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Zeegers, M.A.J.; Colonnesi, C.; Stams, G.-J.J.M.; Meins, E.

**DOI**

[10.1037/bul0000114](https://doi.org/10.1037/bul0000114)

[10.1037/bul0000114.supp](https://doi.org/10.1037/bul0000114.supp)

**Publication date**

2017

**Document Version**

Final published version

**Published in**

Psychological Bulletin

**License**

Article 25fa Dutch Copyright Act

[Link to publication](#)

**Citation for published version (APA):**

Zeegers, M. A. J., Colonnesi, C., Stams, G.-J.J.M., & Meins, E. (2017). Mind Matters: A Meta-Analysis on Parental Mentalization and Sensitivity as Predictors of Infant-Parent Attachment. *Psychological Bulletin*, 143(12), 1245-1272. <https://doi.org/10.1037/bul0000114>, <https://doi.org/10.1037/bul0000114.supp>

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# Mind Matters: A Meta-Analysis on Parental Mentalization and Sensitivity as Predictors of Infant–Parent Attachment

Moniek A. J. Zeegers, Cristina Colonnesi,  
and Geert-Jan J. M. Stams  
University of Amsterdam

Elizabeth Meins  
University of York

Major developments in attachment research over the past 2 decades have introduced parental mentalization as a predictor of infant–parent attachment security. Parental mentalization is the degree to which parents show frequent, coherent, or appropriate appreciation of their infants' internal states. The present study examined the triangular relations between parental mentalization, parental sensitivity, and attachment security. A total of 20 effect sizes ( $N = 974$ ) on the relation between parental mentalization and attachment, 82 effect sizes ( $N = 6,664$ ) on the relation between sensitivity and attachment, and 24 effect sizes ( $N = 2,029$ ) on the relation between mentalization and sensitivity were subjected to multilevel meta-analyses. The results showed a pooled correlation of  $r = .30$  between parental mentalization and infant attachment security, and  $r$ s of  $.25$  for the correlations between sensitivity and attachment security, and between parental mentalization and sensitivity. A meta-analytic structural equation model was performed to examine the combined effects of mentalization and sensitivity as predictors of infant attachment. Together, the predictors explained 12% of the variance in attachment security. After controlling for the effect of sensitivity, the relation between parental mentalization and attachment remained,  $r = .24$ ; the relation between sensitivity and attachment remained after controlling for parental mentalization,  $r = .19$ . Sensitivity also mediated the relation between parental mentalization and attachment security,  $r = .07$ , suggesting that mentalization exerts both direct and indirect influences on attachment security. The results imply that parental mentalization should be incorporated into existing models that map the predictors of infant–parent attachment.

### Public Significance Statement

This study pooled findings from previous research to investigate which aspects of early parenting predict the quality of parent–child relationships. Parents' ability to "tune in" to their babies' thoughts and feelings predicted the most optimal relationships, over and above parents' sensitivity when interacting with their babies. These findings highlight the role of parents' attunement to their young children's mental states in shaping the parent–child relationship.

**Keywords:** parental mentalization, infant attachment security, parental sensitivity, three-level meta-analysis, meta-analytic structural equation modeling

**Supplemental materials:** <http://dx.doi.org/10.1037/bul0000114.supp>

Attachment (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969/1982, 1973, 1980) and theory of mind or mentalizing abilities (Premack & Woodruff, 1978; Wimmer & Perner, 1983) are

both hugely influential constructs for understanding individual differences in development across the life span. Theoretical and empirical research over the past two decades has united these constructs by considering whether individual differences in parents' mentalizing abilities can help explain the origins of different patterns of infant–parent attachment.

All typically developing adults have the capacity to understand how people's behavior is governed by their internal states and can imagine what others may be thinking or feeling. However, there are individual differences in the extent to which adults use these underlying mentalizing abilities when representing others and making sense of their behavior. Some adults spontaneously characterize significant others in terms of their thoughts, feelings, intentions, and motivations, whereas others focus instead on physical appearance or behavioral tendencies (Meins, Fernyhough, &

This article was published Online First August 14, 2017.

Moniek A. J. Zeegers, Cristina Colonnesi, and Geert-Jan J. M. Stams, Research Institute of Child Development and Education, University of Amsterdam; Elizabeth Meins, Department of Psychology, University of York.

We thank our colleagues Mark Assink and Suzanne Jak from the Research Institute of Child Development and Education who provided insights and expertise that greatly assisted this research.

Correspondence concerning this article should be addressed to Moniek A. J. Zeegers, Research Institute of Child Development and Education, Postbus 15780, 1001 NG Amsterdam, the Netherlands. E-mail: [m.a.j.zeegers@uva.nl](mailto:m.a.j.zeegers@uva.nl)

Harris-Waller, 2014). Research by Keysar and colleagues has shown that adults' tendency to understand others' mental states is a relatively effortful process that is by no means automatic (Epley, Keysar, van Boven, & Gilovich, 2004; Keysar, Lin, & Barr, 2003; Lin, Keysar, & Epley, 2010). These studies thus suggest that there is a competence–performance gap between having the capacity to understand others' internal states and using this capacity within social relationships and interactions (Apperly, 2012; Meins, Fernyhough, Johnson, & Lidstone, 2006).

Mentalizing abilities were first discussed in relation to attachment when it was observed that adults who demonstrated coherent and autonomous representations of attachment relationships during the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1985) were inclined to explain their own and their caregivers' behaviors in terms of intentions and motives (Fonagy, Steele, Moran, Steele, & Higgitt, 1991). Adults with either dismissive, preoccupied, or unresolved AAI classifications on the other hand showed less understanding of their own and others' intentionality when describing their childhood experiences (Fonagy et al., 1991). The well-established link between parental AAI classification and infant–parent attachment (van IJzendoorn, 1995; Verhage et al., 2016) thus led to questions about whether mentalizing abilities play a role in predicting infant–parent attachment or explaining the intergenerational transmission of attachment (e.g., Meins, 1997; Oppenheim & Koren-Karie, 2002; Slade, Grienenberger, Bernbach, Levy, & Locker, 2005).

The aspect of mentalizing abilities that has received attention in relation to infant–parent attachment is *parental mentalization* (Sharp & Fonagy, 2008)—the parent's ability to represent and hold in mind the internal states of their child. Parents' tendency to consider the child's internal states is proposed to be important in predicting secure infant–parent attachment (Fonagy et al., 2016; Meins, 1999, 2013; Meins, Fernyhough, Fradley, & Tuckey, 2001; Meins et al., 2012; Slade et al., 2005). The parent's ability to consider the thoughts and feelings of the infant is proposed to foster a secure attachment relationship because it indicates to the child that his or her affective states are recognized, and can be mirrored or contained by the parent (Fonagy & Target, 1997). The aim of the present study was to perform the first meta-analysis to investigate the role of parental mentalization in predicting infant–parent attachment security.

### Defining Parental Mentalization

The “mentalizing parent” is inclined to interpret their child's behavior in terms of envisioned mental states, such as emotions, thoughts, desires, and intentions. Low parental mentalization can be characterized in two different ways: (a) a lack of awareness or disregard of the mental world of the infant (Fonagy et al., 2016; Slade, 2005); or (b) inaccuracy in interpreting the infant's internal states (Meins et al., 2001, 2012). Mentalization thus concerns the degree to which parents show frequent, coherent, or appropriate mentalizing in relation to their infant (e.g., Koren-Karie, Oppenheim, Dolev, Sher, & Etzion-Carasso, 2002; Meins et al., 2001, 2012; Sharp & Fonagy, 2008; Slade et al., 2005).

Approaches to assess parental mentalization typically focus on an analysis of the frequency and content of mind-related speech during an interview or parent–infant interaction (Meins et al., 2001, 2012; Oppenheim & Koren-Karie, 2002; Slade et al., 2005).

Interview assessments involve asking parents to describe their relationship with their child (Koren-Karie et al., 2002; Slade et al., 2005) or the child themselves (Meins, Fernyhough, Russell, & Clark-Carter, 1998). Mentalizing parents frequently and coherently attribute internal states to the child during the interview. The observational assessment of parental mentalization focuses on the extent to which parents appropriately attribute internal states to their infants while interacting with them (Meins et al., 2001, 2012).

Although these approaches assess parental mentalization under varying conditions and yield different measurements, they all characterize mentalization in terms of explicit verbal expressions, indexing processes that are accessible to awareness, introspection, and flexible control (Slade, 2005; Van Overwalle & Vanderkerckhove, 2013). However, mentalization can also refer to processes that are implicit and inaccessible to awareness and flexible control (e.g., Shai & Belsky, 2011a; Van Overwalle & Vanderkerckhove, 2013). For instance, when a mother interacts with her infant, she may not talk about what is going on in her infant's mind, but still show behaviors indicative of mentalization (e.g., turn-taking, mirroring facial expressions). Both explicit and implicit mentalization can therefore be expected to predict infant–parent attachment security. Research on implicit parental mentalization (also referred to as *parental embodied mentalization*; Shai & Belsky, 2016) is, however, in its infancy, and empirical studies on parental embodied mentalization in relation to infant attachment security are yet to be published. On the other hand, research on explicit forms of mentalization has expanded over the past two decades, leading to the development of three concepts that index parental mentalization—*parental mind-mindedness* (Meins, 1997), *parental insightfulness* (Oppenheim & Koren-Karie, 2002), and *parental reflective functioning* (Slade et al., 2005)—all of which have been investigated as a predictor of infant attachment security.

### Parental Mind-Mindedness

The first concept developed to assess parental mentalization is parental mind-mindedness (Meins, 1997). Mind-mindedness, originally defined as caregivers' tendency to treat their children as individuals with minds of their own, is operationalized in different ways depending on the age of the child. From the preschool years onward, mind-mindedness is assessed in terms of the extent to which the parent talks about mental and emotional characteristics when given an open-ended invitation to describe the child (Meins et al., 1998). In infancy, mind-mindedness is assessed in terms of parents' appropriate versus nonattuned comments on their infant's internal states during parent–infant interaction. Longitudinal studies have shown that the observational and describe-your-child measures of mind-mindedness are positively related (McMahon, Camberis, Berry, & Gibson, 2016; Meins et al., 2003).

The infant observational assessment of mind-mindedness grew from a rethinking of Ainsworth, Bell, and Stayton's (1971, 1974) construct of parental sensitivity (Meins, 2013; Meins et al., 2001). Meins et al. (2001) argued that there was a lack of consensus on the type of parenting behaviors and attitudes that encapsulate sensitivity. Furthermore, they questioned whether general global rating scales typically used to measure sensitivity (e.g., the Maternal Sensitivity Scales; Ainsworth et al., 1974) were the most accurate method of assessing a parent's attunement to their infant's current state. Meins et al. (2001) thus sought to explore additional

ways in which mothers could demonstrate attunement to their preverbal infants' internal states, and identified five potential indices of mind-mindedness: maternal responsiveness to change in the infant's direction of gaze, maternal responsiveness to the infant's object-directed action, imitation, encouragement of autonomy, and appropriate mind-related comments. The latter was the only index of mind-mindedness that predicted children's outcome or related to mothers' subsequent mind-mindedness in the preschool years (Meins et al., 2001, 2003), and thus mind-mindedness has become defined specifically in terms of parents' mind-related comments.

Appropriate mind-related comments index the parent's accurate interpretation of the infant's internal state according to the following criteria: the comment (a) accurately reflects the current infant's internal state (e.g., "You are very interested in mommy's watch" if the infant repeatedly looks at and touches the watch); (b) links the infant's current internal state with similar events in the past or future (e.g., "Do you remember seeing a cow when we went to the farm last weekend?" while the infant plays with a toy cow); (c) suggests new activities that the infant would like or want if there was a lull in the interaction; or (d) voices what the infant would say if he or she could talk. Nonattuned mind-related comments indicate a misreading of the infant's internal state; a mind-related comment is coded as nonattuned if (a) the coder disagrees with the mother's reading of her infant's mind (e.g., "You're bored with mommy's watch now" even though the infant is still engaged with it); (b) the comment referred to a past or future event that had no obvious relation to the infant's current internal state (e.g., asking if the infant remembers the cow at the farm in the absence of any current context relating to animals or farms); (c) the mother asked what the infant wanted to do, or commented that the infant wanted or preferred a different object or activity, when the infant was already actively engaged in an activity or was showing a clear preference for a particular object; or (d) the referent of the mother's comment was not clear (e.g., "You like that" when there was no specific toy or activity to which the comment could apply). High scores for appropriate mind-related comments indicate mind-mindedness, as do low scores for nonattuned mind-related comments.

Appropriate and nonattuned mind-related comments are thought to be two distinct dimensions of parents' mind-mindedness and are used as separate predictors of children's development (Meins, 2013; Meins et al., 2012). Appropriate mind-related comments are positively correlated with parental sensitivity, and appear to encompass traditional conceptions of sensitive responsivity (Arnott & Meins, 2007; Demers, Bernier, Tarabulsky, & Provost, 2010a; Meins et al., 2001, 2012), whereas nonattuned comments are unrelated to sensitivity (Arnott & Meins, 2007; Licata et al., 2014; Meins et al., 2002, 2012). Nonattuned mind-related comments index the parent's lack of awareness of the infant's mental perspective or the imposition of the parent's own feelings or agenda on the child (Meins, Bureau, & Fernyhough, 2017). Although both of these types of mind-related comments involve the parent imputing internal states to the infant, they have been found to be unrelated, with correlations between appropriate and nonattuned mind-related comments being almost zero (Meins et al., 2002, 2012). Mind-mindedness has thus been argued to be a multidimensional construct, unlike constructs such as sensitivity, which represent behavior on a single continuum spanning extreme insensi-

tivity to extreme sensitivity (Licata et al., 2014; Meins, 2013; Meins et al., 2001, 2012).

