

Child Psychopathology. There were no reliable differences between samples with psychopathology risk and without psychopathology risk for avoidance (risk: 12.7%, 95% CI [7.7%, 19.6%]; no risk: 14.0%, 95% CI [11.9%, 16.2%]), security (risk: 41.2%, 95% CI [30.3%, 51.6%]; no risk: 54.4%, 95% CI [50.3%, 57.7%]), ambivalence (risk: 12.2%, 95% CI [7.9%, 18.6%]; no risk: 10.9%, 95% CI [9.7%, 12.2%]), and disorganization (risk: 33.9%, 95% CI [22.4%, 47.9%]; no risk: 20.7%, 95% CI [17.3%, 24.6%]). Of note, confidence intervals were large.

Foster/Adopted. Rates of avoidance (foster/adopted: 14.7%, 95% CI [10.0%, 20.7%]; biological: 13.7%, 95% CI [11.7%, 15.8%]), security (foster/adopted: 39.2%, 95% CI [31.2%, 46.0%]; biological: 54.9%, 95% CI [51.1%, 58.4%]), and ambivalence (foster/adopted: 9.5%, 95% CI [6.6%, 13.6%]; biological: 11.1%, 95% CI [9.8%, 12.5%]) did not statistically differ across foster/adopted samples and biological samples. Foster/adopted samples had marginally higher rates of disorganization (36.6%, 95% CI [28.1%, 46.2%]) than biological samples (20.3%, 95% CI [17.0%, 24.3%]; $Q = 2.69, p = .10$).

Family Sociodemographic Risk. There were no reliable differences between samples with sociodemographic risk and without sociodemographic risk for avoidance (risk: 16.2%, 95% CI [12.5%, 20.9%]; no risk: 13.2%, 95% CI [11.1%, 15.3%]), security (risk: 47.2%, 95% CI [40.1%, 53.5%]; no risk: 55.7%, 95% CI [51.6%, 59.1%]), ambivalence (risk: 8.6%, 95% CI [6.7%, 11.1%]; no risk: 11.8%, 95% CI [10.2%, 13.2%]), and disorganization (risk: 27.8%, 95% CI [21.1%, 36.0%]; no risk: 19.3%, 95% CI [16.1%, 23.3%]).

Methodological Factors

Coding System. There were no reliable differences between studies coded with Cassidy-Marvin or Main-Cassidy for avoidance (Cassidy-Marvin: 12.8%, 95% CI [10.8%, 15.0%]; Main-

Cassidy: 18.3%, 95% CI [13.2%, 24.4%]), security (Cassidy-Marvin: 55.2%, 95% CI [51.2%, 58.7%]; Main-Cassidy: 47.6%, 95% CI [39.0%, 55.7%]), ambivalence (Cassidy-Marvin: 11.1%, 95% CI [9.8%, 12.8%]; Main-Cassidy: 10.3%, 95% CI [7.4%, 13.7%]), and disorganization (Cassidy-Marvin: 20.9%, 95% CI [17.3%, 25.0%]; Main-Cassidy: 23.9%, 95% CI [16.3%, 33.6%]). It should be noted that confidence intervals for the Main-Cassidy studies were quite large.

Number of Separations/Reunions. No differences in the rates of avoidance (one: 15.6%, 95% CI [12.4%, 19.2%]; two: 12.9%, 95% CI [10.8%, 15.1%]), security (one: 51.3% [45.6%, 56.9%]; two: 54.9%, 95% CI [50.5%, 58.5%]), ambivalence (one: 11.3%, 95% CI [9.2%, 13.7%]; two: 10.8%, 95% CI [9.5%, 12.3%]), and disorganization (one: 21.8%, 95% CI [16.6%, 28.0%]; two: 21.4%, 95% CI [17.9%, 25.8%]) were identified for studies that did one vs. two separations/reunions.

Length of Separations. There were no differences between studies that used short (<5 mins) and long separations in avoidance (short: 13.5%, 95% CI [11.3%, 15.9%]; long: 15.3%, 95% CI [12.1%, 19.0%]), security (short: 54.6%, 95% CI [50.4%, 58.4%]; long: 50.7%, 95% CI [44.6%, 56.4%]), ambivalence (short: 10.8%, 95% CI [9.5%, 12.3%]; long: 11.0%, 95% CI [8.9%, 13.4%]), and disorganization (short: 21.2%, 95% CI [18.0%, 25.3%]; long: 23.0%, 95% CI [17.9%, 29.7%]).

