Mind matters

On mothers’ and fathers’ mentalizing about their child

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The fact that we try to make sense of our own and others' behavior in terms of thoughts and feelings is unique to us as humans. This capacity is termed mentalizing, or theory of mind, and has proven to be a hugely influential construct for understanding individual differences in development across the life span. Over the last two decades, mentalizing has become embedded in theories that attempt to explain child-parent attachment security as well as children's socioemotional functioning. The dissertation aimed to a) review the existing literature on parents' and children's mentalizing in relation to children's emotion regulation and behavioral functioning, and b) investigate whether mothers' and fathers' mentalizing (i.e., mind-mindedness) predicts variation in children's emotion regulation and behavioral functioning.
MIND MATTERS

On mothers’ and fathers’ mentalizing about their child
Colophon
Mind Matters - On mothers' and fathers' mentalizing about their child
Moniek Zeegers

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General introduction and outline of the dissertation
Chapter 1

GENERAL INTRODUCTION AND OUTLINE OF THE DISSERTATION

This is a transcript of a recording of a father playing with his 6-month-old son.

‘Aha yes, you want to grab the ball. Oh, there you go, you’ve got it. The ball is your absolute favorite, isn’t it? (…) Wow, you are very busy with your legs today. Let’s see if you remember how to kick the ball. Yes, you do. You know, Ajax could use a good striker. Do you like playing football? Yes? Yes! [baby turns his body away from the ball, grabs a different toy] Haha, o.k., oh all right, maybe I was the one enjoying.

Besides expressing his dream to have a son with a professional football career, this father is also showing signs of mentalizing—performing an imaginative mental activity about his son and himself, namely, perceiving and interpreting his baby’s and his own behavior in terms of intentional mental states (e.g., feelings, thoughts, needs, desires, beliefs, reasons, and purposes) (Bateman & Fonagy, 2012). A mentalizing parent understands that his or her mind is separate from the baby’s mind (“I think/feel something, my baby thinks/feels something”). A mentalizing parent also understands that his or her baby does not yet have the abilities to conceive the world the way adults do, and is aware that he or she is never sure of what is going on in the mind of the baby—one can merely make an educated guess about the thoughts or feelings that may symbolize the behavior of the baby. It is the high quality of a parent’s mentalizing that is thought to be crucial in the extent to which children come to perceive themselves as autonomous, efficacious agents (Sharp & Fonagy, 2008). The child’s socioemotional development can become impaired if a parent consistently fails to provide the child with representations of his or her internal world and mind and either ignores endeavors or represents them back with distortion or without adjustment (Fonagy, Gergely, Jurist, & Target, 2002). The present dissertation aimed to shed further light on the impact of parents’ mentalizing capacity on the security of the infant-parent attachment relationship and socioemotional development of young children, as well as the adaptability of parents’ mentalizing stance through intervention.

Mentalizing - A General Introduction

Over the years different terms arose to describe people’s ability and proclivity to think about their own and others’ state of mind, of which mentalizing and having a ‘theory of mind’ are used most often. Mentalizing was first introduced as a psychoanalytic concept in France (l’École Psychomatique de Paris) in the 1960s, as a result of analyzing adult patients with psychosomatic disorders (Freeman, 2016). Somaticizing patients seemed to be unaware of their affective arousal, showing a lack of attunement
to their own feelings - a lack of mentalizing (Luquet, 1987; Marty, 1991). Inspired by these observations, Fonagy and colleagues (1991) further developed the concept of mentalizing within the context of parenting and attachment relationships. Around the same time, developmental scientists started to investigate when and how children come to know that other people think, want, feel, believe things (Baron-Cohen, Leslie, & Frith, 1985; Premack & Woodruff, 1978; Wimmer & Perner, 1983). This developmental ability in children was termed a representational theory of mind. So, the term mentalizing arose from clinical observations of adult patients, while theory of mind arose from developmental research, but both terms tap into the same mental capacity.

The extent to which humans are able to mentalize is unique to our kind (Harari, 2011). Our mentalizing ability is probably the result of the evolutionary process of language development and social cooperation (Dunbar, 1998). To increase the chance of survival in a potentially frightening and increasingly complex social world, conscious reflection and planning of action were required (Cortina & Liotti, 2010). It was, and still is, an apparent asset to have this form of social cognition, to be aware of one’s own and others’ thoughts, beliefs and feelings so that one is able to anticipate peoples’ behavior, make choices and manage ourselves (Damasio, 2010; Freeman, 2016). The evolutionary development of language was crucial in this process, since the unique feature of language is the ability to transmit information about things in the physical and mental realm (Harari, 2011). By using language and symbols, humans became able to bridge the world of imagination and reality (Slade, 2005; Winnicott, 1965,1971).

Typically developing (adult) humans are capable of connecting behavior to mental states and verbalizing these connections. In fact, trying to understand one’s own and others’ minds is part of daily life. We understand that actions of ourselves and others are typically goal driven, motivated by an intent, a feeling, a desire, a wish. It may be evident that mentalizing is a multifaceted and hugely complex construct. Our mentalizing capacity concerns basic emotion understanding, recognizing that we feel happy because the sun is shining. But it also concerns a more complex understanding of how thoughts, feelings, and behavior are intertwined, for instance, being aware that we avoid things that we believe are dangerous and make us feel worried or anxious. We use our mentalizing capacity when we try to guess which way – left or right – a passing individual will go, but also when we understand that our partner is acting agitated at home about putting things in the dishwasher while actually he or she is frustrated about a missed opportunity at work. Hence, the capacity to mentalize is not only functional, important during daily actions and interactions with strangers, but also fundamental to the quality of the interactions and relationships we form with the people close to us. So, how can one make sense of mentalizing conceptually and which aspects of mentalizing are key to people’s mental health and relationships?
Neuroscience studies have greatly advanced our understanding of what constitutes (good) mentalization. So far, it seems that many distinct neural circuits are active during mentalizing, and neural activity depends on the particular features of the mentalization activity (Luyten, Fonagy, Lowyck & Vermote, 2012; Luyten & Fonagy, 2015; Nolte et al., 2013). Mentalizing may therefore best be clarified in terms of four dimensions that can be organized along polarities (Luyten, Fonagy, Lemma, & Target, 2012). These polarities are: (a) automatic (unconscious) versus controlled (conscious) mentalizing, (b) mentalizing with regard to self and to others, (c) mentalizing based on external features (e.g., he points to the milk; he wants me to pass him the milk) or internal features (e.g., she thinks he got the job; she feels excited) of self and others, and (d) thinking about thinking and beliefs (cognitive domain) versus the feeling and thinking-about-the-feeling (affective domain). The quality of mentalizing—“good” mentalizing—is dependent on the balance in the systems underlying the abovementioned polarities, so being conscious and reflective of how oneself and others feel and think (Luyten, Fonagy, Lemma et al., 2012).

A question that follows is: what enables people to maintain a balance in the several dimensions of mentalizing? Although there is still much to learn about this question, another major outcome of neuroscience studies indicates that the interaction between two specific factors largely determines whether someone is able to maintain good mentalizing: (a) stress or arousal and (b) the use of attachment strategies in response to stress or arousal (see Luyten & Fonagy, 2015, for an elaborate review). In short, the experience of stress or arousal has a negative impact on brain areas that are essential to mentalizing. For instance, stress impedes people’s ability to keep a balance in thinking about their own versus others’ thoughts and feelings, or in controlled versus automatic mentalizing processes (Arnsten, Mathew, Ubriani, Taylor, & Li, 1999; Mayes, 2000; 2006). Moreover, individuals who predominantly use secure attachment strategies in response to stress are better able to maintain control over their mentalizing, as they are able to seek proximity to internalized attachment figures when faced with adversity (Fonagy & Luyten, 2009; Luyten, Fonagy, Lowyck, et al., 2012). In other words, past attachment experiences with important others are proposed to underlie people’s capacity to either maintain or lose the awareness of their own and others’ thoughts and feelings during stressful situations.

Research has demonstrated that in normative samples of children and adults, variation in mentalizing abilities predicts ‘healthy’ socioemotional functioning (e.g., Hughes & Ensor, 2006; MacIntosh, 2013; Song, Waller, Hyde, & Olson, 2016). The literature on mentalizing and socioemotional functioning is complex, though, since for instance research has shown that bullies have excellent mentalizing abilities (e.g., Sutton, Smith, & Swettenham, 1999), and bully-victims have poor mentalizing abilities.
Perhaps the importance of mentalization is highlighted most clearly by the large body of studies in the past 30 years demonstrating that imbalances in the dimensions of mentalizing seem to be a transdiagnostic factor across almost all mental health disorders (e.g., autism, anxiety, psychosis, depression, eating disorders, narcissistic personality disorder, borderline personality disorder; Chung, Barch, & Strube, 2014; Cusi, Nazarov, Holshausen, Macqueen, & McKinnon, 2012; Fonagy & Luyten, 2016; Kuipers & Bekker, 2012; Ladegaard, Larsen, Videbech, & Lysaker, 2014; Luyten, Fonagy, Lemma, & Target, 2012; Skårderud, 2007). It appears that mentalizing is a fundamental capacity of people that determines the depth to which social information is processed, affecting behavior and mental health in all people.

Studying Mentalization in the Parenting Context

The term mentalizing became embedded in parenting research in the context of studying attachment security in children and the intergenerational transmission of attachment from parent to child (Fonagy, Steele, Moran, Steel, & Higgit, 1991; 2002; van IJzendoorn, 1995; Meins, 1997; Meins et al. 2001; Oppenheim & Koren-Karie, 2002; Slade, 2005). That is, at one point (van IJzendoorn, 1995), it became clear that a robust large association exists between parents’ adult attachment classification and infant–parent attachment, and that parents’ sensitive responsiveness to their infant’s signals only partially explains this link (Verhage et al., 2016). Meta-analytic data indicated that parental sensitivity explains 25% of the association between adult and child attachment, with around 75% of the variation remaining unexplained (referred to as the attachment transmission gap), suggesting that other mechanisms may underlie the transmission of attachment from parent to child (Verhage et al., 2016).

Attention to the parent’s mentalizing capacity as a possible predictor of attachment security arose after a study demonstrated that adults who displayed coherent and autonomous representations of attachment relationships during the Adult Attachment Interview (AAI; George, Kaplan, & Main, 1985) were prone to explain their own and their caregivers’ behaviors in terms of internal states, such as motives and intentions (Fonagy et al., 1991). On the other hand, adults with insecure (dismissive, preoccupied, or unresolved) AAI classifications showed less understanding of their own and others’ intentionality when describing their childhood experiences (Fonagy et al., 1991). These results thus led to questions about whether mentalizing capacity plays a role in predicting child–parent attachment or explaining the transmission of attachment from parent to child (e.g., Meins, 1997; Oppenheim & Koren-Karie, 2002; Slade, Grienenberger, Bernbach, Levy, & Locker, 2005).

Since then, four validated assessments of parents’ tendency to mentalize with respect to their child have been developed: a) mind-mindedness, b) parental reflective
functioning, c) insightfulness, and d) parental embodied mentalization; Meins, 1997; Oppenheim & Koren-Karie, 2002; Shai & Belsky, 2011; Slade et al., 2005). Three of the approaches (a, b, and c) 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). These constructs tap into mostly conscious, verbal, and reflective processing of social information that requires the capacity to reflect consciously and deliberately on and make adequate attributions about the feelings, thoughts, and intentions of self and others (Luyten et al., 2012). This emphasis on speech may reflect the fact that the human evolution of mentalizing is theorized to be accompanied by the evolution of language, and the two are developmentally intertwined (Harari, 2011). On the other hand, mentalizing also involves processes that are implicit and inaccessible to awareness and flexible control. These processes are captured in the assessment of parental embodied mentalization by considering sequences of parent-child body-to-body movements (e.g., Shai & Belsky, 2011a; Van Overwalle & Vanderkerckhove, 2013).

**Parental Mind-Mindedness**

The empirical studies in the present dissertation focused on the construct of mind-mindedness, originally defined as caregivers’ tendency to treat their children as individuals with minds of their own (Meins, 1997). The construct of mind-mindedness 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. The 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 agreement on the kind of parenting behaviors and attitudes that epitomize sensitivity. Furthermore, Meins et al. 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. The researchers thus sought to explore other ways in which mothers could demonstrate attunement to their preverbal infants’ internal states, considering multiple possible indices of mind-mindedness, ultimately leading to defining mind-mindedness in terms of parents’ use of mind-related comments during interactions (Meins et al., 2001).
The most substantial lines of research on mind-mindedness concern studies on predicting a) infant-parent attachment security, over and above parental sensitivity, and b) children’s own mentalizing abilities (theory of mind). With regard to the prediction of attachment, a body of studies on mind-mindedness considered parents’ appropriate and nonattuned mind-related speech as a correlate of parental sensitivity and predictor of attachment security. So far, most studies support the hypothesis that appropriate and nonattuned mind-related comments reflect two orthogonal dimensions of mind-mindedness, as they are unrelated to each other, and only appropriate mind-related comments associate with sensitive behavior of parents (e.g., Arnott & Meins, 2007; Demers, Bernier, Tarabulsy, & Provost, 2010a; Meins et al., 2001, 2012; Meins, 2013). Appropriate mind-related comments indicate attunement to and validation of the infant’s internal state. Nonattuned comments reflect the extent to which misinterpretations of the infant’s state emerge as a result of parents projecting their own state of mind or imposing their own agenda on the infant (Meins, 2013). A few studies demonstrated that mind-mindedness, specifically the proportion of nonattuned mind-related comments, predicts more (and unique) variance in attachment than sensitivity (e.g., Meins et al., 2001; 2012; 2017). Other studies demonstrated that (appropriate) mind-mindedness did not emerge as a significant predictor of attachment when sensitivity was taken into account (e.g., Laranjo et al., 2008; Lundy, 2003; Oppenheim et al., 2005). Hence, mixed findings have been presented on the unique contribution of mind-mindedness to the prediction of infant-parent attachment, next to parental sensitivity (McMahon & Bernier, 2017). With regard to the prediction of children’s mentalizing abilities there seems to be more convergent support for the hypothesis that appropriate mind-related comments during interactions with infants predict different aspects of children’s mentalizing abilities assessed between 2 and 5 years (Kirk et al., 2015, Laranjo et al., 2010, 2014; Meins et al., 2002, 2003; Meins, Fernyhough et al., 2013). Thus, the child’s capacity to develop a mentalizing stance depends on the capacity to be mind-minded, allowing the parent to “create a world for the child in which he may experience himself as a feeling, wanting, thinking being” (Target & Fonagy, 1996, p. 461).

Other than predicting attachment and children’s understanding of mind, it has been proposed that mind-related comments provide children with verbal scaffolds, structuring interactions in terms of clear mental concepts of the self and others. These scaffolds act as external regulators of the child’s affect and behavior at first, but later become internalized in the form of private speech, enabling children to self-regulate (Fernyhough, 2008; McMahon & Bernier, 2017; Vygotsky, 1987). Few studies have addressed these propositions to date by examining mind-mindedness in relation to executive functioning in toddlerhood and externalizing and internalizing behavior problems in preschoolers (Bernier, Carlson, & Whipple, 2010; Gagné, Bernier, &
McMahon, 2018; Meins, Centifanti et al., 2013). None of these studies, however, used direct assessments of children’s emotion regulation capacity.

The Present Dissertation

This dissertation aimed to investigate the propositions made in earlier studies that parents’ mentalizing capacity and mind-mindedness are important predictors of children’s attachment security and socioemotional functioning (e.g., Fernyhough, 2008; Fonagy et al., 2002; Meins, 1997; Meins et al., 2001; Slade, 2005). Thereby, this dissertation also sheds further light on the two core hypotheses of attachment theory (Bowlby, 1969/1982) that postulate that a) the parent’s sensitive responsiveness to the infant’s signals is key to shaping individual differences in secure attachment and b) early attachment experiences greatly affect later socioemotional functioning, which may extend to adult attachment and parenting (Bowlby, 1973). This dissertation is divided into three sections, each with a separate aim. The first section aimed to examine the associations among parent and child mentalization, parental sensitivity and child-parent attachment security (Chapters 2 and 3). The second section aimed to examine unexplored relations between both parents’ mind-mindedness and young children’s socioemotional development (Chapters 4 and 5). The third section aimed to evaluate interventions that aim to change parents’ mentalizing stance and/or mind-mindedness (Chapters 6, 7, 8). Below I explain the rationale for the studies in each section.

Since research on the association between people’s mentalizing and attachment relationships expanded hugely the past two decades, the aim of Section 1 was to synthesize the research on the associations among the parent’s and child’s mentalizing capacity and child-parent attachment security. As mentioned above, parental mentalization has been introduced in the light of understanding variation in attachment (in)security and the intergenerational transmission of attachment security. Ever since it became clear that parental sensitivity was not an exclusive or the most important predictor of attachment security, it seemed important to continue observing parental features and behavior that could explain why some children feel secure in the presence of their caregiver and others do not (van IJzendoorn, 1995; Meins et al., 2001; Slade, 2005; Oppenheim).