### Parental Insightfulness

Parental insightfulness, like the infant observational measure of mind-mindedness, evolved from Ainsworth et al.'s (1971, 1974) construct of sensitivity, and focuses on the internal processes underlying sensitive behavior (Koren-Karie et al., 2002; Oppenheim, Goldsmith, & Koren-Karie, 2004; Oppenheim & Koren-Karie, 2002; Oppenheim, Koren-Karie, & Sagi, 2001). The insightfulness assessment aimed to develop a "systematic, direct way to assess the capacity to 'see things from the child's point of view' and the thought processes that can impede or derail this capacity" (Oppenheim & Koren-Karie, 2013, p. 551). The insightfulness assessment is also rooted in research on the AAI, as it focuses on the organization of maternal thought and speech, and is thought to reflect how parents' representations of their own attachment experiences are applied in order to appreciate the child's behavior at a specific moment (Oppenheim & Koren-Karie, 2013). The main characteristic of the insightful parent is his or her tendency to invoke the motives underlying the child's behavior (i.e., the parent takes a mentalizing stance). Oppenheim and Koren-Karie (2002) further discussed how this tendency involves parental acceptance of the mental states of the child, an open-to-change attitude toward the child's behaviors and mind, and a multidimensional and balanced view about positive and negative features of the child (Oppenheim & Koren-Karie, 2013).

The insightfulness assessment involves two steps. First, parent and child are recorded during three interactional situations, representing different elements of the parent-child relationship (e.g., play, teaching, caregiving). Subsequently, the parent is asked to watch the first 2 min of each of the video segments, describe what their child was experiencing (thinking, feeling) in the segment, and explain from which part of the video they derived these perceptions. Parents are also asked how they felt about the child's behaviors, to list their child's main characteristics, and to describe what best defines their relationship with their child. The interviews are transcribed verbatim and coded following a classification strategy similar to that of the AAI and the Internal Working Model of the Child Interview (Benoit, Zeanah, Parker, Nicholson, & Coolbear, 1997). The development of this coding system involved the reviewing of 20 transcripts of mothers whose children had been classified as secure or insecure (resistant or disorganized) as infants (Oppenheim et al., 2001). The transcripts were searched for maternal characteristics that were common to mothers of children with the same attachment classification, and that discriminated between mothers of children with different attachment classifications. Ultimately these characteristics were integrated into a coding system in which transcripts are rated on 10 scales (see Oppenheim & Koren-Karie, 2002, p. 598, for an overview of these scales) and classified into one of four parent types: (a) the positively insightful parent conveys acceptance of the child's mental states, reflecting on the mind of the child in a coherent way; (b) the one-sided parent appears not to be open to a change in their perception of the child's mental states, or overemphasizes negative or positive qualities of the child; (c) the disengaged parent shows a lack of emotional involvement and a tendency to describe only the behaviors of the child, avoiding talking about the child's mental states; and (d) the



mixed parent shows no clear patterns in speech as defined in the above categories; rather, the mixed parent responds differently to each video segment or the questions about the child's characteristics, and the observer cannot judge which of the styles is dominant.

Although the insightfulness assessment grew out of research involving parents with infants, the assessment can be used with parents of children up to 18 years (Oppenheim & Koren-Karie, 2013). In families with typically developing children and families with children with autism, positively insightful mothers have been shown to have higher levels of sensitive and synchronous behaviors during mother-child interacting compared with mothers classified as disengaged or one-sided (e.g., Hutman, Siller, & Sigman, 2009; Koren-Karie et al., 2002). These findings support the notion that the capacity to be insightful underlies sensitive caregiving behavior (Koren-Karie et al., 2002).

### Parental Reflective Functioning

The concept of parental reflective functioning grew out of research on adult reflective functioning, which refers to adults' ability to reflect upon their own and their caregivers' mental states during the AAI (Slade et al., 2005). Parental reflective functioning assesses the parent's ability to apply reflective functioning when talking about their child and the parent-child relationship, and thus provides "a more direct look at the phenomena proposed to underlie the intergenerational transmission of attachment than inferring this from adults' descriptions of their relationship with their own parents" (Slade, 2005, p. 275). Although parental reflective functioning was not explicitly developed with the intention of rethinking the concept of sensitivity, parents' tendency to represent their children's mental states was considered to be at the heart of sensitive caregiving (Slade, 2005).

While parental reflective functioning is usually assessed using the Parent Development Interview (PDI; Aber, Slade, Berger, Bresgi, & Kaplan, 1985; Slade et al., 2005) during infancy and toddlerhood, it is also possible to use this procedure to assess parental reflective functioning in later childhood and adolescence (e.g., Benbassat & Priel, 2012). The PDI is a 45-item semistructured clinical interview, which was originally constructed to elicit descriptions of current parenting experiences and parents' representations of the relationship with their child. In the interview parents are asked to describe and elaborate on a recent situation in which the child misbehaved and a situation in which parents "were really clicking" with their child. Parents are furthermore asked to elaborate on their parenting strengths and weaknesses, feelings they encounter as a parent, and internal states relating to separations from the child.

Interview answers are transcribed verbatim and analyzed using the addendum to the Reflective Functioning Scoring Manual (Slade, Bernbach, Grienerberger, Levy, & Locker, 2004). The addendum was developed for use with the PDI and relates closely to the reflective function coding manual developed by Fonagy and colleagues for use with the AAI (Fonagy, Target, Steele, & Steele, 1998). After reading the transcripts, answers on 21 interview questions are scored on an 11-point scale ranging from -1 (*negative reflective functioning*) to 9 (*full or exceptional reflective functioning*) on four categories: (a) awareness of the nature of mental states, (b) the explicit effort to find out mental states

underlying behavior, (c) recognizing developmental aspects of mental states, and (d) mental states in relation to the interviewer (Slade et al., 2005). Scores of 5 and above are typically assumed to indicate clear support of parental mentalizing capacities. Ratings under 5 are interpreted as either negative, absent, or not fully developed mentalizing abilities. In addition to the individual scores on the separate questions, a total score is ascribed to each interview as a whole. The total score refers to a general pattern of reflective functioning that is derived from the range of mentalizing abilities displayed across the different categories. Parents score high when they have demonstrated the capacity to reflect on their own mental states, those of their child, and "the complex interactions between mental states and behavior that occur within the context of the continually developing parent-infant relationship" (Slade et al., 2005, p. 289).

A more recently developed instrument aiming to measure parental reflective functioning is the Parental Reflective Functioning Questionnaire (PRFQ; Fonagy et al., 2016). The PRFQ intends to assess mentalization in parents of children below age 3, a period during which children's verbal communication skills are not fully developed. It is an 18-item questionnaire consisting of questions on three scales: (a) prementalizing modes, capturing a possible lack of mentalizing modes (e.g., "When my child is fussy he or she does that just to annoy me"); (b) certainty about the mental states of the child ("I always know why my child acts the way he or she does"); and (c) interest and curiosity in the mental states of the child (e.g., "I am often curious to find out how my child feels"). The items are rated on a scale from 1 (*strongly disagree*) to 7 (*strongly agree*). However, the PRFQ has only been developed and validated very recently, so research using this assessment of parental reflective functioning is in its infancy.

### Comparing the Parental Mentalization Constructs

The three constructs assess mentalization through parents' active, spontaneous representations of their children's internal states as indexed by their verbal expressions focusing on the child's mind. All three concepts can be measured using an interview that evokes live and immediate representations of the child, but mind-mindedness is the only parental mentalization construct that can be assessed from actual parent-infant interaction. Although the concepts refer to a similar mental activity in the parent, they show different accents with regard to analyzing mind-related speech. Table 1 provides a summary of the three mentalization constructs and their assessment approaches. Parental reflective functioning classifies the degree to which parents link behaviors of the child to mental states, and the coherence with which parents describe these links. Insightfulness emphasizes whether the mind-related speech shows signs of acceptance of the child's state of mind, and the balance between positive and negative mind-related speech. Similar to parental reflective functioning, the insightfulness assessment takes into account whether parents are aware of the opacity of the child's mental states. Parental reflective functioning and insightfulness provide insight into how the parent generally organizes and represents the mind of their child (Oppenheim & Koren-Karie, 2013; Slade, 2005). The mind-mindedness interview focuses on the frequency of mind-related speech relative to speech about behavioral, physical, or general aspects of the child (Meins & Fernyhough, 2015), and like parental reflective functioning and

Table 1  
*Definitions and Assessment Approaches of the Three Parental Mentalization Constructs*

Construct	Definition	Assessment approach
Parental mind-mindedness	The parent's tendency to treat their child as a mental agent (Meins, 1997)	During the preverbal stage of infancy: Free-play interactions are recorded, and transcripts of parental speech are coded for the appropriateness of mind-related comments using the coding manual of Meins and Fernyhough (2015). Postinfancy: Parents are asked to describe their child. Mental descriptions are coded following the guidelines of Meins and Fernyhough (2015).
Parental insightfulness	The parent's capacity to consider the motives underlying their children's behaviors and emotional experiences in a complete, positive, and child-focused manner (Koren-Karic et al., 2002).	Parents are interviewed regarding children's thoughts and feelings after watching short videotaped vignettes of parent-child interactions. Interviews are classified in terms of coherence and balance in mind-related speech following the guidelines of Koren-Karic and Oppenheim (2001).
Parental reflective functioning	The parent's capacity to hold the child's mental states in mind (Slade, 2005)	The Parent Development Interview (Aber et al., 1985) is taken and (mind-related) answers are analyzed in terms of connections between behaviors and the mind and coherence using the addendum to the Reflective Functioning Scoring Manual (Slade et al., 2004). The Parental Reflective Functioning Questionnaire (PRFQ) involves three subscales (prementalizing modes, certainty about mental states, and interest and curiosity in the mental states of the child), yielding a total score for parental reflective functioning (Fonagy et al., 2016)

insightfulness, assesses the parent's ability to represent the mind of his or her child.

Observational mind-mindedness is a measure at the interface between representational and behavioral operationalizations of parent-infant interaction (Meins, 2013). In order to make a mind-related comment, the parent must represent what the infant is thinking or feeling, but these comments form part of the actual behavioral interaction between parent and child. As discussed above, mind-related comments are dichotomously coded as appropriate or nonattuned with reference to whether or not the internal state attributed to the infant is anchored in what the infant is currently experiencing. The fact that the measure is observation-based means that the infancy measure of mind-mindedness is unique in providing an index of whether parents are accurate in attributing internal states to their children.

Empirical studies comparing the three parental mentalization constructs are still scarce. The relation between mind-mindedness and parental reflective functioning was examined in a study on mothers and their 7-month-olds (Rosenblum, McDonough, Sameroff, & Muzik, 2008). Mothers' appropriate mind-related comments during free-play were associated with their reflective functioning during an interview ( $r = .39$ ). However, associations between insightfulness and either mind-mindedness or parental reflective functioning have not yet been empirically investigated.

### Predicting Attachment Security: Beyond Sensitivity

Since the development of the strange situation procedure to assess infant-parent attachment security (Ainsworth et al., 1978), researchers have attempted to identify parental characteristics that predict individual differences in infant-parent attachment. The strange situation categorizes infants into one of four attachment groups on the basis of their response to reunion with their caregiver after two short periods of separation: secure, insecure-avoidant, insecure-resistant (Ainsworth et al., 1978), and insecure-

disorganized (Main & Solomon, 1986, 1990). A considerable number of studies have focused on two main parental predictors of attachment security: Sensitivity during infant-parent interaction, and parents' current state of mind with regard to their own attachment experiences as assessed by the AAI. Previous meta-analyses provided empirical evidence for the direct moderate-to-strong association between infant-parent attachment and both sensitivity (e.g., de Wolff & van IJzendoorn, 1997;  $r = .24$ ) and parents' AAI classification (van IJzendoorn, 1995;  $r = .48$ ; Verhage et al., 2016;  $r = .31$ ).

The observed differences in security-seeking behaviors during the strange situation procedure reflect variations in infants' expectations of parental availability and emotional support (Ainsworth et al., 1971; Bowlby, 1969/1982). It is theorized that secure-base expectations are more likely to be constructed when the parent is sensitive, allowing infants to experience that moment-to-moment shifts in their states are understood, and responded to promptly and in an appropriate manner (Ainsworth et al., 1978). To date, at least eight meta-analytic reviews have been published on the relation between attachment security and either maternal (Atkinson et al., 2000; de Wolff & van IJzendoorn, 1997; Goldsmith & Alansky, 1987; Kassow & Dunst, 2007a, 2007b; van IJzendoorn, 1995; Verhage et al., 2016) or paternal (Lucassen et al., 2011; van IJzendoorn & de Wolff, 1997) sensitivity. The reviews all reported on the pooled correlation for the relation between sensitivity and infant attachment security, but they differed in terms of the inclusion criteria, most importantly in sample characteristics. Overall, the reviews show small to medium-to-large overall correlations for the relation between sensitivity and attachment security, varying from .12 (paternal sensitivity and attachment; Lucassen et al., 2011) to .35 (Verhage et al., 2016). Sensitivity has also been examined as a possible mechanism explaining the intergenerational transmission of attachment from caregiver to child. Two of the prior meta-analytic reviews examined the mediating effect of

sensitive parenting on child attachment (van IJzendoorn, 1995; Verhage et al., 2016). These reviews showed that the mediating pathway explained 25% of the association between caregiver attachment representation and child attachment. Around 75% of the variation remained unexplained (referred to as the *transmission gap*), indicating that other mechanisms may underlie the transmission of attachment from parent to child.