Stranger in SSP-M. When there was a stranger in the SSP-M, the rates of avoidance were significantly higher (16.1%, 95% CI [13.7%, 18.6%]) than when there was no stranger (9.9%, 95% CI [7.7%, 12.5%]; $Q = 8.18, p < .001$). The rates of security were significantly lower when there was a stranger (51.1%, 95% CI [46.5%, 54.8%]) relative to when there was no stranger in the SSP-M (58.3%, 95% CI [52.2%, 63.8%]; $Q = 7.04, p = .01$). There were no

marked differences in the rates of ambivalence (stranger: 10.6%, 95% CI [9.2%, 12.1%]; no stranger: 12.0%, 95% CI [9.8%, 14.4%]) and disorganization (stranger: 22.3%, 95% CI [18.3%, 27.2%]; no stranger: 19.8%, 95% CI [14.9%, 25.8%]).

Regional Differences. Table 2 shows the distribution of attachment across regions.

-----Insert Table 2 about here-----

This table shows how the distribution of security, avoidance, ambivalence, and disorganization varies across regions represented in the meta-analysis. Additional information is available in Supplemental Table 3, which presents the results of the multinomial multilevel model comparing regional differences with North America as the reference category. The only evidence of a statistical difference was in rates of ambivalence between Asia and North America, with North America showing higher rates of ambivalence. This difference, however, is only based on two samples drawn from Japan that both did not classify any child as ambivalent. It should be noted that the vast majority of studies (89%) included in this meta-analysis drew from North American and European populations, and that other geographical locations were poorly represented to conduct this comparison.

Distribution of the Disorganized Subtypes in Cassidy-Marvin Studies

The Cassidy-Marvin coding system also provides information regarding subtypes of disorganized attachment, and the distribution of these subtypes has yet to be estimated. We estimated their distribution using the same technique as for the 4-way distribution across studies that (a) reported this information or (b) provided this information after a request for additional information to the authors. Studies varied in their coding of disorganized subtypes, notably some differentiated between behavioral disorganization (D) and insecure-other (IO) while others grouped these subtypes. Given that IO falls under D for purposes of reliability training and

according to preschool attachment training manuals (Cassidy & Marvin, 1992; Moss et al., 2015), IO and D were combined for this analysis, resulting in an estimation of the distribution of D/IO, controlling-caregiving, controlling-punitive, and controlling-general classifications. Of note, coders also varied as to whether they coded for controlling-general attachments, some opting for the best fitting controlling-caregiving or controlling-punitive category. Given that there was no way of ascertaining this without going back to the recordings of SSPs, we chose to report on controlling-general here.

Across 40 samples and 4,213 children (log likelihood = -843.74), the distribution of disorganized subtypes was: 63.8% D/IO (95% CI [54.2%, 69.7%]), 15.9% controlling-caregiving (95% CI 10.5%, 22.0%), 10.8% controlling-punitive (95% CI [7.4%, 16.1%]), and 9.5% controlling-general (95% CI [5.6%, 17.5%]). Contrary to theoretical expectations that controlling behaviors develop over the preschool years, the proportions of each of the subtype relative to D/IO remained consistent despite child age (controlling-caregiving contrast: $B = .002$, $SE = .02$, $p = .94$; controlling-punitive contrast: $B = .01$, $SE = .02$, $p = .55$; controlling-general: $B = -.02$, $SE = .03$, $p = .56$). Substantial variance was identified in the proportions across studies for all three contrasts (controlling-caregiving versus D/IO: = -1.71, $se = .284$; controlling-punitive versus D/IO = -2.07, $se = .278$; controlling-general versus D/IO = -2.91, $se = .489$).

Global Distribution of 4-way Attachment Classifications in Child-Father Dyads

The estimation of the global distribution of child-father attachment in the SSP-M involved 6 samples and 514 children (log likelihood = -562.16). The child-father distribution was estimated as 59.8% secure (95% CI [49.2%, 64.4%]), 14.1% avoidant (95% CI [6.3%, 26.8%]), 8.5% ambivalent (95% CI [4.2%, 21.6%]), and 17.6% disorganized/controlling (95% CI [11.9%,

23.2%]). Given that only six samples were included, we were not able to consider moderators affecting the distribution of child-father attachment.