Chapter 2 presents a meta-analytic study that considered whether parental mentalization (i.e., mind-mindedness, parental reflective functioning, and insightfulness) should be incorporated in models that map child-parent attachment. In this study, we examined to what extent parental mentalization predicts unique variation in attachment over and above parental sensitivity. Secondly, we examined whether parental mentalization is associated with and predicts attachment via sensitive caregiving behavior.
Chapter 3 presents a second meta-analysis. This study synthesized research on attachment as a predictor of two measures of children's mentalizing abilities: false-belief understanding (FBU) and emotion understanding (EU). The review was initiated because a) questions were raised on whether attachment possibly relates more strongly to children's emotion understanding than to false belief understanding (e.g., Greig & Howe, 2001), and b) doubts about the direct nature of the attachment–mentalization relation (Meins et al., in preparation). The meta-analysis explored the potential moderating effect of the method of assessing attachment, as well as the potential mediating effect of children's verbal ability, on the association between attachment security and children's mentalizing ability.

Since it is the premise of attachment theory that a secure parent-child relationship facilitates healthy social and emotional development (Bowlby, 1973), we investigated in Section 2 whether the positive effects of parents' early mentalizing capacity extend to young children's socioemotional development. Section 2 furthermore taps into the call for research on the mentalizing capacity of fathers (Camoirano, 2017; McMahon & Bernier, 2017). So far, research on parental mentalization, or parenting research in general, focuses on the effects of a single parent, typically the mother, on the child's development. It has been long established that in two-parent families (mother-father), two separate child-caregiver attachment relationships are formed that are each of utmost importance to the child's sense of security and developmental health (Lucassen et al., 2011). However, parenting research rarely examines the unique and complementary effects of both parents on their child’s development. Fathers have been included in 11 (typically) small-sample studies on mind-mindedness, and 8 of these studies investigated paternal mind-mindedness as a predictor of children's developmental outcomes (see McMahon & Bernier, 2017; Gagné et al., 2018; Miller, Kim, Boldt, Goffin, & Kochanska, 2019). Furthermore, none of these studies examined the possible joint effects of couples’ mind-mindedness on child outcomes.

The two studies in Section 3 were part of a longitudinal study on the antecedents of anxiety from infancy to middle childhood (de Vente, Majdandžić, Colonnese, & Bögels, 2011). Chapter 4 examined whether a pathway exists from mothers and fathers’ mind-mindedness to infants' physiological emotion regulation via parents' caregiving behavior across the first year of life (from 4 to 12 months). Only one study so far examined the relation between early mind-mindedness and toddlers’ executive functions relevant to self-regulation (working memory, impulse control, and set shifting; Bernier et al., 2010). No study has yet explored whether mind-mindedness exerts an effect on emotion regulation throughout the first year of life.

Chapter 5 investigated to what extent mothers’ and fathers’ mind-mindedness in early infancy (4 months), late infancy (12 months) and toddlerhood (30 months), as well
as the interaction between mothers’ and fathers’ mind-mindedness, predict children’s social competence and behavior problems at 4.5 years. In other words, this study considered whether the combination of mind-mindedness in two parents predicted their child’s later social and behavioral development.

If the models that link parental mentalization and mind-mindedness to child attachment and socioemotional development hold, these models have implications for modifying existing (attachment oriented) interventions by incorporating an explicit focus on enhancing parental mentalization. There are multiple ways through which interventions can bring about changes in parents’ mentalizing, some of which have proven to be more successful than others (e.g., Sadler et al., 2013; for an overview see Camoirano, 2017). The complex developmental history of an individual’s mentalizing capacity (i.e., seeing that it is linked to attachment experiences; Arnott & Meins, 2007; Luyten & Fonagy, 2015), leads to the question of whether mentalizing could be readily adapted by short parenting interventions, and whether such adaptations remain over a longer time span. Section 3 examined the effectiveness of two parenting interventions that aim to change parents’ “online” moment-to-moment representations of their child’s mind.

The Mindful with your baby/toddler intervention is an 8-week group intervention for parents of children aged zero to 4 years with increased levels of parenting stress, and incorporates mindful parenting training and attachment oriented psycho-education. The aim of the training is to increase parents’ awareness of their own and their child’s inner states in a non-judgemental manner through meditation practices (Potharst et al., 2017). Chapter 6 presents a small-sample pilot study on the self-reported effects of the Mindful with your toddler interventions, since only the effectiveness of the Mindful with your baby intervention had previously been examined. In Chapter 7 we investigated whether the Mindful with your Baby/Toddler training led to observed changes in maternal mind-mindedness, sensitivity, and mother and child synchrony.

Chapter 8 presents an evaluation of an attachment-based intervention, Basic Trust, that aims to decrease child attachment insecurity through explicitly improving both mothers’ and fathers’ use of child-directed mind-related speech through video feedback training. The intervention teaches parents to use a stepwise method of interacting with their child, whereby parents consistently refer to the child’s mental states or behavior, before mentioning their own opinions, instructions, and initiatives (Polderman, 2017). We investigated whether the training led to improvements in children’s insecure attachment and internalizing/externalizing problems, as well as changes in mothers’ and fathers’ mind-mindedness, sensitivity, and self-reported parenting stress directly, and six months after the training had ended.
Finally, Chapter 9 includes a discussion on the present dissertation’s contribution to the research on parental mentalization (for each of the three sections separately) along with its implications for future fundamental and intervention research.
A meta-analysis on parental mentalization and sensitivity as predictors of infant-parent attachment

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Chapter 2

ABSTRACT

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.
Predicting infant-parent attachment - a meta-analysis

INTRODUCTION

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, & 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 infant-parent 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 pre-school years (Meins et al.,
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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, Tarabulsy, & 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

**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 &
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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, Grienenberger, 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.

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

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<th>Construct</th>
<th>Definition</th>
<th>Assessment approach</th>
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| Parental Mind-Mindedness         | The parent’s tendency to treat their child as a mental agent (Meins, 1997) | - During the pre-verbal 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).  
- Post-infancy: 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-Karie 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-Karie 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).  
- Questionnaire involving three subscales (pre-mentalizing 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) |
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 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-months-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
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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
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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
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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 of the supplementary 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), 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 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
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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 of the online supplementary 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 of the online supplementary 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 \((n = .73)\), to excellent for percentage boys \((ICC = .96)\), effect size \((n = .90)\), and child age \((n = .94)\), 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 $r = – .09$ to $r = .54$. Mentalization showed an overall significant positive association with infant attachment security, $r = .30$, 95% CI [.22, .38].

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 $r = .74$. 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
Table 2. Estimated Pooled Correlations (Fisher’s Z and Pearson’s r) for the Relationships between Parental Mentalization, Sensitivity and Infant Attachment Security

<table>
<thead>
<tr>
<th>Association</th>
<th>#k</th>
<th>#ES</th>
<th>N</th>
<th>Zr (SE)</th>
<th>r (SE)</th>
<th>95% CI (r)</th>
<th>t (df)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mentalization - Attachment</td>
<td>13</td>
<td>20</td>
<td>960</td>
<td>.31 (.04)</td>
<td>.30 (.04)</td>
<td>[0.22, 0.38]</td>
<td>7.21 (19)</td>
<td>&lt;.001***</td>
</tr>
<tr>
<td>Sensitivity - Attachment</td>
<td>51</td>
<td>82</td>
<td>6664</td>
<td>.26 (.03)</td>
<td>.25 (.03)</td>
<td>[0.20, 0.31]</td>
<td>9.07 (81)</td>
<td>&lt;.001***</td>
</tr>
<tr>
<td>Mentalization - Sensitivity</td>
<td>14</td>
<td>24</td>
<td>2085</td>
<td>.25 (.03)</td>
<td>.25 (.03)</td>
<td>[0.18, 0.31]</td>
<td>7.20 (23)</td>
<td>&lt;.001***</td>
</tr>
</tbody>
</table>

Note. #k = number of studies; #ES = number of effect sizes; N = total of unique participants; Zr = Fisher’s Z correlation; r = Pearson’s r correlation coefficient; 95% CI = 95% confidence intervals of Pearson’s r coefficient; t = t-value; * p < .05; ** p < .01; *** p < .001.
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, \( F(1, 100) = 0.19, p = .05, p = .667, 95\% \text{ CI} [ -0.16, 0.25 ] \).

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, \( r = .29, SE = .04, 95\% \text{ CI} [ .21, .37 ], p < .001 \), sensitivity and attachment, \( r = .26, SE = .03, 95\% \text{ CI} [ .21, .32 ], p < .001 \), and mentalization and sensitivity, \( r = .27, SE = .04, 95\% \text{ CI} [ .19, .35 ], p < .001 \). 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 controlled for the effect of the other predictor in the model. The coefficient of $\beta = 0.24$ 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, $r = 0.07, 95\% \text{ CI } [0.04, 0.10]$. 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).

![Figure 1](image)

**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 $0.07 [0.04, 0.10]$

### 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 ($\omega^2 = 0.001$, $\chi^2 (1) = 0.001$, $p = 0.971$). Significant variation in effect sizes within studies was present ($\omega^2 = 0.014$, $\chi^2 (1) = 3.56$, $p = 0.059$; one-sided). A total of 1.65% of the total variance was accounted for by
Chapter 2

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 ($\hat{\omega}^2 = .026, \chi^2(1) = 8.37, p = .004$), as well as variation within studies ($\hat{\omega}^2 = .007, \chi^2(1) = 17.97, p < .001$). 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 ($\hat{\omega}^2 < .001, \chi^2(1) < 0.001, p = .984$). Significant variation within studies was present ($\hat{\omega}^2 = .014, \chi^2(1) = 10.23, p < .001$). 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 of the supplementary 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 of the supplementary 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, $r = .32$, 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
### Table 3. Parental Mentalization and Attachment: Estimated Results (Fisher's Z, Regression Coefficients, Omnibus-test) for Continuous and Categorical Moderator Variables

<table>
<thead>
<tr>
<th>Study characteristics</th>
<th>#k</th>
<th>#ES</th>
<th>Zr (SE)</th>
<th>β1 (SE)</th>
<th>F (df1, df2)a</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time between measurements (c)</td>
<td>13</td>
<td>20</td>
<td>.01 (.01)</td>
<td>F(1, 18) = 0.68</td>
<td>.422</td>
<td></td>
</tr>
<tr>
<td><strong>Sample characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of the parent (c)</td>
<td>12</td>
<td>19</td>
<td>-.001 (.01)</td>
<td>F(1, 17) = 0.02</td>
<td>.904</td>
<td></td>
</tr>
<tr>
<td>Gender of the parent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mothers</td>
<td>13</td>
<td>17</td>
<td>.31 (.05)***</td>
<td>F(1, 18) = 0.41</td>
<td>.841</td>
<td></td>
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<tr>
<td>fathers</td>
<td>2</td>
<td>3</td>
<td>.28 (.17)***</td>
<td>-.03 (.17)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>low</td>
<td>5</td>
<td>11</td>
<td>.39 (.06)***</td>
<td>F(1, 18) = 3.00</td>
<td>.100</td>
<td></td>
</tr>
<tr>
<td>middle-high</td>
<td>9</td>
<td>9</td>
<td>.25 (.06)***</td>
<td>-.14 (.08)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mentalization assessment</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Assessment strategy</td>
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<td></td>
</tr>
<tr>
<td>MM</td>
<td>8</td>
<td>15</td>
<td>.30 (.06)***</td>
<td>F(1, 18) = 0.02</td>
<td>.884</td>
<td></td>
</tr>
<tr>
<td>IA/PRF</td>
<td>5</td>
<td>5</td>
<td>.31 (.08)***</td>
<td>.01 (.10)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MM Index</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>appropriate</td>
<td>7</td>
<td>10</td>
<td>.26 (.05)***</td>
<td>F(1, 12) = 8.60*</td>
<td>.013**</td>
<td></td>
</tr>
<tr>
<td>nonattuned</td>
<td>3</td>
<td>4</td>
<td>.49 (.07)***</td>
<td>.23 (.08)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. #k = number of studies; #ES = number of effect sizes; Zr = Fisher’s Z correlation; SE = standard error; β1 = estimated regression coefficient; (c) = continuous variables; MM = mind-mindedness; IA = insightfulness assessment; PRF = parental reflective functioning; * p < .05; ** p < .01; *** p < .001. a Omnibus test of all regression coefficients in the model.
Table 4 Sensitivity and Attachment: Estimated Results (Fisher’s Z, Regression Coefficients, Omnibus-Test) for Continuous and Categorical Moderator Variables

<table>
<thead>
<tr>
<th>Study characteristics</th>
<th>#k</th>
<th>#ES</th>
<th>Zr (SE)</th>
<th>β (SE)</th>
<th>F (df1, df2)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Publication year (c)</td>
<td>51</td>
<td>82</td>
<td>.004 (.01)</td>
<td>.004 (.01)</td>
<td>F(1,80) = 0.66</td>
<td>.418</td>
</tr>
<tr>
<td>Time between measurements (c)</td>
<td>51</td>
<td>82</td>
<td>- .01 (.004)</td>
<td>- .01 (.004)</td>
<td>F(1,80) = 1.93</td>
<td>.168</td>
</tr>
<tr>
<td>Effect size controlled</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>3</td>
<td>4</td>
<td>.38 (.03)***</td>
<td>.38 (.03)***</td>
<td>F(1,80) = 0.82</td>
<td>.368</td>
</tr>
<tr>
<td>no</td>
<td>48</td>
<td>78</td>
<td>.26 (.14)***</td>
<td>.26 (.14)***</td>
<td>F(1,80) = 0.82</td>
<td>.368</td>
</tr>
<tr>
<td>Published</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>45</td>
<td>77</td>
<td>.26 (.03)***</td>
<td>.26 (.03)***</td>
<td>F(1,73) = 0.11</td>
<td>.737</td>
</tr>
<tr>
<td>no</td>
<td>2</td>
<td>5</td>
<td>.30 (.14)*</td>
<td>.30 (.14)*</td>
<td>F(1,73) = 0.11</td>
<td>.737</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sample characteristics</th>
<th>#k</th>
<th>#ES</th>
<th>Zr (SE)</th>
<th>β (SE)</th>
<th>F (df1, df2)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of the parent (c)</td>
<td>45</td>
<td>70</td>
<td>.01 (.01)</td>
<td>.01 (.01)</td>
<td>F(1,68) = 0.84</td>
<td>.364</td>
</tr>
<tr>
<td>Gender of the parent</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>mothers</td>
<td>45</td>
<td>70</td>
<td>.27 (.03)***</td>
<td>.27 (.03)***</td>
<td>F(1,80) = 2.66</td>
<td>.107</td>
</tr>
<tr>
<td>Fathers</td>
<td>8</td>
<td>12</td>
<td>.18 (.06)***</td>
<td>.18 (.06)***</td>
<td>F(1,80) = 2.66</td>
<td>.107</td>
</tr>
<tr>
<td>Percentage boys (c)</td>
<td>46</td>
<td>76</td>
<td>.004 (.005)</td>
<td>.004 (.005)</td>
<td>F(1,74) = 0.47</td>
<td>.496</td>
</tr>
<tr>
<td>Age child sensitivity assessment (c)</td>
<td>51</td>
<td>82</td>
<td>.004 (.003)</td>
<td>.004 (.003)</td>
<td>F(1,80) = 1.49</td>
<td>.225</td>
</tr>
<tr>
<td>Age child attachment assessment (c)</td>
<td>51</td>
<td>82</td>
<td>- .003 (.003)</td>
<td>- .003 (.003)</td>
<td>F(1,80) = 0.61</td>
<td>.438</td>
</tr>
<tr>
<td>Continent</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>13</td>
<td>20</td>
<td>.30 (.06)***</td>
<td>.30 (.06)***</td>
<td>F(3,78) = 0.96</td>
<td>.404</td>
</tr>
<tr>
<td>North-America</td>
<td>26</td>
<td>42</td>
<td>.22 (.04)***</td>
<td>.22 (.04)***</td>
<td>F(3,78) = 0.96</td>
<td>.404</td>
</tr>
<tr>
<td>Asia</td>
<td>9</td>
<td>12</td>
<td>.30 (.07)***</td>
<td>.30 (.07)***</td>
<td>F(3,78) = 0.96</td>
<td>.404</td>
</tr>
<tr>
<td>other</td>
<td>6</td>
<td>8</td>
<td>.34 (.09)***</td>
<td>.34 (.09)***</td>
<td>F(3,78) = 0.96</td>
<td>.404</td>
</tr>
<tr>
<td>SES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>low</td>
<td>12</td>
<td>18</td>
<td>.24 (.06)***</td>
<td>.24 (.06)***</td>
<td>F(2,79) = 0.08</td>
<td>.920</td>
</tr>
</tbody>
</table>
### Table 4 (continued)

<table>
<thead>
<tr>
<th>Attachment assessment</th>
<th>#ES</th>
<th>Zr (SE)</th>
<th>β₁ (SE)</th>
<th>F (df1, df2)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrument</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SSP</td>
<td>42</td>
<td>.24 (.03)**</td>
<td>.10 (.06)</td>
<td>F(1,80) = 3.23</td>
<td>.077</td>
</tr>
<tr>
<td>AQS</td>
<td>11</td>
<td>.34 (.05)**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classification SSP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>three-way (ABC)</td>
<td>11</td>
<td>.31 (.07)**</td>
<td></td>
<td>F(1,61) = 1.25</td>
<td>.269</td>
</tr>
<tr>
<td>four-way (ABCD)</td>
<td>31</td>
<td>.22 (.04)**</td>
<td>-.09 (0.08)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Sensitivity assessment         |     |           |            |              |         |
|Location                       |     |           |            |              |         |
| home                          | 27  | .27 (.04)**|            |              |         |
| lab                           | 28  | .25 (.04)**| -.02 (.06) | F(1,54) = 0.40 | .532    |
| Duration (c)                  | 38  | .00 (.00)  |            |              |         |
| Instrument                    |     |           |            |              |         |
| Ainsworth scales              | 21  | .20 (.04)**|            |              |         |
| MBQS                          | 11  | .33 (.06)**| .14 (.08)  |              |         |
| EAS                           | 4   | .30 (.11)**| .10 (.12)  |              |         |
| other                         | 18  | .28 (.05)**| .09 (.06)  |              |         |
| Modification instrument       |     |           |            |              |         |
| original                      | 34  | .30 (.04)**|            |              |         |
| scales removed                | 6   | .21 (.08)**| -.09 (.09) |              |         |
| scales added                  | 11  | .18 (.06)**| -.12 (.07) |              |         |