Articles in which the varying meta-analytic results and attachment transmission gap are discussed and explained (e.g., de Wolff & van IJzendoorn, 1997; Meins, 2013; Pederson, Gleason, Moran, & Bento, 1998; Thompson, 1997) often cite methodological problems (e.g., the broad definition and heterogeneous operationalization of the sensitivity construct) and poor interrater reliability to account for sensitivity being unable to explain the intergenerational transfer of attachment. Verhage et al. (2016) recently corrected the overall correlation between sensitivity and attachment for interrater and test–retest reliability, showing that these methodological factors do not underlie the transmission gap. However, the diverging ways of defining and measuring sensitivity may be a more serious issue. Studies on sensitivity show large differences between assessment conditions in terms of the extensiveness or context of the parent–child observation (i.e., laboratory, home; observation during feeding, play, task, strange situation; Thompson, 1997). Moreover, over the past two decades the quantity of, and diversity in, sensitivity instruments has continued to grow (Mesman & Emmen, 2013). Instruments have been developed that vary in: (a) specificity (i.e., microlevel vs. macrolevel approaches); (b) focus on the quantity or quality of parental behaviors and actions (Meins, 1999; Meins et al., 2001); (c) the use within various age groups (i.e., from infancy to adolescence); (d) compositions of sensitivity components (e.g., inclusion or exclusion of positive attitude, stimulation, mutuality; de Wolff & van IJzendoorn, 1997); and (e) the use in different caregivers (e.g., mothers and fathers; Grossmann et al., 2002).

The lack of consensus on how sensitivity can best be defined and measured has been shown to influence the effect sizes reported in previous meta-analyses (e.g., Atkinson et al., 2000; de Wolff & van IJzendoorn, 1997; Goldsmith & Alansky, 1987; Kassow & Dunst, 2007a, 2007b). For example, focusing on the quality (vs. quantity) of sensitive behaviors has been found to be most effective in explaining attachment variance (Goldsmith & Alansky, 1987). On the other hand, the research syntheses of Kassow and Dunst (2007a, 2007b) reported a similar association between attachment and contingent responsiveness (a quantitative measure of sensitivity, including the frequency of parental responses to infant behaviors) compared with qualitative measures of sensitive responsiveness. In contrast, de Wolff and van IJzendoorn (1997) reported somewhat larger overall effect sizes for studies using Ainsworth et al.'s (1974) global rating sensitivity scale. These mixed results cause difficulties in grasping the mechanisms via which sensitivity is related to attachment security.

A solution to this problem may be to narrow the focus on parenting behaviors specifically to parents' mind-related speech. As mentioned above, mind-mindedness, insightfulness, and parental reflective functioning can all be seen as refinements of the sensitivity construct. Mentalization addresses whether parents interpret their children's behaviors in terms of internal experiences or how accurate their interpretations are. In contrast, the global sensitivity scale does not, or at least not exclusively, speak to

parents' reading of their infants' internal states. The content and coherence of parents' theorizing about their children's thoughts and feelings may be key to understanding how infants come to perceive their parents as being sufficiently fine-tuned to their needs, thereby building trust in the parent and establishing a secure attachment relationship.

### Parental Mentalization and Attachment Security

Most studies investigating predictive links between parental mentalization and infant–parent attachment have used the mind-mindedness assessment. The majority of studies on mind-mindedness have reported that appropriate mind-related comments relate positively to concurrent (e.g., Demers et al., 2010a) and later (e.g., Arnott & Meins, 2007; Laranjo, Bernier, & Meins, 2008; Laranjo, Bernier, Meins, & Carlson, 2010, 2014; Lundy, 2003; Meins et al., 2001, 2002, 2012; Taubner et al., 2014) secure attachment. Two studies found negative associations between infant attachment and parental mind-mindedness within biological (Ontai & Virmani, 2010;  $N = 35$ ,  $r = -.09$ .) and foster families (Bernier & Dozier, 2003;  $N = 64$ ,  $r = -.36$ ). However, these studies both used the mind-mindedness interview to assess parents' level of mind-related speech during infancy. The interview measure was developed to analyze parents' descriptions of older children and does not allow for an evaluation of the appropriateness of mind-related speech (Meins & Fernyhough, 2015). Bernier and Dozier theorized that age-appropriate representations of the infant are likely to play a critical role in the formation of secure attachment relationships. When parents assume a range of mental processes that have not fully developed in the infant to describe them in an interview, this possibly indicates a lack of attunement to the infant.

Fewer studies have addressed the relation between nonattuned mind-related comments and attachment. Arnott and Meins (2007,  $N = 33$ ) found that nonattuned comments of mothers (but not fathers) at 6 months predicted insecure attachment at 12 months. In the studies of Meins et al. (2002, 2012) the use of nonattuned mind-related comments at ages 6 or 8 months predicted insecure attachment at 12 or 15 months. The study of Meins et al. (2012,  $N = 203$ ) also tested whether appropriate and nonattuned mind-related comments could predict attachment security across the four individual attachment categories rather than merely at the dichotomous secure or insecure level. Mothers of securely attached children produced fewer nonattuned comments than their counterparts in the avoidant, resistant, and disorganized insecure groups, and more appropriate mind-related comments than mothers in the avoidant, disorganized, and (at trend level) resistant groups. Considering nonattuned mind-related comments in addition to appropriate attunement to the infant's internal states was also successful in differentiating between the insecure-avoidant and insecure-resistant attachment groups. Mothers in the resistant group scored more highly than mothers in the avoidant group specifically for nonattuned mind-related comments (Meins et al., 2012). These results suggest that mothers of insecure-resistant infants mentalize about their infants, but have a tendency to fail to represent the infant's internal states accurately.

Turning to the studies on insightfulness and parental reflective functioning, Koren-Karie, Oppenheim, Dolev, Sher, and Etzion-Carasso (2002,  $N = 129$ ) reported that mothers classified as

positively insightful more often had 1-year-olds who were classified as securely attached, compared with mothers classified as disengaged or one-sided. Ramsauer et al. (2014) found similar results for mothers with clinical depression ( $N = 19$ ), and to a lesser extent in a nonclinical control group ( $N = 20$ ). In the first study on parental reflective functioning (assessed with the PDI), Slade et al. (2005) found that higher scores of maternal reflective functioning at 10 months predicted secure attachment at 14 months in a group of 40 infant–mother dyads. In the study of Stacks et al. (2014), 83 mothers with childhood maltreatment histories participated. The mothers with securely attached infants at 16 months showed higher concurrent levels of reflective functioning ( $r = .30$ ). A recent study (Fonagy et al., 2016) using the PRFQ at 10 months showed that two of the three subscales (prementalizing modes, and interest and curiosity in mental states) predicted attachment security at 12 months.

The question of whether both parental mentalization and sensitivity individually foster secure attachment has also been addressed. There are two main possibilities for how these aspects of parenting predict later infant–parent attachment. First, mentalization may explain variance in attachment security over and above any effect of sensitivity. Support for this notion was provided by the results of two studies conducted by Meins et al. (2001, 2012) showing that mind-mindedness predicted attachment security independently of sensitivity. Meins et al.'s (2001,  $N = 65$ ) original study focused only on appropriate mind-related comments, whereas Meins et al. (2012,  $N = 204$ ) showed that both appropriate and nonattuned mind-related comments predicted independent variance in infant–parent attachment after accounting for the effect of maternal sensitivity. Koren-Karie et al. (2002) also found that insightfulness classifications significantly increased the prediction of strange situation classifications beyond maternal vocabulary and maternal sensitivity in a group of 129 mother–infant dyads.

Second, because parental mentalization reflects the mental activity that enables parents to demonstrate sensitive parenting behaviors (e.g., nonintrusiveness, structuring, synchrony, autonomy supporting behaviors, etc.), mentalization may predict attachment via its effect on sensitivity. For instance, Laranjo et al. (2008, p. 693) stated that “in order to respond appropriately to infants’ cues, caregivers must first interpret these cues correctly, requiring that they attribute intentions to their infants.” On this view, mentalizing is considered to be a prerequisite for sensitivity. Support for this notion comes from studies reporting positive associations between sensitivity and parental reflective functioning (e.g., Stacks et al., 2014), appropriate mind-related comments (e.g., Demers et al., 2010a; Farrow & Blissett, 2014), and positive insightfulness (e.g., Koren-Karie et al., 2002; Ramsauer et al., 2014), suggesting that parents with higher mentalization are better equipped to provide their infants with sensitive responsiveness (Demers et al., 2010a).

The possible mediating role of sensitivity in the relation between parental mentalizing and attachment has also been tested directly in studies on mind-mindedness and parental reflective functioning (Laranjo et al., 2008; Lundy, 2003; Stacks et al., 2014). Lundy (2003,  $N = 48$ ) reported that the ability of mothers and fathers to engage in frequent reciprocal and mutually rewarding interactions with their infants (an indicator of sensitive responsiveness) mediated the relation between appropriate mind-related comments and higher scores on the Attachment Q Sort (AQS; Waters & Deane, 1985). Laranjo et al. (2008,  $N = 59$ ) reported

that maternal sensitivity only partially mediated the relation between appropriate mind-related comments at 12 months and attachment security at 15 months (assessed with the AQS). In the study of Stacks et al. (2014;  $N = 83$ ) the concurrent association between maternal reflective functioning and secure attachment at 16 months was partially mediated by mothers’ sensitivity.

## The Present Study

The findings described above suggest that parental mentalization can be both a direct predictor of secure attachment and a prerequisite for parents’ sensitive behavior that in turn relates to secure attachment. The existing literature and empirical work on mentalization point to a necessity to examine (a) parental mentalization as a direct predictor of infant attachment security, (b) the combined effect of mentalization and sensitivity in predicting attachment security, and (c) the possible mediating role of sensitivity in explaining the relation between mentalization and attachment. In the current meta-analytic review we investigated these relations using a three-level approach to meta-analysis (Hox, 2002; Raudenbush & Bryk, 1985; van den Noortgate & Onghena, 2003) and meta-analytic structural equation modeling (MA-SEM; Cheung, 2008, 2015).

By performing moderator analyses we could examine the influence of the different assessment strategies of the three parental mentalization constructs (i.e., mind-mindedness, insightfulness, and parental reflective functioning) on the overall relation with attachment security. First, as the majority of the included studies on mentalization used the mind-mindedness assessment approach, we examined whether studies on mind-mindedness showed different overall correlations for attachment security compared to insightfulness and parental reflective functioning. Second, as mind-mindedness is considered a multidimensional construct (if measured during infant–parent interaction; Meins et al., 2012), we tested whether parents’ ability to show appropriate mentalization showed different associations with attachment security compared with nonattuned mentalization. In this way, we were able to examine whether the accuracy of mentalization may be of particular relevance for understanding the predictors of attachment security (Meins et al., 2001, 2012; Sharp, Fonagy, & Goodyer, 2006).

## Method

### Selection of Studies

In the current study, we created three separate data sets in order to perform the analyses addressing the triangular relations among parental mentalization, sensitivity, and infant–parent attachment security. Eligible studies thus had to report on the association between attachment and parental mentalization, and/or attachment and sensitivity, and/or sensitivity and parental mentalization. We searched for studies published between 1997 and 2016 (August). This time frame was chosen because the first study on *parental* mentalization (mind-mindedness) appeared in 1997. We aimed to keep the time frame equal for all included studies and therefore excluded studies on sensitivity and attachment conducted before 1997. For a meta-analytic review of studies conducted before



1997, we refer to the research syntheses of de Wolff and van IJzendoorn (1997) and Kassow and Dunst (2007a).

First, seven electronic databases were searched until August 2016 for articles, book chapters, dissertations, and reports on mind-mindedness and/or sensitivity and/or attachment: Web of Science, PsycINFO, Google Scholar, Medline, Embase, Cochrane Library, and ERIC. The most relevant combination of three components that we used entailed: (“mentalization” OR “mentalizing” OR “mind-minded” OR “mind-related” OR “insightfulness” OR “reflective function” OR “sensitivity” OR “responsiveness” OR “responsivity” OR “Ainsworth” OR “emotional availability” OR “maternal behavior” OR “paternal behavior” OR “parenting quality” OR “interactive behavior”) AND (“attachment” OR “strange situation” OR “separation reaction” OR parent–child relation). The search yielded 8,479 results. We first screened the titles and abstracts of the articles we gathered from this search. Next, full article texts of possibly relevant studies were checked.

After the search in the online database, we found relevant studies of which we checked the reference lists to find additional articles. Reference lists of research reviews that were performed on the relation between sensitivity and attachment were also examined (Atkinson et al., 2000; de Wolff & van IJzendoorn, 1997; Goldsmith & Alansky, 1987; Kassow & Dunst, 2007a, 2007b; Lucassen et al., 2011; van IJzendoorn & de Wolff, 1997; Verhage et al., 2016). Third, several experts in the field were contacted to complement the list of eligible studies and to locate unpublished studies. We received 19 possibly applicable studies in response to our requests of which we included 10 studies.

**General inclusion and exclusion criteria.** The general inclusion and exclusion criteria were guided by two aims. First, we aimed to examine the magnitude of the relation between parental mentalization and infant attachment security, and eventually to compare this magnitude with the strength of the relation between sensitivity and attachment. We created general inclusion criteria with the intention of minimizing differences between all included study samples. Second, during the search process we noticed that the number of studies on parental mentalization and attachment was relatively small. This indicated that moderator analyses may suffer from a lack of power to detect reasons for heterogeneity of effect sizes. Previous meta-analyses on predictors of infant–parent attachment showed that characteristics such as risk status (clinical), biological/nonbiological relations, and age of the child during the attachment assessment are significant moderators (e.g., de Wolff & van IJzendoorn, 1997; Verhage et al., 2016). Reducing the need for elaborate moderator analyses was our second reason for keeping between-study differences to a minimum. To evaluate whether our approach resulted in less heterogeneity in effect sizes between studies, we performed one-sided log-likelihood-ratio-tests.