Discussion

The SSP-M coding systems (i.e., Cassidy-Marvin and Main-Cassidy) are the most commonly used observational measures to assess children's attachment behaviors in the preschool years and early childhood. They have been instrumental in identifying the developmental sequelae of attachment insecurity beyond infancy. The current study synthesized the distribution of attachment classifications (secure, avoidant, ambivalent, and disorganized/controlling) in the SSP-M and conducted a series of moderator effects to determine when distributions may vary based on sample and study characteristics. This synthesis served four main goals: (a) establishing a baseline distribution for the preschool years and early childhood against which future studies can be compared; (b) comparing the similarities and differences in attachment processes between infancy and later developmental periods; (c) determining which risk settings may be the most challenging to attachment relationships during this period, thereby providing insights into the populations that may most benefit from interventions, and (d) identifying areas of growth for the study of preschool and early childhood attachment.

The Similarity Between the SSP and SSP-M Distributions

Through an analysis of 95 samples and 8,076 children, mostly drawn from North American and European populations, we identified the following global 4-way distribution of child-mother attachment in the SSP-M: 53.5% secure, 14.0% avoidant, 11.0% ambivalent, and 21.5% disorganized/controlling. Despite marked differences in the maturational capabilities of children seen in the SSP-M compared to the SSP, and some differences in procedure and coding,

the global distribution of the SSP-M is strikingly similar to that of the SSP (51.6% secure, 14.7% avoidant, 10.2% resistant, and 23.5% disorganized; Madigan et al., 2021). Two hypotheses, one theoretical and one methodological, may explain this similarity between systems. First, Ainsworth conceptualised the attachment component of human relationships as reflecting one single process – the operation of safe haven/secure base dynamics through the attachment behavioural system – and alterations to the output of that system as a result of the child’s experience. The similarity in distribution may suggest that these processes operate in similar ways at a species level. This would be in line with Main’s (1993) theoretical account of the basic nature of security and insecurity: that infants and children are disposed by the attachment system to want the availability of a familiar caregiver when alarmed, but that the child’s awareness and response to alarm will be shaped by their expectations about this availability, based on experience with the caregiver. For this reason, for Main, seeking the caregiver’s availability is the primary, most straightforward, and most frequent response to alarm, since insecurity represents a modification or disruption of this basic response.

Second, the development of the SSP-M was heavily based on the SSP, and the SSP was influential in describing the ways that attachment behaviors would mature into later developmental periods. The similarity in the distributions may be a result of the intertwined history of the instruments, which would in turn show a high level of congruence at the level of the instrument.

Significant Moderators of the SSP-M Distributions

The distribution of the SSP-M varied as a function of different moderators, each of which will be addressed below.

Temporal Trends. Changes in the distribution of the SSP-M over time were identified: the proportion of children classified as avoidant has decreased over time compared to the proportion of children classified as secure. There were no changes over time in the proportion of children classified as ambivalent or disorganized/controlling in the SSP-M. These findings mirror temporal trends of the SSP, where a decrease in avoidance is also observed (Madigan et al., 2021). Given that these trends are observed in infants and children despite different procedures and methodologies, it is likely that they reflect a broader change at a societal level, for example, changes over time in parenting practices (potentially due, in a small way, to dissemination efforts) or secular trends in parenting (i.e., how parenting changes as a function of the social environment). Although meta-analyses are well-positioned to provide insights into such societal changes, results pertaining to temporal trends are limited by the use of the year of *publication* as a proxy for the year of *data collection*. Given that some studies are published using data that was collected thirty years ago (e.g., the NICHD, recruitment in 1991), coding year of publication as a moderator could result in the loss of important nuances that could otherwise help identify when and where differences arise over time (see Deneault et al., 2022). More transparency in reporting can help mitigate this limitation and help identify sources of differences over time in the future.

Risk. When comparing at-risk samples (any indicator of global risk) to samples that did not present risks, results identified higher proportions of disorganized/controlling attachment in at-risk samples (27.2%) compared to samples with no risks (16.0%). Additionally, rates of security were lower in at-risk samples (47.9%) than samples without an indicator of risk (59.6%). Yet when we distinguished between types of risk, the different proportions were only significant in maltreated samples. Samples with child maltreatment had a much higher rate of

disorganized/controlling attachment (47.3%) than non-maltreated samples (19.2%). Conversely, rates of security were much lower in maltreated samples (25.0%) than those without maltreatment (55.7%). This result, which mirrors a similar finding for SSP studies (Madigan et al., 2021), indicates that children who experience maltreatment have difficulty trusting their caregiver as a safe haven. Instead, these children are more likely to experience the caregiver as a source of alarm (Main & Hesse, 1990). Although it is intuitive that maltreatment is an important risk factor in the formation of an attachment relationship, more research is needed to disentangle the multiplicity of maltreatment (Cyr et al., 2010). For instance, it is unknown whether, compared to maltreatment only in infancy, continued maltreatment in the preschool years may result in heightened risk for the attachment relationship. Additionally, little is known about the broader family environment, its interaction with maltreatment, and its potential causal role for children's expectations about their caregiver's availability as a safe haven. Children who experience maltreatment may also be exposed to domestic violence, putting further strain on their capacity to derive safety and comfort from their caregivers. Research on child attachment therefore would benefit from more specificity in the measurement and reporting of maltreatment, and greater attention to family systems.