Note. #k = number of studies; #ES = number of effect sizes; Zr = Fisher’s Z correlation; SE = standard error; β₁ = estimated regression coefficient; (c) = continuous variables; * p < .05; ** p < .01; *** p < .001.

a Omnibus test of all regression coefficients in the model.
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 of the supplementary 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 display funnel plots of effect size estimates against their standard errors for each of the three meta-analyses. The trim and
Table 5. Parental Mentalization and Sensitivity: Estimated Results (Fisher's Z, Regression Coefficients, Omnibus-Test) for Continuous and Categorical Moderator Variables

<table>
<thead>
<tr>
<th>Sample characteristics</th>
<th>#k</th>
<th>#ES</th>
<th>Zr (SE)</th>
<th>β₁ (SE)</th>
<th>F (df1, df2)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age of the parent (c)</td>
<td>14</td>
<td>24</td>
<td>.02 (.01)</td>
<td></td>
<td>F(1, 22) = 3.48</td>
<td>.076</td>
</tr>
<tr>
<td>SES</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F(1, 22) = 0.88</td>
<td>.359</td>
</tr>
<tr>
<td>low</td>
<td>9</td>
<td>12</td>
<td>.21 (.05)***</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>middle-high</td>
<td>6</td>
<td>12</td>
<td>.28 (.09)***</td>
<td>.07 (.07)</td>
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<td></td>
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<tr>
<td>Mentalization assessment</td>
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<tr>
<td>Assessment strategy</td>
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</tr>
<tr>
<td>MM</td>
<td>10</td>
<td>18</td>
<td>.24 (.04)***</td>
<td></td>
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<td>.668</td>
</tr>
<tr>
<td>PRF/INS</td>
<td>5</td>
<td>6</td>
<td>.27 (.07)***</td>
<td>.03 (.08)</td>
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<td></td>
</tr>
<tr>
<td>MM index</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>appropriate</td>
<td>9</td>
<td>10</td>
<td>.30 (.05)***</td>
<td></td>
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<td>.055</td>
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<tr>
<td>nonattuned</td>
<td>5</td>
<td>5</td>
<td>.13 (.07)</td>
<td>-.17 (.08)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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; β₁ = estimated regression coefficient; (c) = continuous variables; * p < .05; ** p < .01; *** p < .001.
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 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 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 attachment, 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 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 mentalizing 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 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 Alansky (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
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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

Figure 2. Funnel plot containing the mentalization–attachment effect sizes and their standard errors
Predicting infant-parent attachment - a meta-analysis

**Figure 3.** Funnel plot containing the sensitivity–attachment effect sizes and their standard errors

**Figure 4.** Funnel plot containing the mentalization-sensitivity effect sizes and their standard errors
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.
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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. 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.
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(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.

Figure 2. 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 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; Colonnesi 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. More-over, 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.
Predicting infant-parent attachment - a meta-analysis
Does attachment security predict children’s thinking-about-thinking and thinking-about-feeling? A meta-analysis

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ABSTRACT

Previous research presents no clear picture of the association between caregiver–child attachment and the two hallmarks of children’s mentalizing abilities: false-belief understanding (FBU) and emotion understanding (EU). The present meta-analytic study investigated four questions: (a) what is the pooled correlation between attachment and children’s mentalizing abilities, as indicated by FBU and EU; (b) are there differences in the magnitude of correlations between attachment and FBU on the one hand, and attachment and EU on the other hand; (c) does children’s verbal ability mediate the relation between attachment and children’s FBU and EU; (d) is the relation between attachment and children’s mentalization moderated by the attachment assessment approach (behavioral vs. representational) and/or instrument? A total of 64 effect sizes (N = 1734 children) were subjected to multilevel analyses. The results showed that the association between attachment and EU, \( r = .31 \), was significantly larger than the association between attachment and FBU, \( r = .19 \). After controlling for children’s language ability, the pooled correlation between attachment and EU dropped slightly to \( r = .26 \), whereas the association between attachment and FBU dropped to a marginally significant correlation, \( r = .10 \). Studies using behavioral measures of attachment reported lower correlations compared to studies using representational measures. The findings suggest that the association between attachment and FBU is indirect, and that methodological differences between the different attachment measures may partially explain the significant relations between attachment and children’s mentalizing abilities.
INTRODUCTION

The concept of mentalizing, or theory of mind, encapsulates how we make sense of our own and others’ minds. It refers to an imaginative mental activity: perceiving and interpreting human behavior in terms of mental states (e.g., needs, desires, feelings, beliefs, goals, and reasons; Allen, 2003). Mentalizing facilitates social functioning because it makes people’s behavior predictable and comprehensible. Even walking through a market requires us to attribute thoughts and intentions to others, or we would constantly bump into each other. Mentalizing makes people’s behavior meaningful—the meaning we attribute to our own and others’ behavior is crucial to how we see and feel about ourselves, others, and our relationships with others. Disturbances in the capacity to mentalize frequently and/or accurately appear to be a transdiagnostic factor across a wide range of disorders (e.g., autism, anxiety, psychosis, depression, eating disorders, borderline personality disorder; Chung, Barch, & Strube, 2014; Cusi, Nazarov, Holshausen, Macqueen, & McKinnon, 2012; Fonagy & Luyten, 2016; Kuipers & Bekker, 2012; Ladegaard, Larsen, Videbech, & Lysaker, 2014; Luyten, Fonagy, Lemma, & Target, 2012; Skårderud, 2007). Understanding the development of people’s mentalizing capacity and tendency has therefore been an important goal of social and behavioral sciences.

The ability to mentalize is thought to stem from a dynamic evolutionary process that fits organisms to their environment, improving their chance of survival and reproduction (Cortina & Liotti, 2010; Gergely & Unoka, 2008). Early forms of mentalizing emerge in infancy, such as intentional or referential communication (e.g., Colonna, Stams, Koster, & Noom, 2010; Liszkowski & Tomasello, 2011) and implicit (nonverbal) understanding of others’ intentions, desires, and beliefs (e.g., Brooks & Meltzoff, 2015; Colonna, Rieffe, Koops, & Perucchini, 2008; Yott, Poulin-Dubois, 2016). These mentalizing tendencies during infancy have been found to be precursors of mentalizing abilities later in childhood, and continue into a full understanding of one’s own and others’ mental states (e.g., Colonna et al., 2008; Thoermer, Sodian, Vuori, Perst, & Kristen, 2013; Wellman, Lopez-Duran, LaBounty, & Hamilton, 2008).

Two of the most examined hallmarks of children’s mentalizing development are the emerging abilities to understand false beliefs and emotions in others. False-belief understanding (FBU) entails whether children are able to understand that actions or thoughts are driven by different beliefs that people hold. The classic task assessing this ability is a storytelling task developed by Wimmer and Perner (1983), which was later modified to what is known as the Sally-Anne test (Baron-Cohen, Leslie, & Frith, 1985). A puppet named Sally takes a marble and hides it in her basket. She then “leaves” the room and goes for a walk. While she is away, Anne takes the marble out of Sally’s basket.
and puts it in her own box. Sally is then reintroduced and the child is asked: “Where will Sally look for her marble?” Around 4 years of age there is substantial variation in whether or not children correctly understand where Sally will look for the marble, providing information on the advancement of children’s developing mentalization abilities (Baron-Cohen et al., 1985).

Emotion understanding (EU) entails whether a child is able to recognize emotional states from facial expressions and understand the causes of emotions that are typically felt by individuals. The classic task assessing this ability is Denham’s (1986) puppet task. This task includes affect labeling and affective perspective-taking judgements, and measures the degree to which children are able to match facial expressions to the correct emotion (i.e., sad, happy, angry, scared). The task involves hand puppets enacting multiple stories, after which the child is asked how the puppet would feel and is then asked to affix the appropriate felt face. Performance on EU tasks also varies greatly among preschoolers, and both FBU and EU performance have shown to predict positive aspects of children’s socioemotional development, such as prosocial behavior and social competence (Barreto, Osório, Baptista, Fearon, & Martins, 2017; Cassidy, Werner, Rourke, Zubernis, & Balaraman, 2003; Imuta, Henry, Slaughter, Selcuk, & Ruffman, 2016; Walker, 2005; Weimer, Dowds, Fabricius, Schwanenflugel, & Suh, 2017), moral reasoning (Lane, Wellman, Olson, LaBounty, & Kerr, 2010), and peer popularity (Slaughter, Imuta, Peterson, & Henry, 2015).

Attachment and Children’s Mentalizing Abilities

Attachment theory is thought to be an important framework for understanding various aspects of child development, including mentalizing abilities (Fonagy et al., 2002; Luyten & Fonagy, 2015). First of all, it seems that child–parent attachment and intersubjective mentalizing abilities are functionally and developmentally distinct, but interrelated (Cortina & Liotti, 2010; Gergely & Onuka, 2008). Support for this view comes from studies showing that attachment behavior is shown in non-humans that lack the capacity to mentalize in the way that humans do (Cortina & Liotti, 2010). The attachment system serves the evolutionary purpose of protection from predators, while the crucial adaptation responsible for mentalizing system probably grew out of the evolution of cooperation that took place among our homo ancestors (Boehm, 1999; Bowles, 2006; Boyd & Richerson, 2005). That is, a fundamental shift occurred during the course of human evolution from a social organization based primarily on competition and dominant hierarchies (promoting the development of attachment behavior) to a social organization based on equality and cooperation (promoting the development of
The creation of a mental processing system is thus not an evolutionary function of the attachment to the caregiver. However, it has been proposed that the secure child–parent attachment relationship may provide the child with an optimal environment in which the mentalizing system can unfold to its full potential. The basic evolutionary purpose of the newborn’s attachment instinct is to maintain proximity to an attachment figure (Bowlby, 1969/1982; Cortina & Liotti, 2010; Midgley & Vrouva, 2013). The infant’s attachment behaviors, such as crying or smiling, are answered by attachment behaviors of the adult (touching, holding, soothing), and these reactions strengthen the infant’s attachment behavior toward that particular adult. At the end of the first year, there are strong differences in the extent to which infants seek out and are comforted by a particular attachment figure when they encounter danger and stress (Ainsworth et al., 1978; Bowlby, 1969/1982). Securely attached infants turn to their attachment figure in times of distress, and both behavioral and physiological signs of negative affect disappear relatively quickly through the contact with the attachment figure (Ainsworth et al., 1978; Main, 2000). Where the securely attached infant is able to use the caregiver to become regulated in an effective way, the insecurely attached infant is typically unable to do so. Attachment differences have also been explained in terms of whether infants have an organized strategy to deal with negative affect and arousal in the presence of an attachment figure (Main & Solomon, 1990).

Over the course of the preschool years, the infant’s attachment behavior is proposed to develop into an internal working model (IWM), a cognitive framework comprising mental representations of attachment relationships (Bowlby, 1969/1982). According to Bowlby, the primary caregiver acts as a prototype for future relationships via the IWM. There are three main features of the IWM: the extent to which (1) others are represented as being trustworthy, (2) the self is represented as valuable, and (3) the self is represented as effective when interacting with others. Around the age of 3, these representations seem to become part of a child’s character, and thus have the potential to affect their appreciation of the world and future interactions with others (Bretherton, Ridgeway & Cassidy, 1990).

Turning to the relation between attachment and children’s mentalizing abilities, it has been proposed that secure attachment aids the child’s construction of coherent and organized mental representations of the child–caregiver relationship that can be used effectively to predict the caregiver’s behavior (Ontai & Thompson, 2008). This ability in turn is argued to provide children with the competence to engage in so-called ‘goal-corrected partnerships’ (Bowlby, 1969/1982). In these partnerships children apply their awareness of the caregiver’s needs to align their own goals with those of the caregiver. Attachment relationships are thus assumed to offer children channels
Chapter 3

through which they can attend to and use mental representations of others to guide behavior. Considering this view, these processes occurring during the developing attachment relationship closely relate to the processes involved in mentalizing: using information related to beliefs, emotions, and intentions to make sense of behavior. A secure attachment may enhance children’s sensitivity to internal states first within child–caregiver interactions, and subsequently within interactions with others (Ontai & Thompson, 2008). Another view on the attachment–mentalizing association stems from neurobiological research with adults, arguing that attachment is essential to the development of a healthy neurophysiological stress-regulation system, which in turn has a major effect on our ability to maintain a mentalizing stance during the experience of arousal (see Luyten & Fonagy, 2015 for an elaborate explanation).

These theoretical notions have led to a significant amount of research examining the relations between attachment and children’s thinking-about-thinking (FBU) and thinking-about-feeling (EU). Findings have been rather consistent on the relation between attachment and EU. A previous meta-analysis on this relation showed a significant medium correlation, with the vast majority of studies reporting significant positive associations between attachment and EU ($r = .34$; Cooke, Stuart-Parrigon, Movahed-Abtahi, Koehn, & Kerns, 2016). The review was, however, based on only 10 studies with samples varying greatly in age, including children aged 1 to 12 years.

With regard to the association between attachment and FBU, inconsistent findings have been found, with studies reporting significant medium to large relations (e.g., Fonagy, Redfern, & Charman, 1997; Marchetti et al., 2014; McElwain et al., 2004; Meins et al., 1998, 2002, 2018; Villachan-Lyra et al., 2015), and studies reporting null findings (e.g., Greig & Howe, 2001; Laranjo, Bernier, Meins, & Carlson, 2014; Meins et al., 2002; Meins et al., 2019; Ontai & Thompson, 2008; Reese, 1998). These inconsistent findings have led researchers to speculate on whether attachment relates more strongly to thinking-about-feeling than to thinking-about-thinking (e.g., Greig & Howe, 2001). So far, meta-analytic data on attachment and false belief are lacking, as are meta-analytic data on whether attachment explains more of the variance in FBU or EU. The first aim of the present study was to examine the above mentioned questions by calculating the pooled correlations between attachment and FBU and attachment and EU, exploring whether the pooled correlations differed significantly from each other in magnitude.

**Attachment and Mentalizing Abilities: A Direct Link?**

Although there are reasons to predict that attachment may be associated with children’s mentalizing abilities, it is less clear to what extent the relation is direct, and/or whether any relation could be explained by possible third factors. Given the
unreliable association between attachment and measures of mentalization, it has been suggested that the pathway connecting the two is indirect (e.g., Cooke et al., 2016; Sharp & Fonagy, 2008). There are multiple correlates of attachment that also relate to children's FBU and EU, and which might explain the attachment–mentalandization relation (e.g., children's language ability; parents' use of mental state language; Cooke et al., 2016; Devine & Hughes, 2016; van IJzendoorn, Dijkstra, & Bus, 1995; Meins et al., 2002; Milligan, Astington, & Dack, 2007; Zeegers et al., 2017). In addition, the nature of the attachment assessment may influence any association between attachment and mentalizing abilities. The second goal of this review was to get a better understanding of the direct or indirect nature of the attachment–mentalization relation and explore the potential moderating effect of the method of assessing attachment.

**Language ability.** Mentalizing ability tasks often involve verbal stories and require verbal answers. A large number of studies document a medium to strong correlation between children's verbal ability and performance on FBU or EU tasks (e.g., FBU: Laranjo et al., 2014; Meins et al., 2002; Oppenheim, 2005; de Rosnay & Harris, 2002; EU: Altamura et al., 2010; Greig et al., 2001; Meins et al., 2019; Repacholi & Trapolini, 2004). A comprehensive meta-analysis on FBU and language ability (k = 104) has shown a medium to large effect of language on FBU (Milligan et al., 2007). Studies in which the relation between attachment and children's mentalizing abilities was examined, therefore, often included language ability as a control variable.

The secure infant–parent attachment system also seems to relate to language ability. Positive associations between attachment and verbal ability have been reported in a number of studies, including an exploratory meta-analysis (e.g., Altamura, 2010; Greig & Howe, 2001; van IJzendoorn et al., 1995; Meins, 1997, 2018). Multiple hypotheses for the attachment–language relation have been posed. For instance, it is thought that the types of infant–parent interaction that promote attachment security lead to interactions that are optimally suited for 'stretching' the child's linguistic capabilities (Meins, 1997). Van IJzendoorn et al. (1995) mention that since secure infants feel free to explore their environment, they are open to derive insights and skills from new environments, rather than being focused on attachment-related environmental cues. The positive associations found between attachment and verbal ability on the one hand, and verbal ability and mentalizing task performance on the other hand, indicate that language may mediate the relation between attachment and children's mentalizing abilities. We studied this question by examining whether the pooled correlation between attachment and mentalizing abilities decreased after controlling for the effect of language ability.