The following criteria were formed: first, the average child age during the assessments could not exceed 36 months. That is, we aimed to examine the relations between the constructs during the developmental phase of infancy (0–3 years; Gross, 2011). With this age criterion, we also kept the assessment methods of attachment equal among studies, as attachment in older children is measured with a different strategy (e.g., the Main–Cassidy classification system; Main & Cassidy, 1988) than in younger children (the strange situation procedure or AQS). Second, as we theorized that parental mentalization and sensitivity underlie mechanisms

that facilitate secure attachment, an exclusion criterion was assessing mentalization or sensitivity at a later age than infant attachment security. Third, we detected large differences between the samples in the studies on sensitivity and mentalization. The studies on parental mentalization were generally conducted with community samples, with variation in socioeconomic status (SES). Associations between sensitivity and attachment, however, were examined within a variety of biological and nonbiological families, as well as community and clinical/medical groups. We therefore excluded nonbiological samples and samples in which either the parent or child experienced medical or psychological problems. Fourth, studies in which participants received an intervention aimed to influence attachment security, mentalization, and/or sensitivity were excluded. Exceptions were made for studies that provided information on a nontreated control group in a community sample (Cassibba, Castoro, Constantino, Sette, & van IJzendoorn, 2015; Ramsauer et al., 2014). Lastly, studies written in languages other than English were included if we were able to translate these studies (i.e., if the study was written in Dutch, German, French, Italian, or Spanish). We found two possibly suitable studies that we were unable to translate, written in Chinese (Lin et al., 2014) and Japanese (Shinohara, 2006).

**Inclusion and exclusion criteria for infant–parent attachment.** With regard to the criteria for studies in which attachment security was assessed, we excluded studies in which attachment was not measured with the strange situation procedure (Ainsworth & Bell, 1970) or the AQS in an observational context. These two instruments are considered to be the most thoroughly examined and validated methods for assessing attachment security (e.g., Ainsworth & Bell, 1970; Ainsworth et al., 1978; van IJzendoorn, Vereijken, Bakermans-Kranenburg, & Riksen-Walraven, 2004; Lamb, Thompson, Gardner, & Charnov, 1985). The current study focused on the secure–insecure attachment continuum, and not the organized–disorganized continuum (Main & Solomon, 1986, 1990), as this continuum was the focus of attention in the majority of the mentalization studies. We therefore excluded studies on sensitivity attachment that were exclusively focused on predicting disorganized attachment.

**Inclusion and exclusion criteria for parental mentalization.** We included studies on parental mind-mindedness, reflective functioning, and/or insightfulness. Studies on mind-mindedness were included when the coding scheme of Meins and Fernyhough (2015) was used to assess mind-mindedness either through observations during parent–child interactions or with the describe-your-child interview (Meins et al., 1998, 2001). The studies using the observational assessment approach of mind-mindedness all reported on the effects of the appropriate index of mind-mindedness ( $k = 12$ ), and in some cases also on the nonattuned index of mind-mindedness ( $k = 6$ ). Studies were included when parental reflective functioning was assessed using the PRFQ or the PDI, following the guidelines of Slade et al. (2004). One exception was made for the study of Rosenblum et al. (2008), in which the relation between parental mentalization and sensitivity was examined. Rosenblum et al. (2008) assessed parental reflective functioning with a different interview (the Working Model of the Child Interview; Zeanah & Benoit, 1995). Because the coding procedure was conceptually based on and similar to the assessment of parental reflective functioning, this study was included. Lastly, we

included studies on insightfulness that followed the assessment procedures mentioned by Oppenheim and Koren-Karie (2002).

**Inclusion and exclusion criteria for sensitivity.** As mentioned earlier, sensitivity research seemed to have stepped aside from the original conception of sensitivity as originally constituted by Ainsworth (Meins, 2013; Mesman & Emmen, 2013). We included studies with sensitivity instruments that incorporated core aspects of Ainsworth et al.'s (1971, 1974) definition of sensitivity, relating to the awareness and correct interpretation of the infant's cues and a contingent and appropriate response to these signals. This approach led us to include studies using observational methods. Sensitivity assessments based on questionnaires or interviews were excluded from the analyses. Second, studies using a microlevel approach (the coding of responsiveness in time fragments of one or a few seconds), event-based coding, or behavior counts were excluded. These approaches usually focus on synchrony, mutuality, or response contiguity. Although these facets of parent–infant interaction are important elements in sensitive parenting, they do not capture the entire definition of the original sensitivity construct, as for instance the appropriateness of actions is not taken into account (e.g., Meins et al., 2001). The studies that remained eligible for inclusion thus all used a form of global rating scale to assess parental (either maternal or paternal) sensitivity. Third, we excluded sensitivity studies that analyzed the total effect of a much broader concept of parenting quality in which sensitivity was just one of the elements, and not the main concept (e.g., Grossmann et al., 2002). A few exceptions were made when a broader parenting quality instrument was used, but the authors reported on separate analyses of a sensitivity scale.

All articles obtained from the search were evaluated on the inclusion and exclusion criteria. This resulted in a total of 17 eligible articles on the relation between mentalization and attachment. On the relation between attachment and sensitivity, 85 articles were eligible for inclusion. Lastly, 18 eligible articles were retrieved for the relation between mentalization and sensitivity. Some of these eligible articles reported on the same sample. When this was the case, two different scenarios could arise: (a) in each article the same sample was analyzed and also the same constructs, instruments, and time points were studied, or (b) in each article the same sample was analyzed, but different constructs, instruments, or time points were studied (e.g., Bakermans-Kranenburg, van IJzendoorn, & Kroonenberg, 2004 and NICHD, 1997, 2001, or Meins et al., 2001, 2002). In case of the first scenario, we only coded the article with the highest number of participants and/or the article that provided the most detailed information on (raw) effect sizes. In the second scenario, we coded multiple effect sizes. For instance, when two articles reported on the relation between sensitivity and attachment within the same sample, but at different time points (e.g., 11 and 15 months), we coded two effect sizes. That is, we used a three-level random effects model to analyze the data, enabling us to use multiple effect sizes of a single study (see below for more information). In Appendix B in the online supplemental materials we provide an overview of all eligible studies, including the same sample studies.

### Calculation of Effect Sizes

Pearson's  $r$  correlation coefficient was chosen as a reflection of the effect magnitude in each study. In order to approximate a

normal sampling distribution, the correlations used in the statistical analyses were Fisher's  $z$  transformed (Lipsey & Wilson, 2001). Approximately 50% of the effect sizes had to be converted, mostly because information was reported on (attachment) group means instead of results on two continuous variables. Statistical information that was provided in the article text was (if necessary) converted into the  $r$  value using the converter of Wilson and Mason ([www.campbellcollaboration.org](http://www.campbellcollaboration.org)), which is based on the formulae of Lipsey and Wilson (2001). If raw means and standard deviations of parental mentalization or sensitivity were provided for different attachment groups, we used this information to calculate the  $r$  coefficient. When associations were "controlled" for the effects of other variables, or if the  $r$  coefficient could not be calculated from the information provided in the text, authors were contacted so that they could supply raw correlations or mind-mindedness or sensitivity means and standard deviations for the different attachment groups.

When the observational assessment of mind-mindedness was used to measure parental mentalization, effect sizes for the appropriate and nonattuned indices of mind-mindedness were reported separately. Because the nonattuned index of mind-mindedness is assumed to be negatively related to attachment security, effect sizes for nonattuned mind-related comments were recoded to fit a positive scale. In one study (Lundy, 2003), the original coding manual was modified. We therefore computed the effect size only for the subscales that resembled the scales used in the manual of Meins and Fernyhough (2015; thoughts, knowledge, and desires, problem solving, emotional engagement, and speaking for the infant). When parental reflective functioning was assessed during an interview, we coded effect sizes on the relation between infant attachment and the overall score for the whole interview. One study used the PRFQ (Fonagy et al., 2016). The effect size was calculated from the average association of the three PRFQ subscales (i.e., prementalizing modes, certainty of mental states, and interest and curiosity of in mental states) with infant attachment security. Lastly, when studies used the insightfulness assessment, we included only the effect sizes on attachment and the insightfulness classifications (and not the subscales). Although the subscales of the insightfulness assessment measure important aspects of the insightfulness transcripts, these scales are not necessarily expected to be associated with maternal sensitivity or attachment security (Koren-Karie et al., 2002).

### Coding of Effect Sizes and Statistical Analyses

More than one relevant effect size was reported in 38.46%, 47.06%, and 57.14% of the studies on the relation between mentalization–attachment, sensitivity–attachment, and mentalization–sensitivity, respectively. Multiple effect sizes per study were reported for the following reasons: (a) associations between the constructs were assessed at multiple time points (e.g., attachment and sensitivity were both assessed at 12 and 18 months); (b) different instruments were used within a single study to assess constructs; (c) different dimensions of mentalization were studied (i.e., appropriate and nonattuned mind-minded comments); and (d) associations between constructs were examined for different groups of parents (i.e., for mothers and fathers, for adult and adolescent parents, or for parents with low and high SES).

In more conventional meta-analytic strategies (i.e., the fixed-effects model or two-level random effects model; Raudenbush, 2009) only one effect size per study is taken into account, either by averaging or eliminating effect sizes that were reported. As a result, information on differences between effect sizes within a single study is lost. This leads not only to lower statistical power, but also to a limitation in research questions that can be addressed, because the influence of sampling differences, designs, and methods cannot be investigated properly (Assink & Wibbelink, 2016; Cheung, 2015). To overcome this matter, we used a three-level approach to random-effects models (for recent examples see Assink et al., 2015; van den Noortgate, López-López, & Marín-Martínez, 2013, 2015; Spruit, van Vugt, van der Put, van der Stouwe, & Stams, 2016). In a three-level random effects model, three sources of variance are modeled: (a) variation in effect sizes due to random sampling of effect sizes (Level 1); (b) variation in effect sizes due to differences within a single study (Level 2); and (c) variation in effect sizes between different studies (Level 3), which is expected because studies are not direct replications of each other and research approaches between studies differ (instruments, statistical techniques, study designs, etc.; Borenstein, Hedges, Higgins, & Rothstein, 2010). The three-level approach thus takes into account the dependency of effect sizes reported in a single study. This means that more than one effect size per study can be included, and the differences in effect sizes within studies as well as differences between studies can be tested if there is evidence for heterogeneity in effect sizes (Assink & Wibbelink, 2016). In this case, moderator analyses can be conducted to test variables that may explain within-study or between-study heterogeneity. A comparison between fixed-effect and three-level meta-analytic approaches showed that when the effects of multiple moderators are tested, increasing statistical power with the three-level approach is preferred over the conventional meta-analytic approach (van den Noortgate & Onghena, 2003).

With regard to the mediational analyses, we fitted a meta-analytic structural equation model (MA-SEM; Cheung, 2008, 2015) to the data, using the metaSEM package in R (Cheung, 2014), and following the guidelines of Jak (2015, pp. 39–56). An advantage of MA-SEM is that data from studies examining parts of the model can be integrated. Effect sizes of all included studies within the three meta-analytic data sets could be used in the analyses, obtaining maximum use of the available data. For these analyses we did not use the multilevel approach, and therefore converted the multilevel meta-analytic dataset to a conventional dataset (i.e., one effect size per study). This was done by averaging the effect sizes reported in one study, if necessary. When researchers reported on effect sizes for two or more groups, for instance adult and adolescent mothers (e.g., Demers et al., 2010a), the group size was considered in the calculation of the average effect size. We tested a model in which the direct effects of mentalization and sensitivity on attachment were modeled, and the effect of mentalization on sensitivity. In order to test the mediating effect of sensitivity, we modeled the indirect effect of mentalization on attachment security through parental sensitivity. Likelihood based confidence intervals were calculated to evaluate the significance of the direct and indirect path coefficient (see Jak, 2015, pp. 51–52).

## Moderator Variables

Potential moderators that could explain either variation in effect sizes between and within studies were categorized into: (a) study and sample characteristics, (b) features of the attachment assessment, (c) features of the mentalization assessment, and (d) features of the sensitivity assessment. An overview of the quantitative and categorical moderator variables is listed in Appendix C in the online supplemental materials.

**Study and sample characteristics.** For every effect size, we coded the year of publication, the time in months between two consecutive assessments, and whether the influence of other variables was controlled in the effect sizes. With regard to sample characteristics, we coded the continent in which the participants lived (Europe, North America, Asia, or an Other category including samples from families living in Africa, Oceania, and South America), gender of the parent, the SES of the family (low, middle, or high), age of the parents during the first assessment, and age of the child during the assessment of attachment, and/or mind-mindedness, and/or sensitivity.

**Characteristics of the attachment assessment.** For studies reporting on attachment data, we coded type of assessment procedure (strange situation procedure or AQS), and location of assessment (laboratory or home). Furthermore, studies using the strange situation procedure to assess attachment differed in their classification systems. In some studies the secure attachment group (B) was compared with the avoidant (A) and resistant (C) insecure attachment groups (i.e., a three-way ABC classification approach). Other studies compared the secure group with the avoidant (A), resistant (C), and disorganized (D) insecure attachment groups (i.e., a four-way ABCD classification approach). Although insecure-disorganized attachment is a primary attachment category (van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999), children with a disorganized classification receive a secondary secure classification when the ABC system is used, which indicates that the use of different classification systems (three- or four-way) may affect the constellations of the secure and insecure groups on which effect sizes are based. We therefore coded for each study using the strange situation procedure whether the attachment groups were classified using the ABC (three-way) or ABCD (four-way) system.

**Characteristics of the mentalization assessment.** For studies reporting on parental mentalization data, it was recorded for each effect size which assessment approach was used (insightfulness, mind-mindedness, or parental reflective functioning). The majority ( $k = 7$ ) of the studies on mentalization and attachment used the observational mind-mindedness assessment, reporting on the appropriate index of mind-mindedness. Of these seven studies, three studies also reported on the nonattuned index of mind-mindedness (see Appendix B1 in the online supplemental materials). With regard to the studies on mentalization and sensitivity, nine studies reported on the relation between appropriate mind-mindedness, and five of these studies also reported on the nonattuned index of mind-mindedness. Because the two indices of mind-mindedness are assumed to be separate predictors of attachment security, we coded in a moderator variable whether the effect size reflected appropriate or nonattuned mind-mindedness.



**Characteristics of the sensitivity assessment.** For studies reporting on sensitivity data, for each effect size we coded the type of sensitivity instrument used (Ainsworth Scales, Emotional Availability Scales, Maternal Behavior Q-Set, or other), the location of the assessment (laboratory or home), and the duration of the assessment. Also, because some authors used sensitivity instruments differently than originally designed (e.g., scales were added, removed, or different scale compositions were made), we coded whether the original instrument was used or whether scales were added or removed.