Geographical Region. The moderator analysis did not, overall, find much evidence of variability in distributions based on geographical locations. This result supports the universality of children's propensity to form an attachment relationship to their caregiver across ethnocultural groups (Mesman et al., 2016). One difference was found in rates of ambivalence in Asia compared to North America, with North America showing higher rates of ambivalence. For the time being, it seems like this finding is an artifact of the samples available, which did not include *any* ambivalent children. Their representativeness of dyads from Japan is unclear, especially

given that there is evidence showing that children from Japan would be more likely to develop an ambivalent attachment due to the values and rewards of this culture (Rothbaum et al., 2000; Umemura et al., 2022).

Presence of a Stranger in the Procedure. One of the methodological variations that resulted in different attachment distributions was the presence of a stranger in the procedure. Specifically, children had higher rates of avoidance when there was a stranger involved in the procedure. This supports Marvin's initial understanding of strangers in relation to older children, namely that they may no longer be a natural cue to danger (Marvin, 1977). Children may be excited to play with the stranger and become focused on their play with them. As a result, they may experience less distress during the procedure, and their attachment system may not be activated. Specifically, when a preschooler witnesses their mother interacting with the stranger and accepting to leave them together, it may be sufficient for the preschooler to consider that the stranger is reliable and trustworthy. As a result, they may be less distressed by the procedure, and at the parent's return, do not seek comfort. This may seem like avoidance to a coder, but rather represent a child who is excited to continue playing with the stranger, thereby neglecting to greet or interact with the parent. A concrete test of this hypothesis in future research is needed to confirm this possibility, which would help shaping research protocols moving forward.

Non-Significant Moderators

Child Characteristics. In line with results in infancy (Madigan et al., 2021), we did not find any differences in attachment distributions across child age and sex in the SSP-M. This result further strengthens that attachment distributions in observational paradigms seem to be similar irrespective of child age across or within the infancy, preschool, and middle childhood periods (Madigan et al., 2021). It should be noted that some scholars have suggested that sex-

based differences in attachment emerge in middle childhood due to andocrine maturation that takes place between 5 and 8 years of age (Del Giudice & Belsky, 2010). The sample of studies reviewed in the current meta-analysis included children up to 8 years of age, suggesting that if sex-based differences do emerge, additional research must be conducted to examine these differences later in childhood or in early adolescence.

Race/Ethnicity. Consistent with findings from infancy (Madigan et al., 2021), we did not find that the percentage of the sample that identified as a minority moderated attachment rates. There was, however, a lack of diversity in samples concerning race and ethnicity (average of 24% of participants that identified as a minority). Given this low number, we analyzed race/ethnicity as a global percentage of minority; we do know, however, that the experience of marginalized groups is unique. Grouping across different marginalized groups may hinder our capacity to detect meaningful differences, and to provide interventions to groups that need them the most. As mentioned above, it is imperative to study more diverse families and to explicitly measure familial background to understand its impact on child development.

Specific Indicators of Risk. With the exception of maltreatment, other specific forms of risks were not significant moderators of attachment distributions in the SSP-M. Consistent with a meta-analysis of SSP studies, medical risk was not a significant moderator. This suggests that parents are likely able to be sensitive, even with a child facing additional medical needs. A similar interpretation may be applied to child psychopathology, where there is also no difference in distribution. It is critical to note that our sample sizes for testing these moderators were smaller compared to the SSP meta-analysis, which could have influenced the patterning of findings.

Interestingly, the distribution did not differ when comparing biological children to children who were adopted or fostered. This finding stands in contrast to results from the SSP studies, where rates of disorganization were higher in adopted or fostered children, and where again, there was more power for testing moderators (Madigan et al., 2021). Although the studies did not present sufficient information to test this hypothesis, it is possible that, by the preschool years and early childhood, children who were adopted at a young age have had more opportunities to experience sensitive caregiving and build a relationship of trust with a caregiver. In infancy, comparatively, children had less time to develop such relationships.