**Measures of attachment.** Other than the possible third factors that might explain the association between attachment and mentalizing abilities, the previous inconsistent findings may also stem from the possibility that the type of measure used to assess
attachment is a confounding factor. Studies assessing attachment and mentalizing abilities concurrently typically assess attachment using a representational measure rather than a behavioral measure, such as the strange situation and the Attachment Q Sort (Ainsworth et al., 1978; Waters & Deane, 1985). Representational measures involve activating the child’s attachment system by presenting emotionally provocative situations as photographs or pictures (Separation Anxiety Test; SAT; Klagsbrun & Bowlby, 1976) or as the beginning of stories (Attachment Story Completion Task; ASCT; Bretherton, Ridgeway, & Cassidy, 1990). These representational measures of attachment define security in terms of the extent to which children (a) feel comfortable with minor separations but react negatively to major separations (SAT), or (b) use attachment figures to assuage the story character’s distress (ASCT). However, these representational measures also require an understanding of other minds, given that responses on these tasks require the child to represent the internal states of others (Thompson, 1998, 2008).

This lack of independence between representational assessments of attachment and mentalizing abilities may thus inflate their association. Interpreting the findings of studies investigating links between representational assessments of attachment and children’s mentalizing abilities is further complicated by the fact that there is questionable support for the assumption that the different types of attachment assessment tap into the same construct. In the largest study on this topic (N = 90), Bar-Haim, Sutton, Fox, and Marvin (2000) reported no associations between infant attachment security and performance on the SAT at 58 months. Similarly, Trapolini, Ungerer, and McMahon (2007) found no longitudinal associations between infant attachment and ASCT performance at age 4. Of the two studies to report impressive longitudinal associations, one used a small and highly selective sample (65% insecure; Main, Kaplan, & Cassidy, 1985), and the other assessed attachment representations using a newly-devised doll play procedure in a sample of only 28 children (Gloger-Tippelt, Gomille, Koenig, & Vetter, 2002).

The findings described above are important for the present review, since previous studies on attachment and children’s mentalizing ability used a wide variety of attachment instruments. If indeed representational attachment scores depend on the child’s FBU and EU, we would expect to find a significant pooled correlation for studies using representational assessments, whereas we would expect to find a weaker association for studies using behavioral measures of attachment. We studied this question by examining to what extent the use of behavioral or representational attachment assessments, as well as the different attachment instruments, moderated the pooled correlation between attachment and children’s mentalizing abilities.
**The Present Study**

In sum, the present study adds to existing research by examining the following research questions: (a) what is the overall relation between attachment and children’s mentalizing abilities, as indicated by FBU and EU; (b) are there differences in the magnitude of correlations between attachment and FBU on the one hand, and attachment and EU on the other hand; (c) does children’s language ability mediate the relation between attachment and children’s FBU and EU; (d) is the relation between attachment and children’s mentalization moderated by the attachment assessment approach (behavioral vs. representational) and/or instrument? Questions (a) and (b) attempt to answer whether there is a significant link between attachment and children’s mentalizing abilities. Questions (c) and (d) attempt to gain more insight in the direct or indirect nature of any association.

We investigated these research questions using a three-level approach to meta-analysis (Hox, 2002; Raudenbush & Bryk, 1985; van den Noortgate & Onghena, 2003) and meta-analytic structural equation modelling (MA-SEM; Cheung, 2008; 2015; Jak, 2015). The multilevel approach also allowed us to include studies that reported multiple correlations between attachment and children’s mentalizing abilities (e.g., when a single study reports correlations between attachment and both emotion and false understanding, or when a single study reports longitudinal and cross-sectional correlations). With this approach we were able to test whether the pooled attachment–FBU correlation was different in magnitude from the pooled attachment–EU correlation. The MA-SEM approach was used to study whether language ability mediates the relation between attachment and EU and/or FBU (Jak, 2015).

In addition to performing moderator analyses on the attachment assessment approach, we performed several other moderator analyses to explain possible differences in effect size within and between studies (e.g., study design, age of assessment, socioeconomic status). Most importantly, we explored whether the pooled correlation of the attachment–FBU relation was affected by the type of task used to assess false belief (e.g., unexpected location, unexpected content, appearance reality task), since the different tasks may appeal to different dimensions of mentalizing (Villachan-Lyra, Almeida, Hazin, & Maranhão, 2015).

**METHODS**

**Selection of Studies**

The following electronic databases were searched until April 2018 for articles, book chapters, dissertations, and reports on attachment and FBU and/or EU: Web of
Science, PsycINFO, Google Scholar, Medline, Embase, Cochrane Library, and ERIC. The most relevant combination of components that we used were consistent with other meta-analyses on attachment or mentalizing capacity (Cooke et al., 2016; Devine & Hughes, 2016; Milligan et al., 2007; Luke & Banerjee, 2013; Wellman, Cross & Watson, 2001; Zeegers et al., 2017): attachment AND “theory of mind” OR mentalizing OR “social cognition” OR “social understanding” OR “emotion understanding” OR “emotion recognition” OR “perspective taking” OR “false belief” OR “belief-desire reasoning” OR “understanding mental states” OR “mental representations”. The search yielded 3,585 results. The titles and abstracts of the articles we gathered from this search were screened, and full article texts of possibly relevant studies were checked. The reference sections of the articles identified through these searches were examined for any other relevant studies. The reference list of a meta-analysis on the relation between attachment and EU was also checked (Cooke et al., 2016). Relevant researchers in the field were contacted by email with a request for any unpublished manuscripts or data that met the inclusion criteria described below.

**Eligibility Criteria**

Studies were eligible for inclusion in the meta-analysis if they examined the relation between attachment and FBU and/or EU. The assessments of FBU and EU had to be made when a child was aged between 36 and 72 months. This time span was chosen because children are not likely to pass false belief tasks before the age of 3 years, while almost all children are likely to pass false belief tasks after age 6. Performances on EU tasks tend to vary more, even after the age of 6 years. However, because we aimed to compare the magnitude of the pooled correlations between attachment and children’s EU and FBU respectively, we kept the age during task assessments equal among studies. On a similar note, the average age during the assessments of attachment could not exceed 72 months.

We aimed to keep the overall sample in this meta-analysis as homogeneous as possible in order to prevent excessive moderator analyses including different types of sample characteristics (e.g., clinical vs. non-clinical, biological vs. non-biological). Studies were therefore only included when participants came from a typically developing population. We excluded samples of children who had been diagnosed with a developmental disorder or who had been exposed to maltreatment. We also excluded adoptive or foster samples. We did include samples of socio-economically disadvantaged children (i.e., Raikes & Thompson, 2006, 2008), since we tested the moderating effect of families’ socioeconomic status.

We included studies in which attachment was assessed using one of the following standardized procedures: (a) behavioral measures: strange situation procedure (SSP;
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Ainsworth et al. (1978), Preschool Assessment of Attachment (PAA; Crittenden, 2004), Preschool Attachment Classification System (PACS; Cassidy & Marvin, 1992), Attachment Q Sort (AQS; Waters & Deane, 1985), and (b) representational measures: Attachment Story Completion Task (ASCT; Bretherton et al., 1990), Separation Anxiety Test (SAT; Klagsbrun & Bowlby, 1976), Manchester Child Attachment Story Task (MCAS; Green, Stanley, Smith, & Goldwyn, 2000).

With regard to the assessments of children’s mentalizing abilities, studies had to assess either FBU or EU. Studies that employed classic false belief tasks or revised versions of classic false belief tasks, were eligible: unexpected location tasks (Baron-Cohen, Leslie, & Frith, 1985; Wimmer & Perner, 1983), unexpected content tasks (Perner, Leekam, & Wimmer, 1987), appearance–reality tasks, (Flavell, Flavell, & Green, 1983), and belief–desire reasoning tasks (Harris, Johnson, Hutton, Andrews, & Cooke, 1989).

With regard to assessments of EU, we included studies that used Denham’s task (1986), which is a standard measure of EU in children aged 3 to 6 years. This task measures the child’s ability to label emotions correctly and to understand which emotion is most likely to be felt in a given situation (e.g., feeling happy when receiving a present). Studies in which an alternative method to assess the EU abilities described above were also included, but only if they assessed the EU abilities that are also targeted in Denham’s task (i.e., labelling emotions and understanding the context of emotions; e.g., Kidwell et al., 2010) (e.g., Repacholi & Trapolini, 2004). For instance, we included a study that used the ‘causes of emotion’ interview developed by Dunn and Hughes (1998). In this interview children are asked to label emotional expressions and to describe ‘what kind of things make you feel X’. Similar to Denham’s task, the questions in this interview entail that the child must be able to understand contextual causes of emotions. The other EU measures that we included also involved the child’s understanding of emotions given a certain context.

Calculating Effect Sizes

The effect sizes of the different studies and relevant study characteristics (age child, type of assessment) are presented in Appendix G of the supplementary materials. Effect sizes were reflected in Pearson’s r correlation coefficients. If necessary, statistics were converted into correlational scores using the converter of Wilson and Mason (www.campbellcollaboration.org). This converter is based on the formulae of Lipsey and Wilson (2001). Prior to the main analyses, the correlations were Fisher’s z transformed, in order to approximate a normal sampling distribution (Lipsey & Wilson, 2001). If necessary, authors were contacted to provide raw correlations, when correlations were “controlled” for the effects of other variables. A few studies assessed FBU with multiple tasks.
(e.g., unexpected location and unexpected content task/appearance–reality task; e.g., Meins et al., 2002; Villachan-Lyra et al., 2015). Authors were also contacted to provide the correlations between attachment and individual false-belief tasks when only the association between attachment and a false-belief or EU sum score was reported, or the raw correlations were not reported in the paper (e.g., Marchetti et al., 2014; Meins et al., 2002; Ontai & Thompson, 2008; Oppenheim et al., 2005).

Where a study employed the SSP to assess attachment security, we calculated Pearson’s r representing the difference in performance on a social cognition task in secure versus insecure groups (i.e., we made no attempt to investigate differences in social cognition using the four category classification system). Where a study employed the SAT to assess attachment security, we extracted the correlation between mentalizing task performance and overall SAT security scores on the SAT (which are calculated by totaling the self-reliance and attachment scores and subtracting the inverse avoidance scores; Fonagy et al., 1997).

The correlation between FBU and the total SAT score was not available for one study (Repacholi & Trapolini, 2004). We therefore calculated the effect size of this study based on the mean correlation between FBU and the three dimensions (i.e., security, self-reliance, and reversed avoidance). Where a study employed the ASCT to assess attachment security, and classified participants as either securely or insecurely attached (as in Greig & Howe, 2001 and Arranz, Artamendi, Olabarrieta & Martín, 2002), we calculated an effect size representing the difference in mentalizing performance between these groups. One study (Vaughn et al., 2011) formed a composite measure of ASCT performance and used this as their measure of attachment security. For this study, we extracted the correlation between scores on that composite dimension and EU. Two studies (Altamura, 2010; Meins et al., 2019) reported participants’ scores on multiple measures (e.g., resolution, coherence, security) of ASCT performance. In both cases, we calculated a mean correlation coefficient representing the mean association between the ASCT dimension scores and FBU or EU.

**Statistical Approach**

We used a three-level approach to analyze the data, allowing us to code multiple effect sizes per study. In conventional meta-analytic strategies only one effect size per study is considered, either by averaging or eliminating effect sizes that were documented (i.e., the fixed effects model or two-level random effects model; Raudenbush, 2009). This means that information on differences between effect sizes within a single study is lost. As a result, there is lower statistical power (Assink & Wibbelink, 2016; Cheung, 2015). This approach also limits the research questions that can be addressed, as the impact of sampling dissimilarities, methods and designs cannot be examined accurately.
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; Cheung, 2015). The three-level approach additionally considers the dependency of effect sizes reported in a single study. This approach thus allows for the inclusion of multiple effect sizes per study.

More than one relevant effect size was reported in 53% and 33% of the studies on the relation between attachment–FBU and attachment–EU, respectively. Multiple effect sizes per study were coded when: (a) associations between the constructs were assessed at multiple time points (e.g., Meins et al., 2019; Symons & Clark, 2000); (b) single constructs were assessed with different instruments or tasks (e.g., Meins et al., 2019; Ontai & Thomson, 2008; Ontai et al., 2002; Reese, 1998), and (c) attachment was assessed for child–mother and child–father dyads separately (McElwain & Volling, 2004; Steele, Steele, Croft, & Fonagy, 1999).

In order to test the mediating effect of children’s verbal ability, 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 investigating parts of the model can be included. By using the effect sizes of all included studies within the three meta-analytic datasets, maximum use of the available data is obtained. For these analyses we did not use the multilevel approach, and 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 different sample sizes (e.g., Meins et al., 2019), the sample size was considered in the calculation of the mean effect size. We tested a model in which the direct effects of attachment and verbal ability on FBU or EU were specified as well as the covariance between attachment and verbal ability. In order to test the mediating effect of verbal ability, we modeled the indirect effect of attachment security on FBU/EU through children’s verbal ability. The pooled correlation between attachment and FBU/EU therefore controlled for the effects of verbal ability on FBU. Likelihood based confidence intervals were calculated to evaluate the significance of the direct and indirect path coefficient (see Jak, 2015, pp. 51–52).

**Heterogeneity in Effect Sizes**

In the case of a multilevel approach to meta-analysis, moderator analyses are beneficial in understanding the extent to which the effect sizes may be inflated or deflated because of differences between and within studies. Yet, moderator analyses are
only useful when the variation in the effect sizes can be assigned not only to sampling variance (Level 1), but also to second- and third-level-variance. The suggestions of Hunter and Schmidt (1990) were followed to evaluate these variances: heterogeneity between effect sizes is substantial when less than 75% of the total variance is assigned to sampling variance (Level 1). Two separate one-sided log-likelihood-ratio-tests were performed to examine whether heterogeneity in effect sizes on the second and third level was substantial (Assink & Wibbelink, 2016). These tests compare a full multilevel model with a model in which one of the variance parameters is excluded. Cheung (2014) reported formulae which we used to estimate the portion of variances that could be ascribed to the separate variance levels.

There were several probable moderators that could explain variation in effect sizes between and within studies: publication status, cross-sectional or longitudinal design, SES of the families, percentage boys, age of the child during the attachment assessment, age of the child during the FBU or EU assessment, type of attachment assessment (behavioral or representational), type of FBU task, type of EU task. An overview of all moderator variables is presented in Appendix H of the supplementary materials. With regard to the type of mentalizing tasks, we performed a series of moderator analyses. First, we examined whether the pooled correlation between attachment and FBU was different for studies using the belief–desire reasoning task (e.g., Fonagy et al., 1997) or either one of the other false belief tasks (i.e., unexpected location or unexpected content/identity). Second, we examined if studies using the unexpected location task (Sally-Ann task or a similar task) had different effect sizes than studies using the unexpected identity/content tasks (understanding false beliefs about an object that is different than it first appears, or has a different content than expected). The unexpected location task asks children to explain others’ (searching) behaviors based on their beliefs, whereas the unexpected identity/content tasks asks children to understand what someone else might (wrongly) think about an object (Villachan-Lyra et al., 2015). Last, we performed moderator analyses to check whether the type of EU task used (i.e., binary variable: Denham’s puppet task or not), moderated the pooled correlation on attachment and EU.

All studies were coded by the first author and the second author coded a randomly selected 20% of the studies (k = 10). Agreement was evaluated by assessing absolute agreement (agree or disagree). Cohen's kappas were calculated to evaluate the interrater agreement among the moderator variables (Fleiss & Cohen, 1973). There was full agreement for the number of participants, child age during the assessment, percentage boys, and type of measurement instrument. Kappa was excellent for SES (ICC .90) and effect size (.90).

The statistical analyses were performed using the guidelines of Assink and Wibbelink (2016). The function “rma.mv” of the metafor package was used in the
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software environment R (version 3.2.2; R Core Team, 2015; Viechtbauer, 2010). We calculated restricted maximum likelihood estimates, as full maximum likelihood estimates seem to show a more downward bias, especially when the number of studies in the meta-analysis is relatively 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.

Publication Bias

We investigated publication bias by examining the funnel plots with all effect sizes regressed against their standard errors. This gives a clue on which studies are missing (e.g., studies with small sample sizes reporting small effect sizes) or overrepresented (e.g., studies with small sample sizes reporting large effect sizes), and therefore possible publication selection bias. We report on both the funnel plot based on the multilevel dataset, as well as the funnel plot based on the conventional dataset (i.e., 1 effect size per study).

Second, we used the PET-PEESE approach to further explore publication bias (Stanley & Doucouliagos, 2014). In the PET-PEESE approach, the effect size is first regressed on the standard error of the effect size in a weighted least squares (WLS) regression with the standard error of the effect size as the weight. Testing if the slope of the regression line is statistically significant serves as a test for statistically significant publication bias. The typical relation when publication bias is present is that higher standard errors are associated with larger effect sizes. The intercept of this regression is interpreted as an estimate of the effect in a hypothetical study of no error (SE = 0) and therefore no bias. Testing whether the intercept is statistically significant serves as a test of whether there is a true, bias-corrected effect different from 0. This test is called the precision-effect test (PET). In the simulation study by Stanley and Doucouliagos (2014), PET performed well when the true effect in the meta-analyzed studies was 0, with the intercept being a slight overestimation of the true effect. When there was a true effect, however, using the variance as the predictor in the regression showed better performance. Here the intercept was a slight underestimation of the true effect. This test is called a precision-effect test with standard error (PEESE). The authors thus suggested that PET is followed up by PEESE if PET shows a true, bias-corrected effect. However, it should be noted that the precision-effect test (PET) sometimes has low power in identifying a genuine nonzero effect when there are only 10 or 20 estimates available in an area of research (Stanley, 2017). We therefore examined both the PET and PEESE results to get an idea of the publication bias. The PET-PEESE approach has...
shown to outperform other methods used to detect publication bias, such as the Fail Safe Number analysis and the Trim and Fill procedure (Stanley & Doucouliagos, 2014). Because there are no studies yet on the use of PET-PEESE with multilevel datasets, we used the conventional dataset (i.e., one effect size per study) that we also used for the MASEM analyses.