The first author coded all studies, the second author coded a randomly selected 15% of the studies ( $k = 12$ ). Cohen's kappa was calculated to examine interrater agreement among the categorical moderator variables, whereas the intraclass correlation coefficient (ICC) was calculated to examine agreement on continuous moderator variables. Interrater agreement ranged from good for SES ( $\kappa = .73$ ), to excellent for percentage boys (ICC = .96), effect size ( $\kappa = .90$ ), and child age ( $\kappa = .94$ ), to full agreement for number of participants, parent age, type of measurement instruments, country in which the research was conducted, and duration of observations (Cicchetti, 1994; Fleiss & Cohen, 1973).

### Heterogeneity in Effect Sizes

When variation between effect sizes in the data-set can be ascribed not only to sampling variance (Level 1), but also to variation at the second and third level, moderator analyses are useful in explaining the extent to which the magnitude of effect sizes may be inflated or deflated because of differences between and within studies. In order to test whether heterogeneity in effect sizes on the second and third level was significant, we performed two separate one-sided log-likelihood-ratio-tests (Assink & Wibbelink, 2016). These tests compared the full multilevel model with a model in which one of the variance parameters was excluded. Formulae reported by Cheung (2014) were furthermore used to estimate the proportion of variances that could be ascribed to the different levels (1, 2, or 3). We evaluated these proportions following the suggestions of Hunter and Schmidt (1990): Heterogeneity between effect sizes can be considered to be substantial when less than 75% of the total variance is ascribed to sampling variance (Level 1).

### Statistical Procedure

The instructions of Assink and Wibbelink (2016) were followed in order to perform the statistical analyses, using the function "rma.mv" of the metafor package (Viechtbauer, 2010) in the software environment R (version 3.2.2; R Core Team, 2015). Restricted maximum likelihood estimates were calculated because full maximum likelihood estimates have been shown to have a more downward bias, particularly when the number of included studies in the meta-analysis is small (e.g., Thompson & Sharp, 1999; Turner, Omar, Yang, Goldstein, & Thompson, 2000). Individual regression coefficients and corresponding confidence intervals for the models were calculated using the  $t$ -distribution (Knapp & Hartung, 2003). The omnibus tests of the null hypothesis that all group mean effect sizes are equal followed an  $F$ -distribution. To maximize power in the two meta-analyses on mentalization, we minimized the number of

categories in the nominal moderator variables to two for each variable (e.g., low and high SES).

### Missing Data and Publication Bias

To investigate possible publication bias in our meta-analyses, we performed multiple analyses for each of the three data sets separately. First, we evaluated the distribution of the effect sizes in SPSS by analyzing the levels of skewness and kurtosis of the distribution (Tabachnik & Fidell, 2013). If the distribution of effect sizes is not equally spread around the mean, this may indicate "missing" studies (e.g., Begg & Mazumdar, 1994). We therefore analyzed graphical representations of the effect size data (e.g., histograms) and used Shapiro-Wilk's test to evaluate normality (Razali & Bee Wah, 2011). Second, we analyzed funnel plots to check whether studies with the largest number of participants were plotted near the average effect size, and smaller studies were spread evenly around the center, creating a funnel-shape distribution. Third, publication bias was further evaluated using Duval and Tweedie's (2000a, 2000b) trim and fill procedure. With this procedure, funnel plot asymmetry arising from possible publication bias is identified and corrected. An adjusted estimate of the pooled effect size is calculated after the estimated hypothetical "missing" effect sizes are added to the dataset. The function "trimfill" of the metafor package (Viechtbauer, 2010) in the software environment R (Version 3.2.2; R Core Team, 2015) was used to perform this analysis. In order to get a sense of the robustness of the overall correlations, we performed sensitivity analyses. With these analyses, we checked whether single studies had a disproportional effect on the overall correlations we reported. That is, as the number of studies we found on mentalization was small, single studies may be very influential to the calculation of the pooled correlation on mentalization and attachment/sensitivity (Vevea & Woods, 2005). We therefore reassessed the random effects models without moderators, each time leaving out one study.

## Results

### Relations Between Parental Mentalization, Sensitivity, and Attachment Security

The overall effects for each meta-analysis are listed in Table 2. For ease of interpretation, the Fisher's  $z$  correlations were transformed back into Pearson  $r$  correlation coefficients. Both correlations scores are presented in Table 2; however, in the text we refer only to Pearson's  $r$  coefficients.

**Parental mentalization and attachment security.** With regard to the association between parental mentalization and attachment security, the analyses were based on 20 effect sizes from 935 unique mother-child and 39 father-child dyads (within 13 samples). The sizes of the study samples varied from 15 (fathers; Arnott & Meins, 2007) to 203 (Meins et al., 2012) dyads. For the relation between parental mentalization and attachment security, correlations varied from  $-.09$  to  $.54$ . Mentalization showed an overall significant positive association with infant attachment security,  $r = .30$ , 95% CI [.22, .38].



Table 2

Estimated Pooled Correlations (Fisher's Z and Pearson's R) for the Relationships Between Parental Mentalization, Sensitivity, and Infant Attachment Security

Association	#k	#ES	N	Z <sub>r</sub> (SE)	r (SE)	95% CI (r)	t (df)	p
Mentalization–Attachment	13	20	960	.31 (.04)	.30 (.04)	[.22, .38]	7.21 (19)	<.001***
Sensitivity–Attachment	51	82	6,664	.26 (.03)	.25 (.03)	[.20, .31]	9.07 (81)	<.001***
Mentalization–Sensitivity	14	24	2,085	.25 (.03)	.25 (.03)	[.18, .31]	7.20 (23)	<.001***

Note. #k = number of studies; #ES = number of effect sizes; N = total of unique participants; Z<sub>r</sub> = Fisher's Z correlation; r = Pearson's r correlation coefficient; 95% CI = 95% confidence intervals of Pearson's r coefficient; t = t-value.

\*\*\* p < .001.

**Sensitivity and attachment security.** The analyses on the association between sensitivity and attachment were based on a total of 82 effect sizes from 5,871 unique mother–infant and 793 father–infant dyads (within 50 studies). The sizes of the study samples ranged from 16 (Cassibba et al., 2015) to 1,151 (NICHD, 1997) families. For the relation between sensitivity and attachment, correlations varied from  $r = -.19$  to  $.74$ . In line with earlier meta-analytic work, sensitivity showed an overall significant positive association with infant attachment security,  $r = .25$ , 95% CI [.20, .31].

**Parental mentalization and sensitivity.** The analyses on the association between parental mentalization and sensitivity were based on 24 effect sizes on 2,029 different mothers (within 14 studies). The sizes of the study samples varied from 20 (Ramsauer et al., 2014) to 961 participants (McElwain, Booth-LaForce, & Wu, 2011). Effect sizes ranged between  $r = -.04$  and  $.41$ . The overall correlation between parental mentalization and sensitivity was significant,  $r = .24$ , 95% CI [.18, .31].

**Comparing predictors.** The pooled correlation between parental mentalization and attachment was .05 higher than the pooled correlation between sensitivity and attachment. In order to compare parental mentalization and sensitivity as predictors of attachment, we created a new multilevel dataset with all effect sizes on the mentalization–attachment and the sensitivity–attachment relation, and checked whether the effect sizes differed substantially from each other in moderator analyses. The multilevel approach does not require correlations between different predictors (i.e., mentalization and sensitivity) within primary studies to be known (Assink & Wibbelink, 2016). This meant that the moderator analyses took into account whether mentalization–attachment and sensitivity–attachment effect sizes came from the same study. The analyses showed that the pooled correlation for the relation between mentalization and attachment was not significantly larger than the pooled correlation for the relation between sensitivity and attachment,  $F(1, 100) = 0.19$ ,  $\beta = .05$ ,  $p = .667$ , 95% CI [–.16, .25].

In order to get a sense of the robustness of the pooled correlation from each meta-analysis, we performed sensitivity analyses. This meant that we checked whether the pooled correlation changed each time a single study was left out. For the association between mentalization and attachment, the pooled correlation varied from .28 (when Meins et al., 2012 was left out) to .31 (without Ontai & Virmani, 2010). The pooled correlation of the association between sensitivity and attachment did not change more than .01 after leaving out a study. Lastly, within the sensitivity and mentalization analyses, the

pooled correlation ranged from .21 (without Rosenblum et al., 2008) to .25 (without McElwain et al., 2011).

### Direct and Indirect Effects of Parental Mentalization on Attachment

In order to test the combined effect of mentalization and sensitivity on attachment security, and to test the indirect influence of mentalization on attachment through sensitivity, we analyzed the data using MA-SEM. We created a conventional meta-analytic dataset with a two-level structure, calculating one effect size per study if necessary. We first performed conventional two-level meta-analyses. These analyses showed similar results for the pooled correlation between mentalization and attachment,  $r = .29$ ,  $SE = .04$ , 95% CI [.21, .37],  $p < .001$ , sensitivity and attachment,  $r = .26$ ,  $SE = .03$ , 95% CI [.21, .32],  $p < .001$ , and mentalization and sensitivity,  $r = .27$ ,  $SE = .04$ , 95% CI [.19, .35],  $p < .001$ .

The results of the MA-SEM are presented in Figure 1. The direct effects of the predictor mentalization and mediator sensitivity on attachment reported in the figure are slightly smaller than the pooled correlations retrieved from the multilevel meta-analyses reported in Table 2. That is, the effect of each predictor was

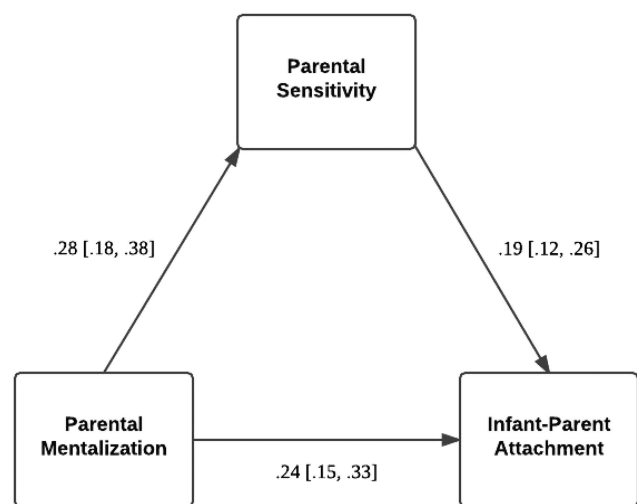


Figure 1. Results of the meta-analytic structural equation model with direct and indirect effects of parental mentalization on infant attachment security. The indirect effect of parental mentalization on infant attachment through sensitivity was .07 [.04, .10].

controlled for the effect of the other predictor in the model. The coefficient of  $\beta = .24$  represents the effect of mentalization on attachment given the effect of sensitivity on attachment. The total amount of attachment variance explained by mentalization and sensitivity was 12%. Moreover, 8% of the variation in sensitivity was explained by parental mentalization. The indirect effect of mentalization on infant attachment security through sensitivity was small but significant,  $r = .07$ , 95% CI [.04, .10]. Because the direct effects of sensitivity and mentalization on attachment were also significant, this result indicates that the relation between mentalization and attachment is partially mediated by sensitivity (Rucker, Preacher, Tormala, & Petty, 2011).

### Variation in Effect Sizes

We investigated whether differences in effect sizes could be attributed to random sampling error (Level 1), within-study variance (Level 2), or between-study variance (Level 3). For the association between parental mentalization and attachment, variation between studies was not significant ( $\hat{\sigma}^2 = .001$ ,  $\chi^2(1) = 0.001$ ,  $p = .971$ ). Significant variation in effect sizes within studies was present ( $\hat{\sigma}^2 = .014$ ,  $\chi^2(1) = 3.56$ ,  $p = .059$ ; one-sided). A total of 1.65% of the total variance was accounted for by variation in effect sizes between studies, 43.21% within studies, and approximately 55.41% by random sampling variance.

For the association between sensitivity and attachment, significant variation between studies was present ( $\hat{\sigma}^2 = .026$ ,  $\chi^2(1) = 8.37$ ,  $p = .004$ ), as well as variation within studies ( $\hat{\sigma}^2 = .007$ ,  $\chi^2(1) = 17.97$ ,  $p < .001$ ). A total of 61.66% of the total variance was accounted for by variation between studies, 17.39% within studies, and 20.95% by random sampling variance.

Lastly, for the association between parental mentalization and sensitivity, variation between studies was not significant ( $\hat{\sigma}^2 < .001$ ,  $\chi^2(1) < 0.001$ ,  $p = .984$ ). Significant variation within studies was present ( $\hat{\sigma}^2 = .014$ ,  $\chi^2(1) = 10.23$ ,  $p < .001$ ). A total of 0.69% of the total variance was accounted for by variation in effect sizes between studies, 65.20% within studies, and approximately 34.11% by random sampling variance.

Taken together, significant heterogeneity between and within studies seems to be present in the sensitivity–attachment dataset. Moderators that could possibly explain part of this second- and third-level variation in effect sizes were therefore added to the sensitivity–attachment random effects model. The mentalization–attachment and mentalization–sensitivity effect sizes showed substantial variety in effect sizes only within studies. Thus, for the analyses on parental mentalization and attachment as well as parental mentalization and sensitivity, we reported on the effects of moderator variables for which (some of the) studies presented multiple effect sizes (see below for more information).

### Moderator Analyses

By adding moderators as covariates to the random effect models (separately), we examined the extent to which study and sample characteristics affected the associations we found for the triangular relations between parental mentalization, sensitivity, and attachment security. An overview of all moderator variables is presented in Appendix C in the online supplemental materials. In the tables, Fisher's  $z$  coefficients are presented. For ease of interpretation we again reported Pearson's  $r$  coefficients in text.