Another discrepant finding between the SSP studies (Madigan et al., 2021) and the current set of SSP-M studies relates to sociodemographic risk. In SSP studies, avoidant and disorganized attachments were more prevalent in samples that faced socio-demographic risk. Analogous findings were not identified in the SSP-M. It is possible that there were simply too few studies of families that experience this specific type of risk in the SSP-M, or that an accumulation of risks may be needed to see an effect on attachment distribution (Cyr et al., 2010). More diverse research is needed to understand the ways that sociodemographic risks become embedded at different levels of the family, including child-caregiver relationships.

Methodological Variations. Other than the significant difference based on the inclusion of the stranger, other methodological variations did not produce differences in attachment distributions. Specifically, there were no differences based on the length of the SSP-M procedure, the coding system, the number of separations and reunions, or the length of separations and reunions. It should be noted, however, that some variations may have been less frequent in the sample of studies, resulting in lower statistical power to detect differences.

Similar distributions cannot substitute predictive validity, and so it would be premature to conclude that such variations are unimportant.

Distribution of Disorganized Subtypes

Across studies that reported or provided the data for the breakdown of disorganized subtypes (40 samples; 4,213 children), the disorganized subtype distribution was: 63.8% of children were classified as D/IO, 15.9% controlling-caregiving, 10.8% controlling-punitive, and 9.5% controlling-general. This result was distinctly surprising given that the current literature expects that the majority of disorganized infants will be classified as controlling in the preschool years (Moss et al., 2005), although very few studies have actually documented the transition from infant disorganization to preschool controlling behaviors. It might be assumed that the discrepancy between this expectation and our findings stems from children developing controlling behaviors over the course of the preschool years, given that more sophisticated skills are required to enact controlling behaviors (Moss et al., 2011). The analysis of child age as a moderator did not, however, support this hypothesis, as proportions remained stable over time. This finding prompts the need for more research delving into the developmental processes that lead a child to form a controlling attachment. Longitudinal research extending into middle childhood would be particularly beneficial to understand the onset and progression of controlling behaviors.

Child-Father Attachment

In many families, fathers are attachment figures to their children just like mothers, however, the vast majority of research on child-caregiver attachment in the SSP-M (94%) only includes child-mother dyads. Across those six samples and 514 child-father dyads, the 4-way attachment distribution was: 59.8% secure, 14.1% avoidant, 8.5% ambivalent, and 17.6%

disorganized. The small number of participants ($k = 6$; $N = 514$), along with the homogeneity across father samples, precluded comparison of the distribution with child-mother dyads, and the comparison of potential moderators. Indeed, the six samples were drawn from a North American population (5 from the USA, 1 from Canada) from an exclusively mid-high socioeconomic background (except one that included mixed SES). Participants across the samples were also primarily White (on average, 85% White). Although the estimate may be helpful for ascertaining an initial estimate of the attachment distribution in child-father dyads, additional work is needed to derive more precise estimates. Thus, it is critical to evaluate these estimates within the boundaries of their limited generalizability.

This lack of inclusion of fathers in attachment research is especially problematic given that there is now sufficient research (including meta-analyses) to show that child-father attachment security has similar benefits as child-mother attachment for children's positive adaptation as child-mother attachment (Dagan et al., 2021; Deneault et al., 2021). In the preschool years specifically, evidence from a low-risk Canadian sample of fathers shows that child-father attachment insecurity is even more predictive of child externalizing behaviors than child-mother attachment security (Bureau et al., 2017).

Additionally, most of the research thus far on fathers (whether in the preschool years/early childhood or in infancy) has relied on a secure versus insecure dichotomy, mostly due to the limited sample sizes. Very few studies have compared the precursors and sequelae of insecure classifications in child-father dyads, particularly for disorganized/controlling attachments. In a notable exception, Deneault et al. (2020) showed that lower paternal sensitivity was associated with higher levels of controlling-caregiving and controlling-punitive, but not behavioral disorganization. Behavioral disorganization was associated with higher concurrent

externalizing problems, but not with externalizing problems measured five years later (Deneault et al., 2022). From these limited results, it is possible that different development trajectories may be observed across disorganized/controlling attachments, as is the case for child-mother dyads (see O'Connor et al., 2011). More research on fathers, in general, is needed to answer this question and to derive a more comprehensive view of the correlates of child-father attachment. Beyond studying fathers in general, efforts should be made to include fathers from diverse social, cultural, and economic backgrounds, as well as fathers in “non-traditional” family configurations (e.g., single fathers, fathers raising children with another father), and to explicitly measure these variables.