RESULTS

Preliminary Analyses - Heterogeneity in effect sizes

Before investigating our research questions, we examined whether effect size differences could be assigned to random sampling error (Level 1), within-study variance (Level 2), or between-study variance (Level 3). That is, only if substantial heterogeneity between or within the effect sizes of studies is present, it is useful to further look at the impact of moderators that might explain the heterogeneity (Assink & Wibbelink, 2016). For the association between attachment and FBU, within-study variance was non-significant, $\sigma^2 < .002$, $\chi^2(1) = .400$, $p = .540$, whereas between study-variance was significant, $\sigma^2 < .022$, $\chi^2(1) = 6.936$, $p = .008$. Of the total variance, 6.02% was explained by variation within studies, 56.62% by variation between studies, and 37.36% by random sampling variance. For the association between attachment and EU, within-study variance was significant, $\sigma^2 < .0012$, $\chi^2(1) = 7.646$, $p = .006$, as well as between study-variance, $\sigma^2 < .010$, $\chi^2(1) = 3.816$, $p = .051$; one-sided; Assink & Wibbelink, 2016). Of the total variance, 35.51% was explained by variation within studies, 32.12% by variation between studies, and 32.37% by random sampling variance. The outcomes described above point to substantial heterogeneity between studies in the attachment–FBU dataset, and substantial heterogeneity within and between studies in the attachment–EU dataset.

MAIN RESULTS

Qa. Pooled correlations between attachment and FBU and EU. The pooled correlations between attachment and FBU as well as attachment and EU are displayed in Table 1. In the text we refer to Pearson’s r coefficients. With regard to the association between attachment security and FBU, the analyses were based on 36 effect sizes from 1029 unique children (within 17 samples). The sizes of the study samples varied from 20 (Villachan-Lyra et al., 2015) to 163 (Meins et al., 2019). Attachment showed an overall significant positive association with FBU, $r = .19$, 95% CI [0.10, 0.28]. With
**Table 1.** Estimated Pooled Correlations (Fisher’s Z and Pearson’s r) for the Relations between Child Attachment Security and FBU or EU

<table>
<thead>
<tr>
<th>Association</th>
<th>#S</th>
<th>#ES</th>
<th>Z_r (SE)</th>
<th>r (SE)</th>
<th>95% CI (r)</th>
<th>t (df)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attachment – False Belief</td>
<td>17</td>
<td>36</td>
<td>.19 (.05)</td>
<td>.19 (.05)</td>
<td>[.10, .28]</td>
<td>4.21 (35)</td>
<td>&lt;.001***</td>
</tr>
<tr>
<td>Attachment – Emotion</td>
<td>15</td>
<td>28</td>
<td>.32 (.04)</td>
<td>.31 (.04)</td>
<td>[.23, .41]</td>
<td>7.15 (27)</td>
<td>&lt;.001***</td>
</tr>
</tbody>
</table>

Note. #S = number of different samples; #ES = number of effect sizes; N = total of unique participants; Z_r = Fisher’s Z correlation; r = Pearson’s r correlation coefficient; 95% CI = 95% confidence intervals of Pearson’s r coefficient; t = t-value; * p < .05; ** p < .01; *** p < .001.
regard to the association between attachment security and EU, the analyses were based on 28 effect sizes from 912 unique children (within 15 samples). The sizes of the study samples varied from 29 (Ontai et al., 2005) to 160 (Meins et al., 2019). Attachment showed an overall significant positive association with EU, $r = .31$, 95% CI [0.23, 0.41].

**Qb. Comparing FBU and EU in relation to attachment.** In order to compare whether attachment showed a significantly larger association with EU, we created a new multilevel dataset with all effect sizes on the attachment–FBU and the attachment–EU relation, and tested whether the effect sizes differed substantially from each other in moderator analyses. The multilevel moderator analyses allowed us to include studies that reported an effect size on both the attachment–FBU relation and the attachment–EU relation. First, the analyses showed that the pooled correlation for the overall relation between attachment and children’s mentalizing abilities was $r = .25$, 95% CI [0.19, 0.31]. Second, the pooled correlation for the relation between attachment and FBU was significantly lower than the pooled correlation for attachment and EU, $F(1, 62) = 4.24, \beta = -.10, p = .025$, 95% CI [-0.19, -0.01].

**Qc. The mediating role of language ability.** The results of the MA-SEM are displayed in Figures 1a and 1b, presenting the effect of a predictor, after controlling for the effect of the other predictor in the model. With regard to the prediction of FBU, 10 out of 17 studies reported on correlations between verbal ability and FBU or attachment. The MA-SEM analyses showed a significant direct effect of attachment on FBU, $r = .10$, 95% CI [0.02, 0.17]. The direct effect of language on FBU was $r = .35$, 95% CI [0.28, 0.43], and the effect of attachment on verbal ability was $r = .15$, 95% CI [0.06; 0.24]. The total amount of variance in FBU explained by attachment and verbal ability was 15%. Further, 2% of the variation in verbal ability was explained by attachment security. The indirect effect of child–parent attachment security on FBU via verbal ability was significant, $r = .05, 95\% \text{ CI} [0.02, 0.09]$. Because the direct effects of attachment and verbal ability on FBU were also significant, the indirect effect indicates that the relation between attachment and FBU is partially mediated by verbal ability (Rucker, Preacher, Tormala, & Petty, 2011).

With regard to the prediction of EU, 8 out of 15 studies reported on correlations between verbal ability and EU or attachment. The MA-SEM analyses showed a significant effect of attachment on EU, $r = .26$, 95% CI [0.17; 0.35]. The direct effect of language on EU was also shown to be significant, $r = .30$, 95% CI [0.19; 0.41], while the effect of attachment on verbal ability in this model was nonsignificant, $r = .13, 95\% \text{ CI} [-0.01; 0.27]$. The total amount of variance in EU explained by attachment and verbal ability was 18%. Further, 2% of the variation in verbal ability was explained by attachment security. The indirect effect of child–parent attachment security on EU via
verbal ability was not significant, \( r = .04, 95\% \text{ CI} [-0.00, 0.09] \). The relation between attachment security and EU was thus not mediated by children’s verbal ability.

**Qd. The moderating effect of attachment assessment approach.** To examine whether there are different relations between behavioral and representational attachment on the one hand, and children's mentalizing abilities on the other hand, we performed several moderator analyses, taking into account the longitudinal or cross-sectional design of studies. That is, we might expect that longitudinal studies show smaller attachment–mentalizing correlations than cross-sectional studies because of a developmental effect combined with increasing number of attachment figures and
experiences. Behavioral measures of attachment were most often used during infancy, and therefore more often in longitudinal studies, whereas representational measures of attachment were only used during the preschool years, and are thus more common in cross-sectional studies. We therefore performed several moderator analyses to examine the effect of the attachment approach, taking into account the design of studies. First, we examined the moderating influence of all behavioral assessment approaches versus representational assessment approaches, without taking into account children’s age during the assessment. We thus included studies using the AQS and SSP during infancy and preschool. Second, we examined the moderating influence of the behavioral assessments during infancy only (< 36 months) versus the representational measures. Third, we checked the moderating influence of the behavioral assessment during childhood (> 36 months) only versus the representational measures. In this way, we were able to gain insight into whether the type of assessment affected the pooled correlation, taking into account the influence of the study design (cross-sectional or longitudinal).

The results of the moderator analyses including the attachment assessment approach are reported in Table 2, including Fisher’s Z estimates. For ease of interpretation we report on r correlations in text. When attachment was measured with a behavioral instrument (k = 8), the pooled correlation between attachment and FBU was significantly lower than when attachment was measured with a representational instrument (k = 10), F(1, 34) = 10.19, β = -0.15, p = .003. The estimated correlation between behavioral attachment and FBU was r = .13, p = .006, whereas the estimated correlation between representational attachment and FBU was r = .28, p < .001. We also found moderating effects when only behavioral assessments during infancy or during childhood were taken into account, suggesting that, overall, the association between behavioral measures of attachment and FBU performance was significantly smaller (although still significant) than the association between representational measures of attachment and FBU performance (see Table 2).

Studies using the SSP and AQS showed the lowest estimated pooled correlation of r = .16 and r = .06 respectively, whereas studies using the SAT and ASCT showed higher correlations, r = .35 and r = .26 respectively. The moderating effect of the PAA/PASC on the attachment–FBU relation could not be studied because there was only one study available that used the PASC (Meins et al., 2019). This study showed a correlation of r = .21 between the PASC at 4 months and FBU at 51 months, and a correlation of r = .14 between the PASC at 44 months and FBU at 61 months.

With regard to the correlation between attachment and EU, studies with behavioral assessment approaches (k = 10) did not report higher or lower correlations with EU than studies using representational assessments (k = 6), F(1, 26) = 1.79, β = -0.09, p = .192. Also there were no moderating effects of type of assessment approach when only
### Table 2. Moderator Effects of Attachment Assessment: Estimated Results (Fisher’s Z, Regression Coefficients, Omnibus-Test) for Continuous and Categorical Moderator Variables (Bivariate Models)

<table>
<thead>
<tr>
<th>Moderator</th>
<th>#studies</th>
<th>#ES</th>
<th>Zr (SE)</th>
<th>β₁ (SE)</th>
<th>F (df1, df2), p-value</th>
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<tr>
<td>All</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>behavioral (SSP/AQS/PAA)</td>
<td>10</td>
<td>22</td>
<td>.13 (.05)**</td>
<td>.15 (.05)</td>
<td>F(1,34) = 10.19, .003**</td>
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<tr>
<td>representational</td>
<td>8</td>
<td>14</td>
<td>.28 (.05)**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 36 months</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>behavioral (SSP/AQS)</td>
<td>8</td>
<td>15</td>
<td>.12 (.05)*</td>
<td></td>
<td>F(1,27) = 9.57, .005**</td>
</tr>
<tr>
<td>representational</td>
<td>8</td>
<td>14</td>
<td>.28 (.05)**</td>
<td>.16 (.06)</td>
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<td>&gt; 36 months</td>
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<td></td>
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<tr>
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<td>7</td>
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<td></td>
<td>F(1,19) = 5.23, .034*</td>
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<td>.13 (.06)</td>
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<td>Attachment instrument *</td>
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<td>9</td>
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<td></td>
<td>F(3,30) = 4.14, .014*</td>
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<td>11</td>
<td>.06 (.08)</td>
<td>-.10 (.09)</td>
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<tr>
<td>SAT</td>
<td>4</td>
<td>8</td>
<td>.35 (.07)**</td>
<td>.18 (.06)*</td>
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<tr>
<td>ASCT</td>
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<td>6</td>
<td>.27 (.07)**</td>
<td>.10 (.07)</td>
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<td><strong>EU</strong></td>
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<td>All</td>
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<tr>
<td>Behavioral (SSP/AQS/PAA)</td>
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<td>18</td>
<td>.28 (.05)**</td>
<td></td>
<td>F(1,26) = 1.79, .194</td>
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<td>.09 (.05)</td>
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<td>&lt; 36 months (SSP/AQS)</td>
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<td></td>
</tr>
<tr>
<td>behavioral</td>
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<td>5</td>
<td>.25 (.09)*</td>
<td></td>
<td>F(1,13) = 1.83, .199</td>
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</table>
Table 2. (continued)

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<th>Zr (SE)</th>
<th>β₁ (SE)</th>
<th>F (df₁, df₂)</th>
<th>p-value</th>
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<td>.12 (.09)</td>
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<td>13</td>
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<tr>
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<td>10</td>
<td>.35 (.06)***</td>
<td>.07 (.08)</td>
<td></td>
<td></td>
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<tr>
<td>Representation</td>
<td>6</td>
<td>10</td>
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<td></td>
<td></td>
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<td>4</td>
<td>.23 (.10)*</td>
<td></td>
<td></td>
<td></td>
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<td>SSP</td>
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<td>10</td>
<td>.30 (.08)**</td>
<td>.06 (.13)</td>
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<td></td>
</tr>
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<td>4</td>
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<td>.18 (.11)</td>
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<td></td>
</tr>
<tr>
<td>PAA</td>
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<td>5</td>
<td>.46 (.10)***</td>
<td>.23 (.11)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SAT</td>
<td>2</td>
<td>4</td>
<td>.34 (.09)***</td>
<td>.11 (.11)</td>
<td></td>
<td></td>
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</tbody>
</table>

Note. PAA = Preschool assessment of attachment; SSP = Strange situation procedure; AQS = attachment Q sort; SAT = Separation Anxiety Test

* The moderating effect of the PAA on the attachment-FBU relation could not be studied since there was only 1 study available that used the PAA (Meins et al., 2019). This study showed a correlation of \( r(128) = .21 \) between the PAA at 44 months and FBU at 51 months, and a correlation of \( r(125) = .14 \) between the PAA at 44 months and FBU at 61 months.
behavioral assessments during infancy or during childhood were taken into account. Lastly, the type of attachment instrument (SSP, AQS, ASCT, PAA/PASC/SAT) did not moderate the relation between attachment and EU.

**Moderator Analyses**

**Attachment and FBU.** Table 3 shows the results of the moderator analyses for the meta-analysis on the relation between attachment and FBU. The analyses showed that effect sizes based on cross-sectional data ($k = 10$) were larger than effect sizes based on longitudinal data ($k = 9$), $F(1, 34) = 5.84$, $\beta = .12$, $p = .021$. The estimated pooled correlation was $r = .24$, $p < .001$ for effect sizes based on cross-sectional data, whereas the pooled correlation was $r = .14$, $p = .009$ for effect sizes based on longitudinal data. Within the pool of longitudinal studies, effect sizes were not significantly smaller when the number of months between the attachment and false belief assessments was larger, $F(1, 18) = 1.99$, $\beta = -.00$, $p = .176$. Effect sizes were larger when children were older during the attachment assessment, $F(1, 35) = 6.24$, $\beta = .01$, $p = .017$.

**Attachment and EU.** Table 4 shows the results of the moderator analyses for the meta-analysis on the relation between attachment and EU. Studies including a sample with families from middle-to-high socioeconomic backgrounds ($k = 12$) reported smaller effect sizes compared to studies including low SES families ($k = 3$), $F(1, 26) = 4.72$, $\beta = -.24$, $p = .039$. Effect sizes based on cross-sectional data tended to be larger than effect sizes based on longitudinal data, $F(1, 26) = 4.98$, $\beta = .14$, $p = .051$. The estimated pooled correlation was $r = .36$, $p < .001$ for effect sizes based on cross-sectional data ($k = 13$), and $r = .22$, $p = .003$ for effect sizes based on longitudinal data ($k = 4$).