**Parental mentalization and attachment.** The effects of the following potential moderator variables were tested: infant age during the mentalization and attachment assessment, time between consecutive measurements, age of the parents, gender of the parent, SES (low or middle-high), conceptual approach (mind-mindedness vs. insightfulness and parental reflective functioning), and accuracy of mentalizing (appropriate vs. nonattuned mind-mindedness). For these variables, multiple effect sizes were sometimes reported within single studies. For instance, in the study of Demers et al. (2010a), effect sizes were reported for adolescent mothers and adult mothers, differing in SES and mean age. The variables listed above were thus potential moderators that could explain variance at the second and/or third level. Table 3 shows the results of the moderator analyses for the meta-analysis on the relation between parental mentalization and attachment security. The results of the analyses with all moderator variables are shown in Appendix D, Table D1 in the online supplemental materials (i.e., in this table moderators were added that could only explain between-study-variance, such as publication year, etc.).

None of the study or sample characteristics showed a significant effect on the pooled correlation between parental mentalization and attachment. There were few studies available on insightfulness ( $k = 2$ ) and parental reflective functioning ( $k = 3$ ) in relation to attachment. Therefore, we decided to test whether studies using mind-mindedness ( $k = 8$ ) yielded different effect sizes compared to studies using insightfulness or parental reflective functioning. The results were nonsignificant. With regard to the studies using the observational assessment of mind-mindedness ( $k = 7$ ), the index of mind-mindedness (appropriate vs. nonattuned mind-related comments) was a significant covariate in the relation between mind-mindedness and attachment,  $F(1, 12) = 8.60$ ,  $p = .013$ . Nonattuned mind-related comments showed a higher pooled correlation with attachment insecurity compared with the relations between appropriate mind-related comments and attachment security,  $r = .45$ ,  $p < .001$ , for nonattuned mind-related comments, and  $r = .26$ ,  $p < .001$  for appropriate mind-related comments). Although, relative to appropriate mind-related comments, nonattuned mind-related comments were related more strongly to infant attachment, the association between appropriate mind-related comments and attachment was also significant. Because effect sizes for nonattuned mind-related comments were initially recoded to a positive scale, the correlational score should be interpreted as a negative association. Thus, when parents produce lower amounts of nonattuned mind-related comments during interactions with their infant, an increase in secure attachment is observed.

**Sensitivity and attachment.** The results of the moderator analyses are shown in Table 4. For the relation between sensitivity and attachment, there was substantial variation in effect sizes at the second and third level. We therefore added moderators that could both explain heterogeneity of effect sizes within and between studies (see Table 4 for an overview of the moderator variables). Sample and study characteristics did not significantly moderate the association between sensitivity and attachment. For three studies, effect sizes were controlled for the influence of other variables in the dataset on sensitivity and attachment. Effect sizes from these studies did not differ from the effect sizes in the studies with “raw” effect sizes,  $F(1, 80) = 0.82$ ,  $p = .368$ . A trend was visible for the type of attachment assessment used. Studies that measured attachment security with the AQS tended to yield larger effect sizes,  $r =$

Table 3

*Parental Mentalization and Attachment: Estimated Results (Fisher's Z, Regression Coefficients, Omnibus-Test) for Continuous and Categorical Moderator Variables*

Moderator	#k	#ES	$Z_r$ (SE)	$\beta_1$ (SE)	$F(df1, df2)^a$	p-value
Study characteristics						
Time between measurements (c)	13	20		.01 (.01)	$F(1, 18) = 0.68$	.422
Sample characteristics						
Age of the parent (c)	12	19		-.00 (.01)	$F(1, 17) = 0.02$	.904
Gender of the parent					$F(1, 18) = 0.41$	.841
Mothers	13	17	.31 (.05)***			
Fathers	2	3	.28 (.17)***	-.03 (.17)		
SES					$F(1, 18) = 3.00$	.100
Low	5	11	.39 (.06)***			
Middle-high	9	9	.25 (.06)***	-.14 (.08)		
Mentalization assessment						
Assessment strategy					$F(1, 18) = 0.02$	.884
MM	8	15	.30 (.06)***			
IA/PRF	5	5	.31 (.08)***	.01 (.10)		
MM Index					$F(1, 12) = 8.60^*$	.013**
Appropriate	7	10	.26 (.05)***			
Nonattuned	3	4	.49 (.07)***	.23 (.08)		

Note. #k = number of studies; #ES = number of effect sizes;  $Z_r$  = Fisher's Z correlation; SE = standard error;  $\beta_1$  = estimated regression coefficient; (c) = continuous variables; MM = mind-mindedness; IA = insightfulness assessment; PRF = parental reflective functioning.

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

<sup>a</sup>Omnibus test of all regression coefficients in the model.

.32, compared to studies using the strange situation,  $r = .24$ , as displayed by a marginally significant omnibus test,  $F(1, 80) = 3.23$ ,  $p = .077$ . As mentioned earlier, sensitivity instruments were sometimes adapted by either adding or removing scales or items. This was particularly the case in studies using the Ainsworth et al. (1974) scale. Adaptation of the sensitivity instrument was not a significant moderator,  $F(1, 80) = 1.66$ ,  $p = .192$ .

**Parental mentalization and sensitivity.** Table 5 lists the results of the moderator analyses for the meta-analyses on the relation between mind-mindedness and sensitivity. Similar to the moderator analyses for mentalization and attachment, we only added moderator variables for which multiple effect sizes were reported within single studies: age of the parents, SES of the families (low or middle-high), assessment strategy (online or offline), and index of mind-mindedness (appropriate or nonattuned mind-related comments). Gender of the parent was not added as a moderator variable, because there were no studies on sensitivity and mind-mindedness in father-child dyads. The results of the analyses with all moderator variables are listed in Appendix D, Table D2 in the online supplemental materials (i.e., in this table moderators were added that could only explain between-study-variance, such as publication year, etc.).

Sample and study characteristics did not moderate the correlation between mentalization and sensitivity. Studies using the assessment approach of mind-mindedness did not yield different correlations with sensitivity compared to studies using the insightfulness or parental reflective functioning assessment. For the studies using the observational assessment of mind-mindedness, the index of mind-mindedness proved to be a near-significant covariate in the association between mind-mindedness and sensitivity,  $F(1, 13) = 4.43$ ,  $p = .055$ . Appropriate mind-related comments tended to show a higher pooled correlation,  $r = .30$ ,  $p < .001$ , with attachment security compared with nonattuned mind-related comments,  $r = .13$ ,  $p = .079$ . The estimated mean effect size for the relation between nonattuned mind-related

comments and sensitivity did not differ significantly from zero, indicating that parents' production of nonattuned mind-related comments during the interaction with their child was not substantially related to their sensitive parenting behaviors. The other moderator variables did not show (near)significant effects on the association between parental mentalization and sensitivity.

### Publication Bias

We applied several strategies to examine whether publication bias was present in the current meta-analyses. There were no signs of statistical outliers that may have had a disproportionate influence on the results (i.e., standardized scores above 3.29 or below -3.29; Tabachnik & Fidell, 2013). We inspected the graphical representation of the effect size distribution, which showed that correlations seemed equally spread around the mean. Shapiro-Wilk's normality tests did not indicate that the effect size distributions were skewed ( $p > .05$ ). Figures 2, 3, and 4 (see Appendix E in the online supplemental materials) display funnel plots of effect size estimates against their standard errors for each of the three meta-analyses. The trim and fill procedure did not render missing studies for each of the meta-analyses. However, visual inspection of the plots did highlight a little asymmetry in the distribution of effect sizes. In particular for the sensitivity-attachment analysis, there were relatively few studies with small samples (i.e., large standard errors) that reported negative correlation coefficients or correlation coefficients below the mean effect size. This indicates that some publication bias may have been present.

### Discussion

In the present study we analyzed the triangular associations among parental mentalization, sensitivity, and infant-parent attachment security by using a three-level approach to meta-analyses (Hox, 2002; Raudenbush & Bryk, 1985; van den Noortgate & Onghena, 2003). The results highlight relations between parental mentalization and

Table 4

*Sensitivity and Attachment: Estimated Results (Fisher's Z, Regression Coefficients, Omnibus-Test) for Continuous and Categorical Moderator Variables*

Moderator	#k	#ES	Z <sub>r</sub> (SE)	β <sub>1</sub> (SE)	F(df1, df2) <sup>a</sup>	p-value
<b>Study characteristics</b>						
Publication year (c)	51	82		.00 (.01)	F(1, 80) = 0.66	.418
Time between measurements (c)	51	82		-.01 (.00)	F(1, 80) = 1.93	.168
Effect size controlled					F(1, 80) = 0.82	.368
Yes	3	4	.38 (.03) <sup>***</sup>			
No	48	78	.26 (.14) <sup>***</sup>	-.13 (.14)		
Published					F(1, 73) = 0.11	.737
Yes	45	77	.26 (.03) <sup>***</sup>			
No	2	5	.30 (.14) <sup>*</sup>	.05 (.14)		
<b>Sample characteristics</b>						
Age of the parent (c)	45	70		.01 (.01)	F(1, 68) = 0.84	.364
Gender of the parent					F(1, 80) = 2.66	.107
Mothers	45	70	.27 (.03) <sup>***</sup>			
Fathers	8	12	.18 (.06) <sup>**</sup>	-.10 (.06)		
Percentage boys (c)	46	76		.00 (.01)	F(1, 74) = 0.47	.496
Age child sensitivity assessment (c)	51	82		.00 (.00)	F(1, 80) = 1.49	.225
Age child attachment assessment (c)	51	82		-.00 (.00)	F(1, 80) = 0.61	.438
Continent					F(3, 78) = 0.96	.404
Europe	13	20	.30 (.06) <sup>***</sup>			
North America	26	42	.22 (.04) <sup>***</sup>	-.09 (.07)		
Asia	9	12	.30 (.07) <sup>***</sup>	-.00 (.09)		
Other	6	8	.34 (.09) <sup>***</sup>	.04 (.11)		
SES					F(2, 79) = 0.08	.920
Low	12	18	.24 (.06) <sup>***</sup>			
Middle	25	41	.26 (.04) <sup>***</sup>	.02 (.07)		
High	15	23	.28 (.06) <sup>***</sup>	.03 (.08)		
<b>Attachment assessment</b>						
Instrument					F(1, 80) = 3.23	.077
SSP	42	66	.24 (.03) <sup>***</sup>			
AQS	11	16	.34 (.05) <sup>***</sup>	.10 (.06)		
Classification SSP					F(1, 61) = 1.25	.269
Three-way (ABC)	11	19	.31 (.07) <sup>***</sup>			
Four-way (ABCD)	31	44	.22 (.04) <sup>***</sup>	-.09 (.08)		
<b>Sensitivity assessment</b>						
Location					F(1, 80) = 0.09	.762
Home	27	42	.27 (.04) <sup>***</sup>			
Lab	28	40	.25 (.04) <sup>***</sup>	-.02 (.06)		
Duration (c)	38	56		.00 (.00)	F(1, 54) = 0.40	.532
Instrument					F(3, 78) = 1.35	.264
Ainsworth scales	21	31	.20 (.04) <sup>***</sup>			
MBQS	11	15	.33 (.06) <sup>***</sup>	.14 (.08)		
EAS	4	7	.30 (.11) <sup>***</sup>	.10 (.12)		
Other	18	29	.28 (.05) <sup>***</sup>	.09 (.06)		
<b>Modification instrument</b>						
Original	34	50	.30 (.04) <sup>***</sup>		F(2, 79) = 1.66	.192
Scales removed	6	13	.21 (.08) <sup>**</sup>	-.09 (.09)		
Scales added	11	19	.18 (.06) <sup>**</sup>	-.12 (.07)		

Note. #k = number of studies; #ES = number of effect sizes; Z<sub>r</sub> = Fisher's Z correlation; SE = standard error; β<sub>1</sub> = estimated regression coefficient; (c) = continuous variables.

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

<sup>a</sup>Omnibus test of all regression coefficients in the model.

both attachment security,  $r = .30$ , and sensitivity,  $r = .25$ . In line with previous research, the association between sensitivity and attachment security was  $r = .25$ . The results of the MA-SEM (Cheung, 2008, 2015) showed that although the overall effect of mentalization on attachment security decreased after controlling for the effect of sensitivity (and vice versa), direct effects of both predictors remained substantial. We also observed a small indirect effect of mentalization on attachment security via sensitive parenting. These results indicate that mentalization exerts both a direct and indirect influence on

infant–parent attachment, and suggest that parental mentalization and sensitivity play complementary roles in explaining attachment security.