Lack of Global Estimates

Although this meta-analytic study endeavored to derive global estimates for the distribution of the SSP-M across the available literature, it is critical to note that the estimates were narrow in their global scope. When considering the regions covered in this meta-analysis, data were synthesized from 12 countries worldwide, including data from Africa, Asia, Australia/New Zealand, Europe, and North America. The vast majority of studies (89%) were, however, conducted in North America and Europe. This means that, globally, little is known about attachment in the preschool years and early childhood across different cultures and geographical regions.

In addition to the critical need to conduct attachment research that better represents different countries and cultures, it is imperative for future studies to be more representative of the diversity of parenting, including fathers and same-sex parents and families. It is also important to expand who is studied and in which context. For example, a recent study on attachment networks notably showed the importance of studying grandmothers as caregivers in some cultural contexts

(Liang et al., 2021). Additionally, parents come from different socioeconomic, ethnocultural, risk backgrounds, and familial configurations, all of which need to be studied and explicitly measured in order to move beyond a WEIRD developmental science.

Limitations

This study has several limitations. First, meta-analyses are dependent on the quality of reporting in individual studies, and authors' willingness to share data that was not presented in relevant articles. In cases when the distribution was not reported and the authors did not provide the data upon our request, the study could not be included in our meta-analysis. Similarly, when authors did not sufficiently report methodological and sample characteristics, this limited our ability to test moderators. One area particularly affected was the testing of methodological moderators, such as the training and reliability of coders. Many studies failed to report this information, or only reported the 2-way reliability while using the 4-way or 6-way classifications for their analyses. More transparency in reporting in attachment studies is a necessary step to achieving more complete moderator testing in meta-analyses.

A second limitation is that our synthesis combined data from two coding systems that were developed for different age groups, despite being commonly used for both age groups. Our moderator analysis deemed that the distribution was not statistically different across the Main-Cassidy and Cassidy-Marvin systems. This, however, does not preclude the possibility that moderators differed for both systems. Given the small number of Main-Cassidy studies and their relative homogeneity, we were unable to test moderators separately for each system. An individual participant data meta-analysis would be helpful in disentangling the effects of age and coding systems, as well as examining the moderators for each system. Additionally, the current synthesis only included a limited number of measures that assessed attachment in the preschool

years and early childhood. Consistent with a meta-analysis of SSP studies, other observational measures that rely on continuous assessments of attachment (e.g., Attachment Q-Set: Waters & Deane, 1985; Cummings' felt security scale: Cummings, 1990; Preschool Attachment Rating Scales: Moss et al., 2015) were not included as they cannot be readily compared to categorically distributed attachment. Additionally, the Preschool Assessment of Attachment (Crittenden, 1992) was not included as its classifications were not directly comparable to those of the SSP-M and was created from a different research tradition (Solomon & George, 2016).

As previously noted, the present sample was quite limited in terms of diversity. Studies were primarily mother-child dyads (94%) and conducted mostly with White dyads from Europe and North America. Moreover, most participants were drawn from low-risk, high SES populations. These samples do not represent the majority of children and their environments. The make-up of the studies should be considered when considering the generalizability of the findings.

Lastly, some samples facing different types of risks were analyzed together due to the small number of samples. For instance, single parents and adolescent parents were all part of a larger sociodemographic risk category. These parents likely face very different types of circumstances, which may affect attachment relationships differently. As more samples become available, it will be informative to further distinguish forms of risks.

Conclusion

This meta-analysis provided the first estimate of the global distribution of attachment in the SSP-M. It included 97 samples from studies conducted over the last 33 years in 12 different countries (though mostly from North America and Europe), with a total of 8,186 child-parent dyads. It is, to date, the most comprehensive review of attachment in the preschool years and

early childhood, allowing for a better view of the breadth and depth of SSP-M research. The analysis of moderators revealed differences in the prevalence of attachment over time and between regions. Additionally, samples of children who experience risk, specifically maltreatment, present lower security rates and higher disorganization rates. Other moderators (e.g., child age and sex) were not significant. Most of these findings were remarkably consistent with a similar review of 287 studies and ~20,000 parent-infant dyads examined in the SSP (Madigan et al., 2021). Lastly, methodological variations generally had little effect on the distribution of attachment, with the exception of a stranger's presence in the procedure. These results provide key insights into attachment beyond infancy and factors that may influence attachment in the preschool years and early childhood.