**Publication bias**

Figures 1 and 2 display funnel plots of effect size estimates against their standard errors for both meta-analyses including the data from the multilevel analyses. Figures 3 and 4 display funnel plots of effect size estimates against their standard errors for both meta-analyses including the data from the conventional analyses. Inspecting the plots, some asymmetry in the distribution of effect sizes was apparent. First, with regard to the relation between attachment and EU, there were relatively few studies with large sample sizes (i.e., small standard errors) reporting on large effect sizes. Second, with regard to the relation between attachment and FBU, 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 suggests that publication bias could be present in the meta-analysis on attachment and FBU in particular.
Table 3. Moderator Analyses Attachment and FBU: Estimated Results (Fisher’s Z, Regression Coefficients, Omnibus-Test) for Continuous and Categorical Moderator Variables (Bivariate Models)

<table>
<thead>
<tr>
<th></th>
<th>#studies</th>
<th>#ES</th>
<th>Zr (SE)</th>
<th>β₁ (SE)</th>
<th>F (df₁, df₂)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
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<td><strong>Study characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year (c)</td>
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<td>36</td>
<td>-.01 (.01)</td>
<td>F(1,34) = 0.33</td>
<td>.567</td>
<td></td>
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<td>Design</td>
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<td></td>
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<tr>
<td>longitudinal</td>
<td>9</td>
<td>20</td>
<td>.14 (.05)**</td>
<td>F(1,34) = 4.84</td>
<td>.035*</td>
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<tr>
<td>cross-sectional</td>
<td>10</td>
<td>16</td>
<td>.25 (.05)***</td>
<td>.11 (.05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time between measurements (c)</td>
<td>9</td>
<td>20</td>
<td>-.01 (.00)</td>
<td>F(1,18) = 1.75</td>
<td>.202</td>
<td></td>
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<tr>
<td>Published</td>
<td>15</td>
<td>32</td>
<td>.22 (.05)***</td>
<td>F(1,34) = 3.82</td>
<td>.059</td>
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<tr>
<td>yes</td>
<td>2</td>
<td>4</td>
<td>.02 (.12)</td>
<td>-.20 (.13)</td>
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</tr>
<tr>
<td>no¹</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Sample characteristics</strong></td>
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<td></td>
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<tr>
<td>Percentages male children (c)</td>
<td>16</td>
<td>35</td>
<td>.00 (.01)</td>
<td>F(1,33) = 0.17</td>
<td>.682</td>
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<td>Age child attachment assessment (c)</td>
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<td>F(1,34) = 6.37</td>
<td>.016*</td>
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<tr>
<td>Age child false belief assessment (c)</td>
<td>17</td>
<td>36</td>
<td>-.00 (.00)</td>
<td>F(1,34) = 0.10</td>
<td>.754</td>
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<td>low</td>
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<td>.27 (.14)***</td>
<td>F(1,34) = 0.39</td>
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<td>34</td>
<td>.19 (.05)***</td>
<td>-.09 (.15)</td>
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<td><strong>Attachment assessment</strong></td>
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<td>home</td>
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<td>21</td>
<td>.22 (.07)**</td>
<td>.05 (.09)</td>
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Table 3 (continued)

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<th>False belief assessment</th>
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<th>#ES</th>
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<th>β₁ (SE)</th>
<th>F (df1, df2)</th>
<th>p-value</th>
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<td>9</td>
<td>12</td>
<td>.21 (.07)**</td>
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Note. # studies = number of studies; # ES = number of effect sizes; Z = Fisher's Z correlation; SE = standard error; β₁ = estimated regression coefficient; (c) = continuous variables; * p < .05; ** p < .01; *** p < .001.

a Omnibus test of all regression coefficients in the model.
b the continuous variables were mean centered before conducting the moderator analyses.
<table>
<thead>
<tr>
<th>Study characteristics</th>
<th>#studies</th>
<th>#ES</th>
<th>Zr (SE)</th>
<th>β₁ (SE)</th>
<th>F (df1, df2)</th>
<th>p-value</th>
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<td>Year (c)</td>
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<td>18</td>
<td>.34 (.04)***</td>
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<th>β₁ (SE)</th>
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<tr>
<td>Percentages male children (c)</td>
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<td>.01 (.01)</td>
<td></td>
<td>F(1,26) = 0.45</td>
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<td>.51 (.10)***</td>
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<td>middle - high</td>
<td>12</td>
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<td>.27 (.04)***</td>
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<th>Zr (SE)</th>
<th>β₁ (SE)</th>
<th>F (df1, df2)</th>
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<td>home</td>
<td>9</td>
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<td>.30 (.07)***</td>
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<td>F(1,26) = 0.19</td>
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<td>9</td>
<td>.34 (.05)***</td>
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Note. # studies= 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 < .05; ** p < .01; *** p < .001.

a Omnibus test of all regression coefficients in the model.
b the continuous variables were mean centered before conducting the moderator analyses.
To explore this further, we performed PET-PEESE analyses. These analyses showed a similar pattern. With regard to the attachment–FBU relation, the PET intercept was $b_0 = -0.03$, $p = .882$, 95% CI [-0.380, 0.326]. Since the intercept $b_0$ was not significantly different from zero, the PET-PEESE estimate of the true underlying effect is -.03. Because -.03 differs from the pooled correlation between attachment and FBU that was found ($r = .19$), it is likely that publication bias is present in the attachment–FBU dataset. The PET intercept was $b_0 = 0.40$, $p = .099$, 95% CI [-0.075, 0.875]. This means that the analyses showed that the estimate of the true underlying effect is .40, but non-significant. We mentioned above that the precision-effect test (PET) sometimes has low power in identifying a genuine nonzero effect when there are only 10 or 20 estimates available in an area of research (Stanley, 2017). We therefore also examined the PEESE results, which use the variance as the predictor in the regression, and are better able to estimate the intercept when there is a true effect. The PEESE results showed a similar intercept, $b_0 = 0.38$, $p = .003$, 95% CI [0.131, 0.633]. Thus, both the PET and PEESE estimates of the true underlying effect were higher than the pooled correlation we found in the meta-analysis (which was .31), suggesting that the estimated pooled correlation is slightly too low.

**DISCUSSION**

We examined four questions concerning the direct and indirect relations between parent–child attachment security and children's mentalizing abilities, as indicated by their performance on FBU and EU tasks: (a) what is the pooled correlation between attachment and children's mentalizing abilities, as indicated by FBU and EU; (b) are there differences in the magnitude of correlations between attachment and FBU on the one hand, and attachment and EU on the other hand; (c) does children's verbal ability mediate the relation between attachment and children's FBU and EU; (d) is the relation between attachment and children's mentalization moderated by the attachment assessment approach (behavioral vs. representational) and/or instrument? The results showed that: (a) the association between attachment and FBU was significant, $r = .19$, as was the association between attachment and EU, $r = .31$; (b) the pooled correlation between attachment and EU was significantly larger than the pooled correlation between attachment and FBU; (c) children's language ability partially mediated the relation between attachment and performance on FBU tasks, but not the relation between attachment and EU; (d) the link between attachment and FBU was significantly lower for studies using assessments of attachment during infancy compared to studies using preschool assessments of attachment.
Chapter 3

Attachment and Children’s FBU and EU

With regard to the results of the first research question, the overall correlations between attachment and FBU and attachment and EU were significant, suggesting that there is an association between attachment and children’s mentalizing abilities. Turning directly to the second question, the results of previous studies provided reason to investigate whether the attachment–FBU and attachment–EU correlations differed in size (e.g., Greig & Howe, 2001). The pooled correlation between attachment and EU could be considered medium to large, and was significantly larger than the attachment–FBU correlation. This outcome suggests that attachment relates more to children’s thinking-about-feeling than thinking-about-thinking.

How may we theoretically explain this outcome? One possibility is that the abilities to understand false beliefs and emotions are not entirely driven by the same cognitive structures, and therefore could be influenced differently by biological and environmental factors. Studies using adult samples have shown that mentalizing abilities are best organized in terms of different polarities that are being driven by separate areas in our brain (Luyten & Fonagy, 2015). That is, there are many distinct neural circuits active during mentalization, and neural activity depends on the particular features of the mentalization activity (Luyten, Fonagy, Lowyck & Vermote, 2012; Luyten & Fonagy, 2015; Nolte et al., 2013). Researchers have therefore attempted to clarify mentalizing in terms of four dimensions that can be organized along polarities (Luyten et al., 2012; Luyten & Fonagy, 2015). These polarities are: (a) automatic (unconscious) versus controlled (conscious) mentalizing, (b) mentalizing with regard to self and to others, (c) mentalizing based on external features (e.g., he points to the milk; he wants me to pass him the milk) or internal features (e.g., he thinks he got the job; he feels excited) of self and others, and (d) thinking about thinking and beliefs (cognitive domain) versus the feeling and thinking-about-the-feeling (affective domain). Adaptive mentalization is characterized by a balance in the systems underlying these four polarities (Luyten et al., 2012).

Defining mentalizing in terms of these different polarities seems relevant since EU and FBU tasks measure similar dimensions of mentalizing to some extent, but also tap into different dimensions. First of all, both FBU and EU tasks explicitly assess the child’s awareness of the other’s (not their own) mental states. Both tasks are offline assessments of the child’s mentalizing capacity, and attempt to assess the child’s understanding of false belief and emotions in a direct and explicit way. However, the tasks also show differences in the dimensions of mentalizing. On the one hand, FBU requires an appreciation of other people’s thoughts and how these thoughts guide people’s behavior. This taps into the mentalizing of cognitive features, primarily governed by controlled processes (Luyten & Fonagy, 2015; Shamay-Tsoory, Aharon-
Peretz, & Perry, 2009). Typical EU tasks, on the other hand, require participants to recognize emotions from facial expressions and to understand the causes of emotions. Lastly, FBU tasks require an understanding of mental concepts that are not visible to the eye (thinking-about-thinking), whereas EU tasks require children to connect the outer (facial expressions) with the inner (emotions) world.

The distinction between EU and FBU in terms of different polarities of mentalization is important because EU and FBU tasks seem to be driven by partly similar and partly different brain areas. The recognition of the emotional state of others is claimed to be a direct, automatic process that does not require psychological inference and metarepresentation (Decety & Jackson, 2004). The understanding of causes of emotion on the other hand, may appeal to the conscious, verbal, and reflective processing of social information that requires the capacity to reflect consciously and deliberately on, and make accurate attributions about, the emotions of others (Luyten & Fonagy, 2015; Walter, 2012). This notion is supported by studies showing that different neural circuits underlie cognitive and affective mentalizing capacity, as well as performance on false belief and emotion recognition tasks (Shamay-Tsoory & Aharon-Peretz, 2007; Shamay-Tsoory et al., 2009; Walter, 2012). For instance, it is proposed that cognitive mentalizing depends on the ventromedial prefrontal cortex (vmPFC), whereas affective mentalizing depends on the dorsomedial prefrontal cortex, the temporoparietal junction, the superior temporal sulcus and the posteromedial cortex (Walter, 2012). Indeed, two studies have shown that patients with lesions in the vmPFC appear to be impaired in false belief tasks, whereas patients with lesions in the inferior frontal gyrus appear to perform worse on emotion recognition tasks (Shamay-Tsoory & Aharon-Peretz, 2007; Shamay-Tsoory et al., 2009).

Altogether, FBU tasks seems to appeal more to brain areas involved in conscious decision making and information processing, whereas EU tasks appeal to both conscious reflective processes and to nonconscious embodied processes, which are driven by brain areas involved in emotional experience. Again, this distinction is important because it suggests that different mentalizing mechanisms operate during the assessment of false belief and EU, and that these different facets of mentalizing may therefore be influenced differently by bioecological predictors. However, empirical research has not yet investigated brain areas associated with different types of mentalizing in children. Exploring the associations between mentalizing abilities, attachment, and neurobiological processes in young children is therefore an interesting avenue for future research.
Chapter 3

Attachment and Mentalization: The Role of Language

The third question of this meta-analytic study concerned the direct or indirect nature of any association between attachment and mentalizing abilities. We studied whether language ability was a significant mediator, because mediation would suggest that the nature of the relation is not direct. With regard to the relation between attachment and FBU, we found that language ability partially mediated the association, as the pooled correlation dropped from $r = .18$ to $r = .10$ after the mediating effect of language ability was controlled. We did not find a mediating effect of language for the relation between attachment and EU, as the pooled correlation dropped from $r = .30$ to $r = .26$ after the mediating effect of language ability was controlled. Interestingly, language ability did show a moderate association with EU performance ($r = .30$), which was similar to the association between language and FBU performance ($r = .35$). Thus, children with good language skills do better on both FBU and EU tasks, but language only affects the attachment–FBU association, and not the attachment–EU association. These results connect to the literature described above, indicating that different neurobiological pathways may link attachment to children’s understanding of other people’s emotions and false beliefs. However, we should be cautious about drawing strong conclusions. A lack of power could underlie this outcome, since only half of the studies reported on correlations for verbal ability and attachment or FBU/EU.

The observed mediational effect of language on the attachment–FBU correlation (partly) supports the view that attachment security is an indirect predictor of children’s later socio-cognitive abilities. That is, if other third variables are taken into account, the correlation may decrease even further, resulting in a model in which the attachment–FBU relation is fully mediated by third factors. From previous meta-analyses we have learned that parents’ (appropriate) mental state language is another factor that predicts both secure attachment and children’s FBU (Devine & Hughes, 2016; Tompkins, Benigno, Kiger-Lee, & Wright, 2018; Zeegers et al., 2017). The MASEM approach that we used in the present study enables researchers to study larger theoretical models including multiple predictor and dependent variables. We recommend that future research examines both children’s language ability and parents’ mental state language as mediators of attachment in a single model, as this would shed further light on the indirect nature of the link between attachment and children’s FBU.

Attachment and Mentalization: The Role of Attachment Assessment Approaches

With regard to the fourth question, we studied whether the pooled correlation between attachment and children’s mentalizing was moderated by the attachment assessment approach (behavioral or representational). Studies using representational attachment measures showed a significantly larger correlation with FBU performance
than studies using a behavioral attachment measure, regardless of a longitudinal or cross-sectional study design. On a similar note, studies using the SSP during infancy or AQS (during infancy or preschool) reported only non-significant to small correlations between attachment and FBU performance. In contrast, we did not find a moderating effect of attachment assessment approach for the relation between attachment and EU. However, it would be an error to conclude from this finding that assessment plays no role in this association. First, only three studies examined the relation between infant attachment (behavioral measure) and later EU (compared to 8 longitudinal studies on the relation between infant attachment and FBU). The moderator analyses may thus simply not have sufficient power to detect a moderating effect of behavioral versus representational measures. Second, the three studies presented very mixed findings. Steele, Steele, Croft, and Fonagy (1999) reported that mother–infant attachment security at 12 months (SSP) predicted later EU ($r = .40$), whereas father–infant attachment security at 18 months did not predict EU at age 6 ($r = .08$). Meins et al. (2019) found no correlations between attachment security (SSP) at 15 months and later EU. Raikes and Thompson (2008; N = 42) reported a $r = .28$ correlation between the attachment security score of the AQS at 28 months and EU at 42 months.

While our results show that behavioral attachment is at best weakly related to FBU, there was a significant relation between representational attachment scores and children's FBU performance. However, this association should be interpreted with caution, and does not necessarily imply a link between secure attachment and superior FBU. As mentioned in the Introduction, representational measures of attachment explicitly require perspective-taking abilities. Given the moderating effect of the attachment assessment approach and the lack of association between behavioral measures of attachment and FBU, the observed association may thus be due to representational attachment measures and FBU tasks drawing on the same ability to understand others’ internal states, rather than indicating a genuine link between attachment security and FBU. Our results therefore do not support the proposal that early secure attachment facilitates children's understanding of others' belief states. Indeed, these outcomes provide reason to study whether the opposite direction of effect holds—are children who are good at reading their own and other people's minds better able to form secure attachments in the preschool years? Support for this direction of cause and effect comes from a recent study investigating predictors of behavioral preschool attachment and stability in behavioral attachment from infancy to age 4. Meins, Bureau, and Fernyhough (2018) reported that better age-2 perspective-taking as assessed in social symbolic play predicted secure attachment at age 4 and maintaining a secure attachment relationship from infancy through to the preschool years. Interestingly, there was some evidence that poorer perspectival symbolic play
abilities may play a role in a transition from secure to insecure attachment over time, with marginally lower perspectival play abilities in children whose attachment changed from secure to insecure compared with those who maintained a secure attachment.

In the adult attachment literature, mentalization-based treatment is widely acknowledged as a way of helping adults with a dismissing or anxious attachment style to start building trust in themselves and others (Bateman & Fonagy, 2013). This type of intervention is based on the assumption that improving mentalization helps patients to go on to learn socially from new experiences, and achieve change in their understanding of their social relationships and their own behavior and actions, thereby building secure attachments (Fonagy & Allison, 2014). Thus, for both children and adults, there is evidence for mentalizing abilities playing a causal role in establishing the security of attachment relationships. This perspective is in line with Bowlby’s recognition that “the child’s capacity both to conceive of his mother as having her own goals and interests separate from his own and to take them into account” (1969, p. 368) as a relevant step towards the establishment of attachment as a goal-corrected partnership.

The potential role of mentalizing abilities in shaping attachment relationships provides valuable information for the development or modulation of interventions aimed at facilitating child attachment security. The Basic Trust method is one example of an attachment intervention method that is focused on explicitly improving children’s mentalizing abilities through teaching parents to frequently and consistently make the child aware of their own and others’ mental states (i.e., by continuously using mental state language when interacting with their child; Polderman, 1998; 2017). Although the effectiveness of this intervention method requires further study, two initial studies have shown that children showed less insecure attachment behaviors after the interventions (Colonnesei et al., 2013; Meins et al., 2019).

Limitations and Future research

A first limitation of this study is that, although the meta-analysis is based on a total of 64 effect sizes, the number of individual samples was relatively small in both meta-analyses ($k=15$; attachment–EU; $k=17$ for attachment–FBU). We examined the sensitivity of the analyses to understand more about the robustness of the results. When influential studies were left out (i.e., studies with a large effect size or sample size), the pooled correlations never changed more than .01. The results were thus not highly dependent on the contributions of one study. The small number of studies may have been more influential when it came to the moderator analyses. As mentioned previously, the moderator analyses were underpowered, and nonsignificant results should be interpreted carefully. We had strict inclusion criteria in terms of sample characteristics (only non-clinical biological children aged between 3 and 6 at the time
of the mentalizing assessment). However, studies used a variety of different validated attachment instruments. Although the moderating impact of the attachment instruments was clear in the analyses, we would have been able to draw more careful conclusions about the methodological issues that underlie the relation between attachment and children's mentalizing capacity if we could have included more studies.

As for all meta-analytic studies, caution is warranted because some unpublished studies may not have been present in the dataset, leading to possible inflations of the estimated pooled correlations. The inspection of the funnel plots as well as the PET-PEESE analyses indicated that publication bias could have been present particularly in the meta-analysis on attachment and FBU. We attempted to track as many unpublished studies as possible by searching for unpublished doctoral theses and conference presentations, and by asking expert researchers in the field if they knew about any unpublished studies. We tracked two unpublished studies on the relation between attachment and FBU, which both showed zero correlation between attachment and FBU (n = 107, Oppenheim, 2005; n = 48, Reese, 1998). Interestingly, both studies assessed attachment security with a behavioral measure during infancy (SSP and AQS). This suggests that if there are unpublished studies that we did not track, the pooled correlation might become lower, and possibly the moderating effect of the attachment assessment approach might become even stronger.