### Mentalization in Relation to Attachment Security and Sensitivity

The meta-analytically derived correlation between parental mentalization and infant–parent attachment security may be considered



Table 5

*Parental Mentalization and Sensitivity: Estimated Results (Fisher's Z, Regression Coefficients, Omnibus-Test) for Continuous and Categorical Moderator Variables*

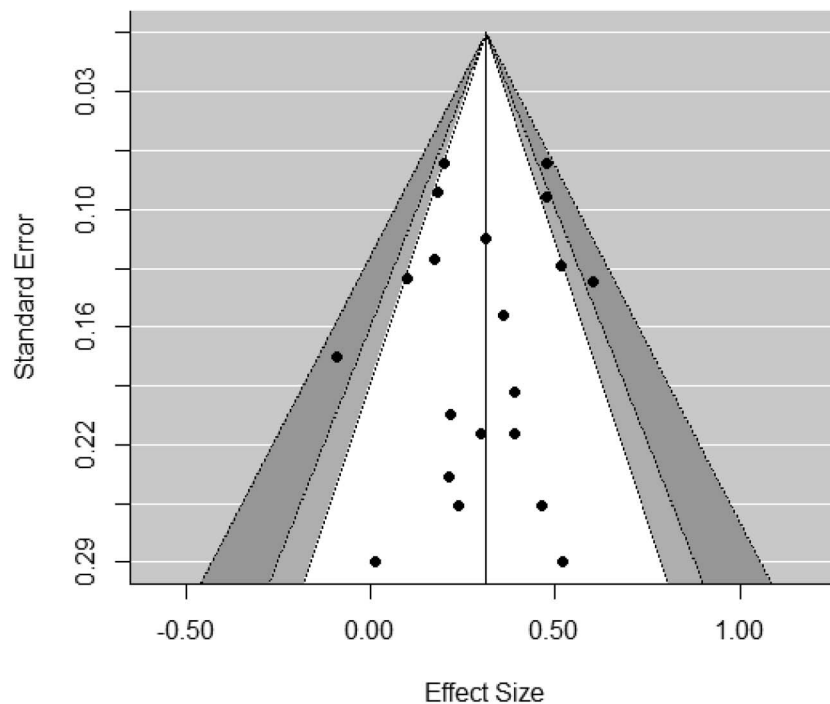
Moderator	#k	#ES	Zr (SE)	$\beta_1$ (SE)	F(df1, df2) <sup>a</sup>	p-value
Sample characteristics						
Age of the parent (c)	14	24		.02 (.01)	F(1, 22) = 3.48	.076
SES					F(1, 22) = 0.88	.359
Low	9	12	.21 (.05)***			
Middle-high	6	12	.28 (.09)***	.07 (.07)		
Mentalization assessment						
Assessment strategy					F(1, 22) = 0.19	.668
MM	10	18	.24 (.04)***			
PRF/INS	5	6	.27 (.07)***	.03 (.08)		
MM index					F(1, 13) = 4.43	.055
Appropriate	9	10	.30 (.05)***			
Nonattuned	5	5	.13 (.07)	-.17 (.08)		

*Note.* MM = mind-mindedness; PRF = parental reflective functioning; INS = insightfulness; #k = number of studies; #ES = number of effect sizes; Zr = Fisher's Z correlation; SE = standard error;  $\beta_1$  = estimated regression coefficient; (c) = continuous variables. \*\*\*  $p < .001$ .

relatively large (Gignac & Szodorai, 2016; Hemphill, 2003), and underlines the relevance of embedding parental mentalization in attachment research. In the introduction we described multiple views on the relation between parental mentalization and sensitivity, and their roles in fostering attachment security. We discussed how parental mentalization may be considered to be a better approximate of parents' tendency to take the perspective of the infant, and accurately interpret the infant's cues. This tendency in turn is assumed to be key in facilitating experiences underlying secure attachment. The magnitude of the pooled correlation between mentalization and attachment was slightly larger than the correlation between sensitivity and attach-

ment, although the difference in magnitude between these correlations did not reach statistical significance. Even if more studies had been conducted (resulting in more power to detect small differences), the absolute difference of .05 may not be considered very large.

More important for understanding predictors of infant-parent attachment may be the finding that both mentalization and sensitivity had significant direct effects on infant-parent attachment after controlling for the effects of each other, highlighting how both of these features of parenting uniquely contribute to explaining variance in attachment security. Our findings are thus in line with the proposal that parental mentalization is directly related to



*Figure 2.* Funnel plot containing the mentalization-attachment effect sizes and their standard errors with confidence intervals set at 90, 95, and 99%.

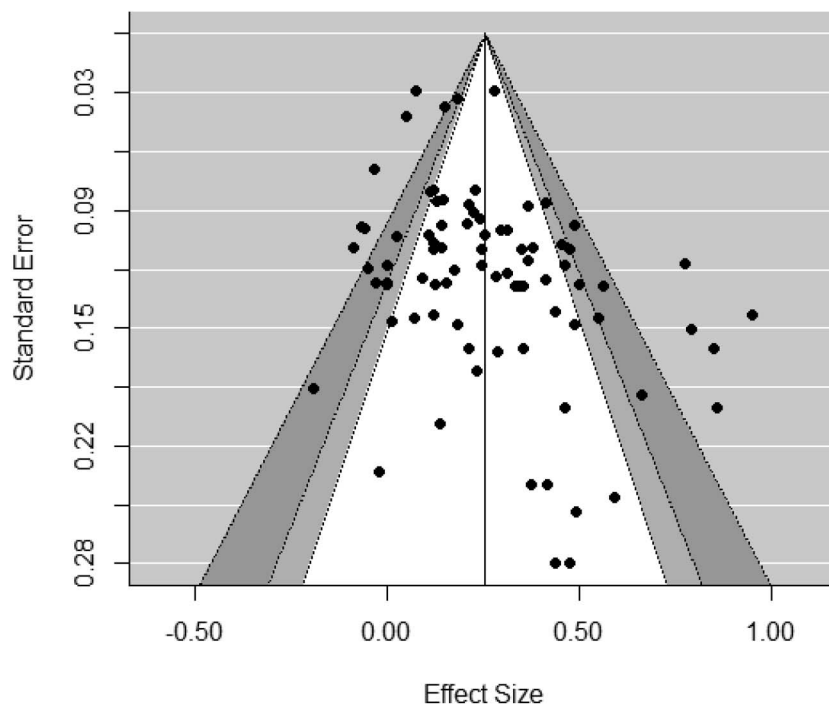


Figure 3. Funnel plot containing the sensitivity–attachment effect sizes and their standard errors with confidence intervals set at 90, 95, and 99%.

infant–parent attachment security. The results of the MA-SEM also partially support the proposal that sensitivity mediates the relation between parental mentalization and infant–parent attachment security (e.g., Laranjo et al., 2008) given that there was a small but significant indirect effect of mentalizing on attachment via sensitivity. However, the direct effect of mentalization on infant attachment remained substantial after controlling for the effect of sensitivity, demonstrating that sensitivity does not fully mediate the relation between mentalization and attachment. The activity of mentalizing increases the likelihood that the parent is aware of the infant’s needs, thoughts, feelings, and so forth, but may not necessarily indicate that the parent is able to convert his or her thoughts about the infant’s mind into sensitive behavioral responses.

It could be argued that there is a further potential developmental pathway to infant–parent attachment: parental mentalization may mediate the relation between parental sensitivity and attachment security. On this account, responding to the infant in a sensitive manner would facilitate the parent’s recognition and accurate interpretation of the infant’s internal states. We did not consider this developmental pathway for a number of reasons. First, as explained above, our focus is exclusively on explicit parental mentalization as indicated in parents’ use of mind-related talk about the child. Second, we used Ainsworth et al.’s (1971, 1974) definition of sensitivity, which requires more than merely synchrony or contingency in response in order to classify the parent as sensitive. Ainsworth et al. (1971) defined the sensitive mother as being “capable of perceiving things from [the child’s] point of view” (Ainsworth et al., 1971, p. 43), whereas the insensitive mother tries to “socialize with the baby when he is hungry, play

with him when he is tired, and feed him when he is trying to initiate social interaction” (Ainsworth et al., 1974, p. 129). This highlights how the appropriateness of the response is key to Ainsworth et al.’s (1974) original definition of sensitivity. We therefore did not consider behaviors such as synchrony, mutuality, or contiguity to be indicative of sensitivity because they are not operationalized in terms of whether the parent’s response appropriately matches the infant’s cue. Given these constraints on our definitions of parental mentalization and sensitivity, it is difficult to provide a convincing account for how responding in a behaviorally sensitive manner would induce the parent to recognize the infant’s internal states; rather, responding sensitively is dependent on the parent being aware of the thoughts or feelings behind the infant’s cue.

Parental mentalization in the current study was represented by the concepts of mind-mindedness, insightfulness, and parental reflective functioning. Overall, correlations of studies using the mind-mindedness assessment did not differ from those of studies using either the insightfulness or parental reflective functioning assessment. Thus, the pooled correlation of .30 suggests that securely attached infants are more likely to have parents that are high in appropriate mind-mindedness, insightfulness, and parental reflective functioning, and low in nonattuned mind-mindedness. Although these concepts aim to measure similar mental processes in parents, they emphasize different aspects of mentalizing about the child, such as coherence, frequency, or accuracy. Theoretically, these aspects of mentalizing are all presumed to be important in evaluating parents’ perspective-taking abilities, and their appropriate interpretation of the infant’s mind. However, not all aspects may be equally relevant in predicting attachment security. Given

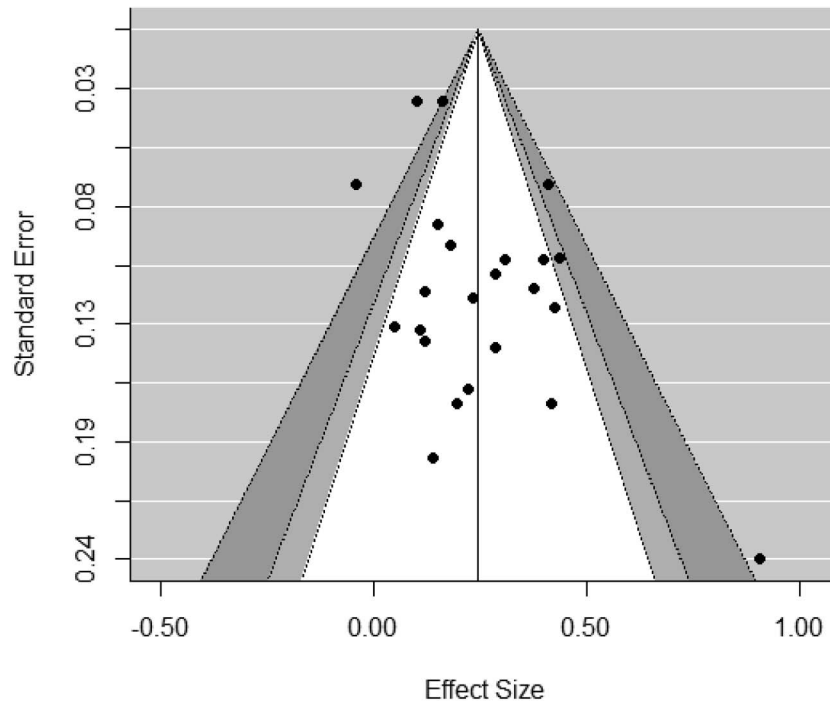


Figure 4. Funnel plot containing the mentalization-sensitivity effect sizes and their standard errors with confidence intervals set at 90, 95, and 99%.

that eight of the 13 studies on parental mentalization and attachment security used mind-mindedness to index mentalization, more studies on insightfulness and parental reflective functioning are needed to understand how these aspects of parental mentalization predict infant-parent attachment security.

To explore whether the appropriateness or accuracy of parental mentalization is important for understanding attachment security, we tested the notion that the two indices of mind-mindedness (i.e., appropriate and nonattuned mind-related comments) are orthogonal dimensions of parental mentalization and independently predict or relate to sensitivity and attachment security (Meins, 2013). Nonattuned mind-related comments (i.e., inaccurate mentalization) predicted attachment insecurity,  $r = .45$ , more strongly than appropriate mind-related comments predicted attachment security,  $r = .26$ . Moreover, nonattuned mind-related comments were unrelated to parental sensitivity,  $r = .13$ , whereas appropriate mind-related comments were positively correlated with sensitivity,  $r = .30$ . Attributing putative internal states that do not appear to relate to the infant's current experience may provide a strong indication that the parent has problems with appropriately representing the infant's mind and treating him or her as a sentient individual (Meins, 2013). On the other hand, failing to make appropriate mind-related comments during interactions does not necessarily point to an absence of mentalizing ability: some parents may not verbally reflect on their infants' states, but nevertheless show their appreciation of the infant's state through nonverbal actions (Shai & Belsky, 2011a, 2011b).

Although these findings fit with Ainsworth et al.'s (1974) emphasis on the appropriateness of parents' interpretations of and responses to the infant's signals in fostering secure attachment, our results should be interpreted with caution, as there were only four

effect sizes on the association between nonattuned mind-related comments and attachment, all from studies conducted by the same research team. The fact that 10 effect sizes were available for the relation between appropriate mind-related comments and attachment security highlights how some studies reported exclusively on the frequencies of appropriate mind-related comments. Our finding that nonattuned mind-related comments represent the index of mind-mindedness that more strongly predicts infant-parent attachment underlines the importance of assessing both appropriate and nonattuned mind-related comments.

Lastly, we turn to the role of paternal mentalization. Only two studies have examined whether fathers' mentalization was differently related to attachment security compared with mothers' mentalization. Three effect sizes from two small-sample studies were available for the association between paternal mentalization and infant-father attachment. Both studies reported that overall, mothers and fathers did not differ in their tendency to mentalize. Associations between paternal accurate mentalization and infant-father attachment were  $r = .29$  and  $r = .48$  in the studies of Lundy (2003) and Arnott and Meins (2007), respectively. These two moderate-to-strong associations give a first indication that accurate interpretation of the infant's mind is also important within the infant-father attachment relationship. The frequency of nonattuned mind-related speech was not examined in the study of Lundy (2003), but Arnott and Meins (2007) reported a nearly zero correlation between fathers' inaccurate mentalization and attachment security. However, these findings must be interpreted with great caution given that this study included only 15 infant-father dyads.

## Sensitivity and Attachment

As reported, we found a mean correlation of  $r = .25$  between parental sensitivity and attachment security. Over the past decades, previous meta-analyses found effect sizes somewhat different in magnitude: Atkinson et al. (2000),  $r = .27$ ; Goldsmith and Alan-sky (1987),  $r = .32$ ; Verhage et al. (2016),  $r = .35$ ; and de Wolff and van IJzendoorn (1997),  $r = .24$ . The relation between sensitivity and attachment thus seems to be substantial given that all meta-analyses found a moderate to medium-to-large association. The moderator analyses showed no moderating effects of factors such as SES and child age in contrast to the outcomes of some previous reviews (e.g., Atkinson et al., 2000; de Wolff & van IJzendoorn, 1997). In general our inclusion criteria were stricter compared with previous meta-analyses, resulting in a more homogeneous set of reviewed studies, and possibly less impact of moderators.