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Figure 1
Prisma Flowchart of Study Selection

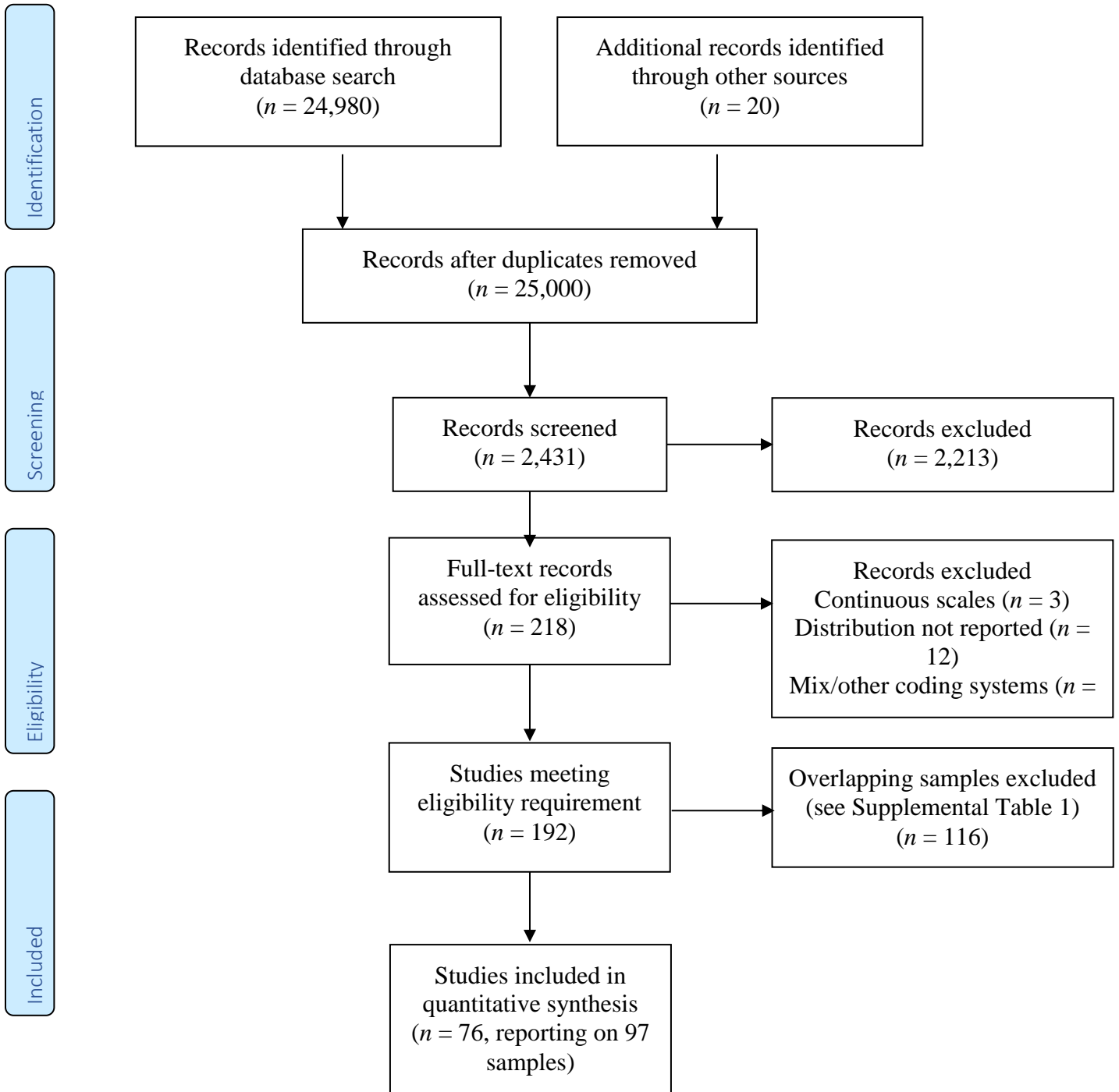


Table 1

Global distribution of attachment for child-mother and child-father dyads and distribution of child-mother attachment per levels of moderators