In the present study, we focused on mentalizing abilities in terms of FBU and EU. There are, however, other (earlier) aspects of mentalizing that were not considered, such as the understanding of discrepant desires, visual perspective taking and the understanding of pointing gestures (Carpendale & Lewis, 2004). Very few studies examined early forms of mentalizing in relation to attachment security (e.g., Laranjo, Bernier, Meins, & Carlson, 2010; Meins et al., 2018). An expansion of research on this topic could help to get a better understanding of the direction of the attachment–mentalizing association. Further, future research may want to direct attention to the relation between attachment and mentalizing in more naturalistic settings. In the end, whether and how we use our mentalization capacity during interactions with other people is what counts during daily social experiences. Behavioral measures of children’s mindreading capacity (e.g., use of mind-related speech during interactions with peers) may provide a more ecologically valid index of mentalizing abilities, with stronger implications for clinical intervention.
Does mothers’ and fathers’ mind-mindedness predict physiological emotion regulation of infants across the first year of life?

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Chapter 4

ABSTRACT

The main aim of this study was to test whether mothers’ (N = 116) and fathers’ (N = 116) mind-mindedness predicts infants’ physiological emotion regulation (heart rate variability; HRV) across the first year of life. Three hypotheses were examined: (a) parents’ mind-mindedness at 4 and 12 months predicts infants’ HRV at 12 months over and above infants’ initial HRV levels at 4 months, (b) mothers’ and fathers’ mind-mindedness independently predict infant HRV, and (c) the effects of mind-mindedness on infant HRV (partially) operate via parenting behavior. Infants’ HRV was assessed during rest and a stranger approach. Mind-mindedness was assessed by calculating the proportions of appropriate and nonattuned mind-related comments during free-play interactions, and parenting quality was observed at 4 and 12 months in the same interactions. Path analyses showed that mothers’ appropriate mind-related comments at 4 and 12 months predicted higher baseline HRV at 12 months, whereas mothers’ nonattuned comments predicted lower baseline HRV at 12 months. Similar, but concurrent, relations were found for fathers’ appropriate and nonattuned mind-related comments and infant baseline HRV at 12 months. In addition, fathers’ appropriate mind-related comments showed an indirect association with infant baseline HRV at 12 months via fathers’ parenting quality. With regard to infant HRV reactivity during the stranger approach, mothers’ appropriate mind-related comments at 4 months and fathers’ nonattuned comments at 12 months predicted a larger HRV decline during the stranger approach at 12 months. Infants’ HRV at 4 months did not predict parents’ later mind-mindedness. The results indicate that mothers’ and fathers’ appropriate and nonattuned mind-related speech uniquely impacts the development of infants’ physiological emotion regulation.
INTRODUCTION

Most parents want their child to have emotions, but not be over-powered by them; to feel disappointed but not to cave in; to be thrilled but not get hysterical, to feel some anxiety (and therefore be careful), but not become overly worried or avoiding. In other words, parents hope that their child will find a balanced way to deal with the impact of emotions—to be able to regulate their emotions. For a substantial period of childhood—the first years—the child’s regulation of emotions crucially depends on the parent’s ability to manage the physical and emotional states of the child (Taipale, 2016). As infants possess only a limited set of self-regulating behaviors, the parent’s daily interpretations of and responses to the infant’s arousal form the infant’s first experiences with the onset and attenuation of emotional states. This leads to the question if and what characteristics of the early parent–child relationship predict the development of children's emotion regulation capacity.

In behavioral science, emotion regulation refers to processes that affect the impact and/or time of an emotional response, either intentional or spontaneous, occurring at the physiological, behavioral, and cognitive levels (Gross, 2013). Although emotion regulation is a product of the interplay between various domains, it is known to be greatly affected by the flexibility of the body to up- or downregulate emotional arousal on a momentary basis (Appelhans & Luecken, 2006; Gross, 1998). A commonly used index to assess physiological regulation is high-frequency (HF) heart rate variability (HRV; Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology, 1996). The HF HRV measure is a noninvasive index of the variation in duration between subsequent heart beats, and provides information on the degree to which the parasympathetic nervous system (PNS) influences heart functioning (Porges, 2001).

The PNS is part of the autonomic nervous system and promotes functions associated with the restoration and conservation of bodily energy and the resting of vital organs. Activation of this system typically results in inhibitory effects on body functions, such as slowing down the heart rate (Porges, 2011). The other branch of the autonomic nervous system, the sympathetic nervous system (SNS), prepares the body for an adaptive response to external challenges. Activation of the SNS results in, for instance, accelerated heart rate. The PNS and SNS thus have opposite effects on the body and continuously interact with each other in maintaining physiological adaptation to the environment (Pumprla, Howorka, Groves, Chester, & Nolan, 2002).

Heart rate variability is typically assessed during a resting (baseline) period or during an active situation, reflecting two different aspects of emotion regulation. The level of HRV during rest (i.e., baseline) is considered to represent an individual’s general
capacity and flexibility to regulate emotions (Appelhans & Luecken, 2006). A high baseline HRV level, indexing higher PNS activity, represents more regulatory capacity (Propper & Moore, 2006). For example, high baseline HRV allows the autonomic nervous system to flexibly adapt to environmental changes, as it can more rapidly withdraw parasympathetic activity. As far as emotions are concerned, more variation in PNS activity is associated with an increased capacity to regulate rapid shifts between high and low arousal states (Appelhans & Luecken, 2006).

A body of empirical work underlines baseline HRV as a physiological marker of emotion regulation capacity in children. In toddlers and older children, high baseline HRV has been proven to relate to, among other things, greater attention control, social competence, empathy, regulation of distress during frustrating events, and lower levels of aggression (Beauchaine, 2015). However, in early infancy, particularly in the first 6 months of infant development, the role of baseline HRV as an index of regulatory processes is less clear. Higher levels of baseline HRV in this developmental phase have been linked to positive affective expressions; for example, during interactions with strangers, sustained visual attention and processing speed, stronger responsiveness to novel stimuli, but also to more negative reactivity (crying, negative emotionality; e.g., Beauchaine, 2001; Fox, Schmidt, & Henderson, 2000; Propper & Moore, 2006). Therefore, high baseline HRV in early infancy has been proposed to represent, next to emotion regulation capacity, the infant’s tendency to actively engage with the environment, and a certain responsiveness, both positive and negative, to environmental challenges (Beauchaine, 2001; Fox, 1989).

Mean levels of baseline HRV typically increase with age from infancy through middle childhood, suggesting that the PNS matures in early childhood (e.g., Bar-Haim, Marshall, & Fox, 2000; Bornstein & Suess, 2000; Izard et al., 1991; Patriquin, Lorenzi, Scarpa, Calkins, & Bell, 2015; Stifter, Fox, & Porges, 1989). This increase is in line with the vast expansion of behavioral emotion regulation strategies in the first years due to improved motor, communication and cognitive skills (Sroufe, 1997). However, there are few studies in which infants’ HRV showed no increase over time (e.g., Fracasso & Porges, 1994; Snidman, Kagan, Riordan, & Shannon, 1995). The individual stability of baseline HRV over time also showed mixed results: several studies have found no stability over the first year of life (e.g., Porter, Bryan, & Hsu, 1995; Stifter et al., 1989), yet other studies have reported moderately stable HRV levels from 3 to 36 months (DiPietro, Bornstein, Hahn, Costigan, & Achy-Brou, 2007; Izard et al., 1991; Patriquin et al., 2015; Porter et al., 1995). These mixed outcomes strongly suggest that there are large individual differences in the development of the autonomic nervous system.

Levels of HRV during active situations, for instance, situations that involve social interactions, are indicative of how the body regulates affective arousal during these
particular situations (Porges, 2011). Emotion regulation during socially stressful
situations is reflected by a decrease in HRV relative to baseline (Porges, 2003;
Shahrestani, Stewart, Quintana, Hickie, & Guastella, 2014). When the PNS withdraws
its inhibitory influence on the heart, activity of the SNS is allowed to become more
prominent, enabling active coping (e.g., a fight or flight response). A decrease in HRV
during stressful situations thus reflects withdrawal of the PNS and active coping with
the external challenge. It is expected that a higher general regulatory capacity (as
reflected in higher HRV during resting state) is associated with more emotion regulation
during a stressful or challenging situation (Porges, 2011), which is reflected in a stronger
HRV decline during the challenge. Most empirical studies support the notion that
stronger HRV decline during stressful or challenging situations reflects active emotion
regulation in children. A recent meta-analysis synthesized studies on children’s (0 to 12
years) HRV change during social tasks (Shahrestani et al., 2014). The results suggest
that typically developing children show HRV decreases from baseline during socially
stressful situations, such as in the strange situation procedure or the still face paradigm.

Predicting infant emotion regulation: parents’ mind-mindedness

As mentioned above, in infancy the autonomous nervous system is not fully
developed and is maturing (Bornstein & Suess, 2000). Moreover, infants are not able
to adjust the environment to fit their emotional states; they display some but limited
behavioral strategies to deal with emotions, such as turning away from stimuli that
cause overarousal, sleeping, self-distraction (e.g., playing with a toy), and self-soothing
behaviors (e.g., sucking). The regulation of their daily emotion thus largely depends
on other individuals, most often the parents. Parents evaluate their infant’s cues and
decide when to feed and comfort their infant, when to keep it warm and protect it
against overarousing stimuli. It has therefore been proposed that parents not only act
as crucial modulators of the infant’s states, but they are also, to some extent, in charge
of the infant’s moment-to-moment states (Taipale, 2016).

Many empirical studies on the contribution of environmental factors to the
development of emotion regulation in infants have examined the influence of the
infant–parent attachment relationship (e.g., Haley & Stansbury, 2003; Hill-Soderlund
et al., 2008; Perry, Calkins, & Bell, 2015). According to attachment theory, infant–parent
relationships are embedded within a dyadic mutually regulating system that affects or
even partially constitutes the infant’s later capacity for emotional regulation (Bowlby,
1969/1982). This theory proposed that newborn infants are biologically predisposed
to maintain proximity to a caregiver in order to increase the chance of protection
and survival. Everyday interactions with the caregiver gradually determine infants’
anticipations of how caregivers react to their expression of distress. These expectations
are thought to be stored in a flexible cognitive framework (referred to as internal working models; Bowlby, 1973). It is suggested that the securely attached infant has constructed a general expectation that his or her emotional cues will be responded to by the parent (Ainsworth, Bell, & Stayton, 1974; Cassidy, 1994). The expression of negative affect (e.g., discomfort, anger, fear) has thus become associated with the parent’s helpful response. The securely attached infant may therefore experience negative affect for a short time, trusting that arousal in the company of the parent will not lead to disruption beyond his or her coping abilities (Fonagy, Gergely, Jurist, & Target, 2002). The infant–parent system thus serves as a context in which the secure infant develops a sense of efficacy in modulating affect.

Attachment seems to provide an important framework for understanding the onset of emotion regulation. A question that follows is: how do infants come to perceive their parents as being sufficiently fine-tuned to their emotion, thereby building trust in the regulatory function of the infant–parent system? A concept that has often been put forward as a key facilitator of attachment and socioemotional development is parents’ mind-mindedness (Meins, 1997; Meins, Fernyhough, Fradley, & Tuckey, 2001; Zeegers, Colonnaesi, Stams, & Meins, 2017). Mind-mindedness is defined as parents’ tendency to treat their infant as a mental agent, and is assessed during infancy as parents’ tendency to comment appropriately or in a nonattuned manner on their infant’s putative internal states during free-play situations (Meins, 1997; Meins et al., 2001). The appropriate and nonattuned indices reflect two orthogonal dimensions of mind-mindedness, unrelated to each other (Meins et al., 2003, 2012). Appropriate mind-related comments indicate attunement to and validation of the infant’s internal state. Nonattuned comments reflect the extent to which misinterpretations of the infant’s state emerge as a result of parents projecting their own state of mind or imposing their own agenda on the infant (Meins, 2013). Greater mind-mindedness is indexed by high levels of appropriate mind-related comments or low levels of nonattuned mind-related comments.

Mind-mindedness is a construct at the interface of representational and behavioral assessment of the infant–parent relationship: parents’ mind-related speech reflects the mental tendency to form theories of the infant’s mind (i.e., to mentalize) as well as the behavioral tendency to explicitly (verbally) communicate theories of the infant’s mind during interactions (Meins, 2013; Meins et al., 2012). On the one hand, the behavioral component of mind-mindedness (mind-related speech) may have a direct effect on the organization of the infant’s affect. An important developmental step during infancy involves the infant’s increasing ability to categorize natural and artificial things (e.g., animal types, furniture), which starts to develop by 3 to 4 months of age (Behl-Chada, 1996; Eimas & Miller, 1992; Quinn & Eimas, 1996). Growing research suggests that spoken words help infants to categorize already from the age of 9 months (for a more
elaborate review on the role of language in emotion, see Lindquist, MacCormack, & Shablack, 2015). For example, 9-month-old infants use words (and not tones, sounds or facial expressions) as cues for understanding which objects in the world are similar and distinct (Dewar & Xu, 2009; Xu, 2002). Similarly, it has been proposed that emotion labelling may be an important cue for helping infants and young children appreciate emotion categories and apply those categories to their own experiences and observations (Lindquist et al., 2015). This theory indicates that early mind-related speech may impact the infant’s developing sense of emotion recognition and organization, and therefore may exert a direct influence on the infant’s emotion regulation capacity across the first year of life.

On the other hand, the mental component of mind-mindedness (mentalizing) may enable parents to respond to and interact with their infant in an attuned manner, both on a conscious and an unconscious level (e.g., by being sensitively responsive to infant cues, synchronous, cooperative, warm, and autonomy granting; Camoirano, 2017; Zeegers et al., 2017). The importance of parents’ “mind-minded” stance on infants’ developing emotion regulation may become more evident in an example of the parent and infant interacting in a peekaboo game. If, during the game, the infant signals that he or she is over-stimulated (e.g., by turning away from the caregiver, tuning out, frantic movements, etc.), the parent’s appropriate understanding of the behavioral signal in terms of internal states (e.g., feeling overwhelmed) is critical in guiding the parent’s reaction. When the parent accurately understands the signal, the parent is more likely to show an attuned response: pause the game, enabling the infant’s autonomic system to recover from the heightened arousal. When these types of interactions occur on a regular basis, the infant’s autonomic nervous system practices with shifting between different states, and maintaining physiological homeostasis. The accumulation of these interactions may then support the flexible working of the infant’s autonomic system (Moore et al., 2009).

Conversely, when the parent does not have a mind-minded stance, he or she may not see or misinterpret the infant’s signal and is more likely to continue the peekaboo game. The infant then does not experience recovery from heightened physiological arousal in a way that is matched to his or her current state of being. If such interactions accumulate over time, the autonomic nervous system may adapt to an over-stimulating environment by maintaining lower overall parasympathetic activity (lower baseline HRV). Hence, parents who are able to appropriately interpret their infant’s state of mind seem better able to adjust themselves and the environment in a way that allows the infant to regulate arousal.

This example suggests that mind-mindedness may be a key predictor of infants’ developing emotion regulation capacity, and that the effect of mind-mindedness may operate through parenting behavior. This notion is supported by a recent meta-analysis...
which showed that mind-mindedness (together with two other measures of parental mentalization: reflective functioning and insightfulness) predicted infant attachment security directly, but also indirectly via parents’ sensitive responsivenes (Zeegers et al., 2017). Next to predicting infant attachment security, parental mind-mindedness has frequently been shown to predict children’s own mentalizing abilities at the ages of 2 to 5 years, such as false belief understanding, and the understanding of discrepant desires and visual perspective taking (e.g., Laranjo, Bernier, Meins, & Carlson, 2010; Lundy, 2013; Meins et al., 2002, 2003, 2013). Children with mind-minded parents thus find it easier to interpret other people’s behavior within a mentalistic framework. Children’s mentalizing abilities have been argued to be an important component of emotion regulation, particularly in the context of social relationships (e.g., Sharp et al., 2011). In other words, there is a body of work suggesting that parents’ use of appropriate mental state language before infants can speak impacts the child’s later socio-cognitive skills relevant to emotion regulation.

The present study

In the present study we aimed to complement existing literature on the development of infants’ emotion regulation capacity. We examined three hypotheses concerning the relations between mothers’ and fathers’ mind-mindedness and infants’ physiological emotion regulation. First of all, we hypothesized that parents’ mind-mindedness at 4 and 12 months would predict infants’ HRV levels at 12 months, over and above infants’ initial HRV levels at 4 months. We expected that appropriate mind-related comments would predict higher baseline HRV (positive association) and a stronger decline in HRV levels (negative association) during a socially challenging task involving a male stranger at 12 months, taking into account infants’ HRV at 4 months. Conversely, we expected that parents’ nonattuned mind-related comments would predict lower levels of baseline HRV and less HRV decline during the stranger situation at 12 months.

There is little research on the determinants of parents’ mind-mindedness. The studies that are available suggest that the tendency to be mind-minded is dependent on the familiarity with the interaction partner and therefore is an indicator of people’s relationship quality (Meins, Fernyhough, & Harris-Waller, 2014). Since relationships are an accumulation of a history of interactions between individuals, mind-mindedness may be influenced by how an infant expresses and responds to arousal from birth. However, previous research has shown that mind-mindedness is unrelated to infant temperament, suggesting that individual infant characteristics do not determine parents’ mind-mindedness (Meins, Fernyhough, Arnott, Turner, & Leekam, 2011). The results of this study furthermore highlight that caregiver mind-mindedness already starts to take shape during pregnancy, and therefore primarily taps into parents’
representations of their children, rather than the child’s behavior in itself. These results suggest that parents’ mind-mindedness is not affected by the infant’s capacity to express and regulate emotion. Because further evidence on the relation is lacking, we simultaneously examined whether infant HRV predicts mind-mindedness (i.e., we tested the transactional relations between infant and parent measures).