Because we included study samples with both mothers and fathers in the dataset, we tested whether the pooled correlation between sensitivity and attachment was moderated by parent gender. Moderator analyses showed that mean effect sizes reported in the eight samples with fathers tended to be smaller,  $r = .18$ , compared with mothers,  $r = .27$ . Our estimated mean correlation for fathers is compatible with the correlations reported in the father-focused syntheses of Lucassen et al. (2011),  $r = .12$ ; and de Wolff and van IJzendoorn (1997),  $r = .13$ . Fathers are presumed to be more focused on stimulation and exploratory play, with less emphasis on emotional and sensitive caregiving compared with mothers (Grossmann, Grossmann, Kindler, & Zimmermann, 2008; Lucassen et al., 2011). The role of sensitivity in the formation of secure attachment may therefore be less influential in father–child dyads. However, most of the global rating sensitivity instruments were developed from observing mother–child dyads, disregarding elements of sensitive behavior that are specific to mother– and father–child interactions. Whether the small(er) correlation between sensitivity and infant–father attachment stems from reliability and validity issues or from different interactional mechanisms deserves further attention in parenting research.

We also examined whether differences in methodological approaches within and between studies (i.e., type of instrument used, duration of the observation, home- or laboratory-based, etc.) affected the overall results. One recurring issue in the sensitivity–attachment discussion is the heterogeneity in assessment procedures, which has been argued to explain why studies conducted after Ainsworth et al.'s (1978) investigation have mainly found small-to-moderate links between sensitivity and attachment (e.g., de Wolff & van IJzendoorn, 1997; Mesman & Emmen, 2013; Pederson et al., 1998; Thompson, 1997). In order to address this issue, we only included studies using a global rating scale (including an evaluation of the appropriateness of sensitive and responsive parenting behaviors), aiming to capture the construct as conceptualized by Ainsworth and her colleagues. Overall, effect sizes were not dependent on the specific type of global instrument used, nor on the addition or removal of items and/or subscales from the original scale. This indicates that the use of different forms of global rating scales may not play a substantial role in the strength of the association between sensitivity and attachment. However, the use of so many different global rating instruments does not aid conceptual clarity on the sensitivity construct, and is therefore not

desirable. For a review on which global rating scales are most compatible with the original (maternal) sensitivity scale, we refer to the article of Mesman and Emmen (2013).

With regard to the methods used to assess attachment security, studies using the AQS tended to report larger effect sizes compared to studies using the strange situation (test of moderators was marginally significant,  $p = .077$ ). Studies using the AQS showed an estimated mean effect size of  $r = .33$  compared with  $r = .24$  for the studies using the strange situation. These results are in line with the review of van IJzendoorn et al. (2004), who found a mean effect size of  $r = .39$  between sensitivity and attachment assessed with the AQS. The instrument was developed with the aim of further examining relations between secure base behavior at home and classifications based on the strange situation. The AQS covers 90 items intended to assess a wide range of attachment-related behaviors on a continuous scale (i.e., secure base and exploratory behaviors, affective response, and social cognition). The strange situation, on the other hand, is exclusively focused on the classification of attachment behaviors during a separation–reunion situation. Possibly the broader focus on the entirety of child attachment behaviors and the home-based assessment of the AQS are more in line with the procedures assessing parental sensitivity (van IJzendoorn et al., 2004). Nonetheless, the correlation we found between AQS scores and parental sensitivity may also have been inflated because most studies used the same observational situation from which both sensitivity and attachment scores were derived.

## Publication Bias

Although the statistical tools we used to detect publication bias did not render significant results, inspection of the funnel plots showed that there were relatively few studies with a small sample size that yielded negative or near-zero correlations between sensitivity and attachment. The fluctuating strength of the pooled correlations found in meta-analyses over the past decades may also point out publication bias and file drawer issues. For instance, in the study of Verhage et al. (2016), the pooled correlation was .10 higher than in the present review, even though this study included at risk samples that usually report lower correlations between parental sensitivity and attachment security (de Wolff & van IJzendoorn, 1997). The main difference with the current study was that in the review of Verhage et al. (2016) only studies on sensitivity and attachment were included if these studies also assessed adult attachment with the AAI. The typical aim of these studies was to explain the mechanism underlying intergenerational transmission of attachment. In the other meta-analyses, such as the analyses reported here, the included studies had a variety of research aims. For example, in several studies, parental sensitivity was assessed as a secondary measure and examined in conjunction with other parental factors as predictors of attachment. Because sensitivity was not the main focus in these studies, it is possible that nonsignificant results for the relation between sensitivity and attachment security may have been easier to publish.

## Limitations

The most relevant limitation is the number of studies on the relation between mentalization and attachment included in the



present meta-analysis. The results may best be interpreted as a first impression of the overall relation between mentalization and attachment, as they are based on 20 separate effect sizes derived from 13 different samples. In order to get a sense of the robustness of the data, we tested the sensitivity of the analyses. This showed that leaving out influential studies (studies with a large sample size, or large effect size) resulted in a similar pooled correlation ( $r = .28$ ), indicating that the results were not dependent on the contribution of one study. The small number of studies may have been a more serious issue with regard to the moderator analyses. We aimed to reduce the impact of this issue by keeping the included studies as equal as possible in terms of study and sample characteristics. For instance, as we learned from previous meta-analyses, clinical or nonbiological samples typically show differences in pooled correlations between sensitivity and attachment compared to nonclinical and biological families (de Wolff & van IJzendoorn, 1997; Verhage et al., 2016). This led us to leave out a study on parental mentalization and attachment within foster families (Bernier & Dozier, 2003). The studies included in the current mentalization–attachment analyses ultimately yielded great similarities in sample characteristics: participants were biologically related, came from Western community samples, and attachment relationships were assessed during infancy with either the AQS or the strange situation procedure. Indeed, analyses showed that the proportion of variance that could be attributed to between-study differences was minor, which resulted in a reduction of moderator tests on between-study differences. This, however, does not diminish the fact that the few moderator tests we did perform within the mentalization–attachment meta-analyses should be interpreted with caution. It is plausible to suggest that small moderator effects did not reach statistical significance due to a lack of statistical power. The results should therefore be interpreted as a preliminary source of information and an encouragement for conducting more research on this topic.

A second limitation of the present study was that we could not investigate the relation between parental mentalization and attachment as assessed in terms of the four types of attachment derived from the strange situation procedure. Our analyses focused on the prediction of secure versus insecure attachment classification, and not the prediction of organized/disorganized or three- or four-way classifications of attachment. That is, most studies explained the two-way secure–insecure split because sample sizes were too small to examine differences between the four separate attachment

groups. Examining the three- or four-way classifications would have been interesting since Meins and colleagues (Meins, 2013; Meins et al., 2012) have outlined how the combination of appropriate and nonattuned mentalizing may allow for a more precise prediction of the four subtypes of attachment. In order to fully understand the additional value of mentalization in the development of secure attachment, large sample sizes are needed. At least 84 or 210 participants are needed to detect a large (.40) or medium (.25) difference in parental mentalization between the secure/insecure groups, respectively (using *G\*Power 3.1 Manual*, 2014; Cohen, 1969, p. 348). At least 102 or 252 participants are needed to detect a large or medium difference in parental mentalization between the three organized attachment groups (avoidant, secure, resistant). Lastly, at least 112 or 280 participants are needed to detect a large or medium effect for parental mentalization between the four attachment groups (avoidant, secure, resistant, disorganized). The need for large-scale studies is something future studies should take into account prior to setting up research on predictors of attachment.

A third limitation concerns the fact that we excluded studies that used microlevel measures of sensitivity. We made this decision to ensure that the assessment approaches of the included studies fitted the original definition of sensitivity, aiming for conceptual clarity, and enabling us to interpret the findings of the mediation analyses in a straightforward way. Our results thus do not speak to whether different operationalizations of sensitivity relate to parental mentalization or predict attachment security independently of parental mentalization. That said, the fact that we operationalized sensitivity in terms of the appropriateness of the response, and thus in the way most similar to parental mentalization, means that the observed independent contributions of sensitivity and parental mentalization to infant–parent attachment are all the more noteworthy.

## Future Directions

The present study's results provide reasons to modify the existing models of attachment by incorporating parental mentalization as a direct predictor of attachment security, but also as a predictor of sensitive parenting. Figure 5 provides an overview of a theoretical model based on the present and prior meta-analyses involving parental predictors of attachment. As can be seen in Figure 5, some relations still need to be addressed in future reviews.

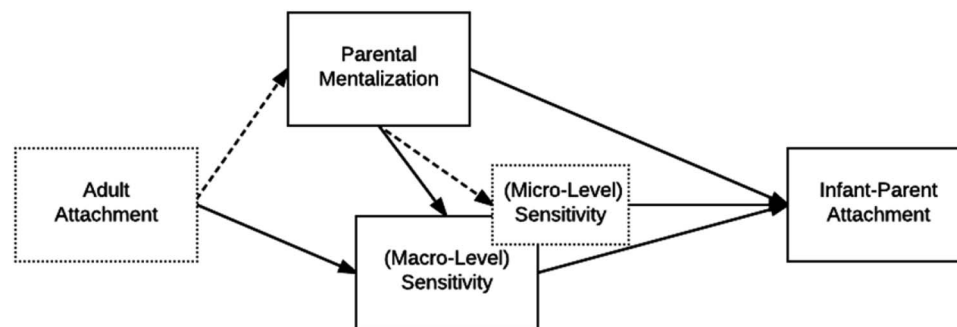


Figure 5. Model predicting infant attachment security based on previous meta-analytic studies. The dotted arrows refer to a relation that has not been supported by meta-analytic data yet.

The present review did not address the possible relation between adult attachment and parental mentalization. We outlined in the Introduction how adults with secure attachment representations are more likely to explain their own and others' behaviors in terms of internal states, as can be observed during the AAI. We did not take into account the relation between parents' own attachment status and their mentalizing abilities in the present study, as we considered the number of studies examining this association to be too few. There is, however, evidence that autonomous AAI attachment is linked to higher general mentalizing abilities (e.g., Bouchard et al., 2008; Fonagy et al., 1991). Furthermore, few studies have addressed the question of whether adult attachment representations relate to parents' ability to mentalize within the relationship with their child (e.g., Arnott & Meins, 2007; Demers, Bernier, Tarabulsy, & Provost, 2010b; Milligan, Khoury, Benoit, & Atkinson, 2015; Slade et al., 2005). More empirical studies are needed to understand whether parental mentalization relates to adult attachment in an attempt to shed further light on the mechanisms underlying transmission of attachment from parent to child.

Given that the present review did not take into account microlevel approaches to sensitive parenting, future research should investigate relations between parental mentalization and both global and microlevel characterizations of sensitivity. It would also be interesting to review the extent to which macro- and microlevel assessments of sensitivity explain shared and unique variance in attachment security. Investigating whether such contributions are independent of parental mentalization would provide the most complete model for understanding how early infant-caregiver interaction predicts later attachment security.

The model in Figure 5 outlines only the role of the parenting environment in explaining variation in infant-caregiver attachment, but it has become clear that a wide range of bioecological factors play a role in predicting attachment. While twin studies typically report a relatively small or negligible genetic component and a large (shared and nonshared) environmental component in infant-caregiver attachment (e.g., Bokhorst et al., 2003; O'Connor & Croft, 2001), studies addressing gene-environment interactions have highlighted that genetic vulnerability should not be disregarded (Gervai, 2009). For example, attachment disorganization seems to be predicted by the combination of a specific gene polymorphism and adverse environmental circumstances (Bakermans-Kranenburg & van IJzendoorn, 2007). These studies once more mark the complex pathways to caregiver-child attachment. The MA-SEM technique used in the present study provides a promising method for building more realistic models in which direct and indirect effects of multiple predictors of attachment can be tested.

The association between parental mentalization and infant-parent attachment has implications for the integration of mentalization-focused treatment approaches in current attachment interventions and preventive treatments. The integration of mentalization-oriented treatment methods in parent-infant interventions has shown promising results for improving infant mental health and the quality of parent-infant interactions (e.g., Baradon, Fonagy, Bland, Lenard, & Sleed, 2008; Colonnese et al., 2012; Fearon et al., 2006; Sadler et al., 2013; Schacht et al., 2017; Slade, Sadler, & Mayes, 2005). For instance, a randomized controlled trial of a mentalization-based intervention

showed that rates of infant-mother secure attachment increased over the course of the intervention (Sadler et al., 2013).

Whether such treatments are effective because they actually improve parents' tendency to mentalize is still unclear. Sadler et al. (2013) reported that increases in maternal reflective functioning were found in both the control and intervention group. Poznansky (2010) and Sadler et al. (2013) have suggested that reflective functioning may generally increase as the baby becomes increasingly known to the mother. It may therefore be difficult to differentiate intervention effects for parental mentalization from natural developments in the infant-parent relationship. However, Schacht et al.'s (2017) study demonstrated the efficacy of a video-feedback intervention that was specifically designed to facilitate mind-mindedness in mothers hospitalized for severe mental illness. Mothers who received the intervention showed a significant decrease in nonattuned mind-related comments and a marginally significant increase in appropriate mind-related comments, and they did not differ from psychologically healthy controls on either index of mind-mindedness post intervention. No such changes in mind-mindedness were observed in a control group of mothers with severe mental illness who received standard care. Moreover, at follow-up in the second year of life, the rate of secure infant-mother attachment was significantly higher in the intervention group than in the standard care group. The results from these first studies investigating the feasibility and effectiveness of mentalization-based interventions are promising, and thus provide a platform for future research on methods via which parental mentalization can be fostered.

## Conclusions

The results of the meta-analyses reported here highlight the role of parental awareness of and attunement to their infants' internal states in fostering both secure attachment and parental sensitivity. Parental mentalization was found to have a direct effect on infant-parent attachment that was independent of parental sensitivity, as well as impacting on attachment indirectly via its effect on sensitivity. Our findings thus inform existing models on the developmental pathways to infant-parent attachment and demonstrate the utility of considering parents' tendency to engage with their child's internal states and not merely their behavioral tendency to respond to the child's cues. Future research on how parents' own attachment representations relate to their mentalization about their child and how to intervene to improve parental mentalization will further delineate the interplay of these factors in predicting infant-parent attachment.

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Received April 22, 2016

Revision received May 3, 2017

Accepted May 5, 2017 ■