Distribution of child-mother attachment across indicators of risks								
	B	A	C	D/Cont	B	A	C	D/Cont
Indicators of risk	Presence of risk				Absence of risk			
Global risk	47.9% [43.3, 52.3]	14.3% [11.9, 17.0]	10.6% [9.0, 12.4]	27.2% [22.7, 32.1]	59.6% [54.6, 63.1]	13.1% [10.8, 15.7]	11.4% [9.5, 13.3]	16.0% [13.1, 20.0]
Child maltreatment	25.0% [15.7, 37.3]	21.2% [12.0, 33.7]	6.6% [3.4, 11.9]	47.3% [32.1, 62.1]	55.7% [52.4, 58.6]	13.8% [11.8, 15.7]	11.3% [10.1, 12.7]	19.2% [16.4, 22.5]
Child medical risk	59.5% [49.2, 68.6]	9.2% [5.1, 14.5]	11.6% [7.6, 16.6]	19.7% [12.3, 31.0]	53.0% [49.5, 56.3]	14.4% [12.3, 16.5]	11.0% [9.7, 12.5]	21.6% [18.3, 25.4]
Child psychopathology	41.2% [30.3, 51.6]	12.7% [7.7, 19.6]	12.2% [7.9, 18.6]	33.9% [22.4, 47.9]	54.4% [50.3, 57.7]	14.0% [11.9, 16.2]	10.9% [9.7, 12.2]	20.7% [17.3, 24.6]
Foster/Adopted	39.2% [31.2, 46.0]	14.7% [10.0, 20.7]	9.5% [6.6, 13.6]	36.6% [28.1, 46.2]	54.9% [51.1, 58.4]	13.7% [11.7, 15.8]	11.1% [9.8, 12.5]	20.3% [17.0, 24.3]
Sociodemographic risk	47.2% [40.1, 53.5]	16.2% [12.5, 20.9]	8.6% [6.7, 11.1]	27.8% [21.1, 36.0]	55.7% [51.6, 59.1]	13.2% [11.1, 15.3]	11.8% [10.2, 13.2]	19.3% [16.1, 23.3]
Distribution of child-mother attachment across methodological moderators								
	B	A	C	D/Cont	B	A	C	D/Cont
Coding system	Cassidy-Marvin				Main-Cassidy			
	55.2% [51.2, 58.7]	12.8% [10.8, 15.0]	11.1% [9.8, 12.8]	20.9% [17.3, 25.0]	47.6% [39.0, 55.7]	18.3% [13.2, 24.4]	10.3% [7.4, 13.7]	23.9% [16.3, 33.6]
Number of separations	One				Two			
	51.3% [45.6, 56.9]	15.6% [12.4, 19.2]	11.3% [9.2, 13.7]	21.8% [16.6, 28.0]	54.9% [50.5, 58.5]	12.9% [10.8, 15.1]	10.8% [9.5, 12.3]	21.4% [17.9, 25.8]
Length of separations	Short				Long			
	54.6% [50.4, 58.4]	13.5% [11.3, 15.9]	10.8% [9.5, 12.3]	21.2% [18.0, 25.3]	50.7% [44.6, 56.4]	15.3% [12.1, 19.0]	11.0% [8.9, 13.4]	23.0% [17.9, 29.7]
Stranger in SSP-M	Stranger				No stranger			
	51.1% [46.5, 54.8]	16.1% [13.7, 18.6]	10.6% [9.2, 12.1]	22.3% [18.3, 27.2]	58.3% [52.2, 63.8]	9.9% [7.7, 12.5]	12.0% [9.8, 14.4]	19.8% [14.9, 25.8]

Note. Distributions are reported in %, followed by 95% CI. B = Secure, A = Avoidant, C = Ambivalent, D/Cont = Disorganized/Controlling.

Table 2

Region	B	A	C	D/Cont
Africa (South Africa, $k = 2$)	39.4 [13.7, 62.9]	25.3 [8.3, 48.3]	9.0 [2.8, 21.8]	26.4 [6.8, 64.0]
Asia (Japan, $k = 2$)	60.9 [31.5, 83.4]	6.7 [1.5, 21.8]	0.0 [0.0, 0.0]	32.4 [10.2, 61.2]
Australia ($k = 2$)	59.3 [45.5, 70.9]	17.0 [9.0, 26.8]	9.3 [5.6, 14.2]	14.4 [6.8, 28.2]
Europe ($k = 22$)	49.5 [41.5, 57.0]	17.2 [12.7, 22.5]	11.6 [9.0, 14.7]	21.7 [15.0, 30.7]
Middle East (Israel, $k = 1$)	39.0 [11.9, 65.5]	12.5 [2.5, 37.2]	14.5 [4.1, 33.9]	34.1 [8.2, 70.6]
North America ($k = 37$)	54.6 [50.3, 58.7]	12.8 [10.6, 15.1]	11.2 [9.8, 12.7]	21.4 [17.5, 25.8]

Note. Distributions are reported in %, followed by 95% CI. B = Secure, A = Avoidant, C = Ambivalent, D/Cont

= Disorganized/Controlling. The estimates for regions other than Europe and North America are based on a handful of studies, and should be interpreted with caution.