Second, we hypothesized that fathers’ and mothers’ mind-mindedness would independently predict the child’s emotion regulation. It is only 15 years since fathers have been included more systematically in studies on parenting and young children’s development in general, and emotion regulation specifically. Fathers’ interaction style with their children is characterized as being generally different from mothers’ interaction style: more lively, excitatory, unpredictable, emotionally arousing. Fathers’ interactions may have a unique effect on children’s development and mental health (Bögels & Perotti, 2011; Lamb, 2000; Paquette, 2004). Especially because paternal play may induce high arousal, fathers’ interpretations of, and responses to, their infant’s emotional expressions may be relevant in understanding how infants internalize strategies to deal constructively with highly emotionally charged situations (Lamb, 2000; Martins, Soares, Martins, & Osório, 2016).

While a body of research exists on the impact of mothers’ mind-mindedness on children’s emotional development, research on the impact of fathers’ mind-mindedness is to our knowledge limited to three studies on the prediction of infant attachment security and the prediction of children’s social understanding and self-regulated conduct (Arnott & Meins, 2007; Gagné, Bernier, & McMahon, 2018; Lundy, 2003, 2013). Although these studies had small sample sizes, the outcomes suggest that fathers’ mind-mindedness is also predictive of children’s socioemotional development, highlighting the relevance of including both mothers and fathers in developmental research on mind-mindedness. In the present study we expected that mothers’ and fathers’ mind-mindedness at 4 and 12 months would independently predict infant baseline HRV and HRV decline at 12 months.

Third, we hypothesized that mind-mindedness predicts infant HRV via parenting behavior. As outlined earlier, mind-mindedness is a construct at the interface of behavioral and representational/mental abilities. Mind-related speech may directly affect children’s emotion regulation. However, the parents’ proclivity to take the infant’s perspective cannot be measured directly and may exert its effect on emotion regulation via parenting behavior. We assessed parenting behavior in terms of parents’ responsiveness, intrusiveness, warmth/affectivity and negativity during parent–infant interactions at 4 and 12 months. We expected that parents high in mind-mindedness would show a higher quality of parenting (i.e., high in responsivity and warmth, low in intrusiveness and negativity) during interactions at 4 and 12 months, which, in turn,
would positively affect infant regulation at 12 months. We further expected that the direct effect of mind-mindedness on infant HRV would hold over and above the indirect effect via parenting quality.

METHODS

Participants
Families from the present study participated in an ongoing longitudinal study on social development from infancy to middle childhood (de Vente, Majdandžić, Colonnese, & Bögels, 2011). Couples expecting their first child were recruited through advertisements in magazines and flyers distributed by midwives. Approval from the ethical committee was obtained, and written informed consent was obtained from all participants. Families were excluded if the infant's birth weight was under 2500 g, or if the infant had neurological disorders, or an APGAR score below 8. Families received a gift voucher after every measurement. We analyzed two measurement waves in the current study: 4 months (Time 1) and 12 months (Time 2). At Time 1, when the infant was 4 months old ($M_{\text{age}} = 4.2, SD = 0.33$), 135 fathers and mothers and their firstborns participated (75 girls, 55.6%). At Time 2, when the child was 12 months old ($M = 12.4, SD = .72$), 131 fathers (3% missing) and 130 mothers (4% missing) took part ($M = 12.4, SD = .72$). Attrition was due to couples indicating that they did not have enough time to participate in the longitudinal study. Mean age of mothers at Time 1 was 31.30 years ($SD = 4.41$) and 33.87 years ($SD = 4.77$) for fathers. The mean educational level of parents was fairly high, $M = 7.10, SD = 1.25$ for mothers, and $M = 6.53, SD = 1.55$ for fathers (on a scale from 1: primary education to 8: university degree). Parents were primarily Caucasian. All parents were living together at the time of the assessments.

On an average weekday (Monday to Friday) at 4 months, 40% of the infants were cared for by their mother, 11% were cared for by their father, and 49% were in non-parental care. On an average weekday at 12 months (Monday to Friday), 34% of the infants were cared for by their mother, 11% were cared for by their father, and 55% were in non-parental care. Fathers never took care of their child more than 2 days of the (work)week at 4 and 12 months. On an average weekend day at both 4 and 12 months, 11% of the infants were cared for by their mother, 5% by their father, and 82% of the couples reported that they both took care of the infant at the weekend.
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Instruments

Mind-mindedness. At 4 months parental mind-mindedness was assessed during a five-minute free play period at the university research lab. The parent was asked to play with his or her child as naturally as possible. They were allowed to use all available space in the room. Each session began with the infant lying on a couch, with the parent sitting next to the infant. After two-and-a-half minutes of play time without toys, the parent was provided with a box with five age-appropriate toys to play with. At 12 months, mind-mindedness was assessed during a 10-minute free play session. The parent and child were seated on a play mat in the centre of the room with age-appropriate toys and pillows. After five minutes the toys were replaced with animal-printed pillows and the parent and child continued their play for another five minutes.

Each comment made by the parent (i.e., each spoken word or sentence) was transcribed and coded by two trained observers using a translated version of the mind-mindedness coding manual (Meins & Fernyhough, 2015; Zeegers & Colonnei, 2016). First, each parent comment was classified as either directed at the child’s mental state or not (i.e., mind-related or not mind-related). The mind-related comments were categorized according to the specific state the parent referred to. Categories were cognitions (e.g., “you remembered this from the zoo”), likes and dislikes (e.g., “you don’t like this rattle”), and emotions (e.g., “you’re all excited to play with these toys”). In addition, comments about infants’ epistemic states (i.e., “are you teasing me?”) and comments which were obviously meant to be dialogue said/thought by the infant (e.g., “Daddy, I want you to pick me up”) were also classified as mind related.

Second, each comment in one of the above categories was coded as an appropriate mind-related comment if one or more of the following conditions were met: (a) the trained coder agreed with the parent’s reading of the infant’s internal state, (b) the internal state comment linked the infant’s current activity with similar events in the past or future (e.g., “do you remember which sound a lion makes from when we went to the zoo?”), or (c) the parent voiced (using the first person) what the child might say if he or she could speak. Comments were classified as nonattuned when the independent coder believed (a) the parent misread the internal state of the child, or (b) the comment referred to a past or future event that had no obvious relation to the infant’s current activity (e.g., “I’m sure you would like to feed the ducks later”).

Interrater agreement was assessed on 90 out of 449 transcripts (20%). First, we assessed the interrater agreement on the number of mind-related comments using intra-class correlations (ICC; two-way random effects model with an absolute agreement definition). Inter-rater agreement was at 4 months ICCfather = .75, ICCmother = .88; at 12 months ICCfather = .84, ICCmother = .84. Next, we assessed the interrater agreement on the appropriateness of mind-related comments by calculating Cohen’s
Chapter 4

Kappa. Interrater agreement was at 4 months $\kappa$ father = .82; $\kappa$ mother = .85, at 12 months $\kappa$ father = .92; $\kappa$ mother = .88. Disagreements were resolved by discussion.

Physiological measures. Physiological measures were obtained during baseline (two minutes) and the stranger approach task. The stranger task was designed on the basis of the Laboratory Temperament Assessment Battery (Lab-TAB; Goldsmith & Rothbart, 1996). The infant was placed in an age-appropriate seat during the lab visit with the mother. Mothers were seated on a chair behind their infant. During the task, a male stranger approached and talked to the infant for 30 seconds and then picked up and held the infant for 30 seconds. Physiological measures were recorded and analyzed with Vsrrp98 software (Molenkamp, 2011). Data acquisition in the programme was performed by a National Instruments NI6224 data acquisition card sampling at a rate of 200S/s per channel. A standard Lead-II configuration was used to record ECG. In Vsrrp98, R-waves were identified and adjusted for artefacts. HRV was calculated as the square root of the mean squared differences (RMSSD) of successive normal-to-normal (NN) intervals (Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology, 1996). For baseline HRV, the mean value of HRV during the two-minute baseline was used. To calculate HRV decline, HRV scores during baseline were subtracted from HRV scores during the stranger approach task. Negative values thus reflected a decrease in HRV during the stranger approach task.

Parenting quality. Parenting quality was assessed at 12 months by scoring parenting behavior on four scales: responsiveness, intrusiveness (reversed), warmth/affectivity, and negativity (reversed). The scoring was based on the Meso Behavioural Rating System for Families with young children (MeBRF; Mahoney, Coffield, Lewis, & Lashley, 1998; Majdandžić, de Vente, & Bögels, 2016). This coding system requires coders to observe and rate participants' behaviors, affect, and non-verbal behavior during structured family interactions (e.g., play or forced-compliance tasks). Every minute of the free-play session (five minutes with toys and five minutes without toys) was scored on a 5-point scale. The scores on the parenting scales were averaged across time intervals, and negative scales (intrusiveness and negativity) were reversed. Subsequently, a composite score of the four scales indicating parenting quality was calculated. The four scales were based on the Erickson Scales and the MeBRF (Erickson, Sroufe, & Egeland, 1985; Mahoney et al., 1998). Responsivity reflected the degree to which the parent responded to the child's initiatives in a sensitive and child-focused manner. Intrusiveness was indicated by the parent's lack of respect for the child's autonomy by interfering with the child's desires, interests or behaviors. Warmth/affectivity was indicated by parents' proclivity to show verbal, physical, and facial signs of affection and support towards the infant. Negativity referred to the extent to which parents verbally and nonverbally...
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communicated hostility, rejection, or disapproval towards the child. The coding was done by four couples of raters and a master coder. To prevent rater bias, leading to an overestimation in the correlation between mind-mindedness and parenting quality, the raters who coded the parenting quality and mind-mindedness data were different from the raters who coded the data on mind-mindedness. A total of 15% of the interactions were double coded and the mean inter-rater agreement across the four couples was $M_{icc} = .87$ ($SD = .08$, range .76 to .91).

**Statistical approach**

**Missing values.** From the participating families, data on mind-mindedness at 4 months was available for 114 mothers and 110 fathers. At 12 months, data on mind-mindedness and parenting behavior was available for 112 mothers and 113 fathers. The scores on mind-mindedness were missing due to no lab visit at one of the time points, parents speaking a foreign language during the interaction that we did not master (e.g., Japanese), and technical problems. Valid data on baseline HRV were available for 111 and 99 infants at 4 and 12 months, respectively. For HRV decline valid data were available for 97 and 84 infants at 4 and 12 months, respectively. Missing data were due to families not visiting the lab at one of the time points or disturbance due to movement artefacts or technical problems. We conducted t tests to examine whether infants with and without missing data at 4 and 12 months had parents with different levels of mind-mindedness. These tests showed non-significant results (all p-values > .10). We also coded whether infants cried during the stranger approach, and checked whether the infants who cried were at risk of having a noisy signal due to movement artefacts (chi-square test of independence). Infants who cried at 4 and 12 months were not more likely to have a noisy signal, 4 months: $\chi^2(1) = 0.07$, $p = .795$, and 12 months: $\chi^2(1) = 0.15$, $p = .700$.

**Model testing**

Path models were assessed using structural equation modelling (AMOS, 23.0, IBM SPSS, version 22). Missing data were handled using the full information maximum likelihood (FIML) method. The FIML method obtains maximum use of the data, without substituting an actual value for missing data points or deleting cases with missing data points (Kline, 2015). Instead, parameter values are estimated that are most likely to have resulted in the observed sample data. Multiple measures were used to analyze the fit of each model to the observed data: (1) a chi-square measure of overall goodness of fit, (2) the Comparative Fit Index (CFI), and (3) the root mean square error of approximation (RMSEA). A non-significant chi-square coefficient indicates that the hypothesized model does not significantly deviate from the model present in the data. A CFI value close to or
greater than .95 warrants that the model is at least a better reflection of the data than a model where all correlations are assumed to be zero. Lastly, the RMSEA coefficient suggests adequate fit when it is close to or less than .08. A value lower than .05 indicates good fit (Kline, 2015). The size and significance of indirect effects were tested with a calculator using a Monte Carlo approach, which is appropriate for structural equation models (Falk & Biesanz, 2016). Below we explain the six models we tested for each of the hypotheses. The models are also visually presented in Figures 1 to 6.

**Mind-mindedness predicts infants’ HRV development**

The first hypothesis concerns the effects of parents’ mind-mindedness on the infant’s development of HRV from 4 to 12 months. To examine the hypothesis, we tested a path model with all transactional relations between parental mind-mindedness and infant HRV at 4 and 12 months for mothers and fathers separately (Models 1 and 2). These models enabled us to study whether parental mind-mindedness predicted infant HRV at 12 months, over and above the effects of infants’ initial HRV status at 4 months. We tested a mother and father model because a path model with all variables (infant, father, mother) included in a single model would be too comprehensive in terms of parameter estimates, considering the amount of participants in this study (Kline, 2015). Model 1 included the transactional relations between infants’ baseline HRV and HRV decline and mothers’ mind-mindedness at 4 and 12 months. Model 2 tested the same relations for the infant–father dyads. The following pathways were modelled: (a) concurrent relations between baseline HRV and HRV decline during the stranger situation at 4 and 12 months (e.g., Izard et al., 1991; Porter et al., 1995), (b) concurrent relations between appropriate or nonattuned mind-related comments and baseline HRV or HRV decline at 4 and 12 months, and (c) longitudinal relations between appropriate or nonattuned mind-related comments and baseline HRV or HRV decline at 4 and 12 months. Previous research has shown that appropriate and nonattuned mind-related comments are unrelated (e.g., Meins et al., 2003, 2012). Also, in the present study we did not find concurrent and longitudinal correlations between appropriate and nonattuned comments at 4 and 12 months. Therefore, we did not model concurrent and longitudinal associations between appropriate and nonattuned mind-related comments.

**Mothers’ and fathers’ mind-mindedness independently predict infant HRV**

The second hypothesis involved the independent contributions of mothers and fathers in predicting infant HRV. We tested two models (Models 3 and 4). In Model 3 we examined the direct longitudinal effects of mothers’ and fathers’ mind-mindedness at 4 months on infant HRV at 12 months. In Model 4 we tested the direct concurrent effects of mothers’ and fathers’ mind-mindedness at 12 months on infant HRV at 12
months. As both mothers and fathers were included in the same model, we were able to examine whether parents uniquely contribute to infant HRV.

**Mind-mindedness predicts infant HRV via parenting behavior**

The third hypothesis focused on whether parents’ mind-mindedness predicts infant HRV via the quality of parenting behavior. To examine this hypothesis, we added measures of mothers’ and fathers’ parenting quality at 4 and 12 months to the above-mentioned models (in Models 5 and 6). In Model 5 we tested the indirect effects of mothers’ and fathers’ mind-mindedness at 4 months via parenting quality at 4 months on infant HRV at 12 months. In Model 6 we tested the indirect effects of mothers’ and fathers’ mind-mindedness at 12 months via parenting quality at 12 months on infant HRV at 12 months. For both models we first tested whether a full mediation model would fit the data. Subsequently we examined whether the model fit improved after adding the direct effects of mind-mindedness to the model (i.e., a partial mediation model).

**Data distribution**

Paternal appropriate and nonattuned mind-mindedness at 4 months, maternal nonattuned mind-mindedness at 12 months and baseline HRV at 4 months had outliers \((z > 3.29)\), which may exert a disproportionate influence on the results. We assigned the outliers with scores one unit larger than the next most extreme score (see Tabachnick & Fidell, 2013, p. 11). We reran the analyses with and without the altered variables. Results were very similar, indicating that the outliers did not impact the outcomes. We present the results with the unaltered variables. The distribution of nonattuned mind-mindedness was skewed because approximately 45% of the parents did not make any nonattuned comments. Variables were (log) transformed. The analyses with and without the transformed variables led to similar results. The untransformed variables were used in the final analyses.

**RESULTS**

Descriptive statistics for the infant and parent variables are reported in Table 1. Overall, infants showed a decrease in HRV during the stranger task at 4 (\(M = -1.16, SD = 10.01\)) and 12 months (\(M = -1.92, SD = 15.30\)). The mean proportions of appropriate mind-related comments at 4 months produced by mothers and fathers were 7% and 8%, respectively. The mean proportion of appropriate mind-related comments at 12 months decreased slightly to 6% for both mothers and fathers. Nonattuned mind-
related comments were made less often: at both time points means were 1% for both mothers and fathers.

Correlations between the mind-mindedness variables and parenting quality, as well as the concordance within couples are presented in Table 2. For both mothers and fathers, appropriate mind-related comments were stable from 4 to 12 months, \( r_{\text{mothers}}(105) = .33, p = .001; r_{\text{fathers}}(102) = .24, p = .016 \). Nonattuned mind-related comments showed stability only for fathers, \( r_{\text{father}}(102) = .42, p < .001; r_{\text{mothers}}(102) = .03, p = .79 \). There was concordance in mothers’ and fathers’ appropriate mind-related comments at 12 months, \( r(109) = .22, p = .018 \). Table 3 presents the correlations between the predictor and outcome variables.

**Path analyses**

The results of all models are presented in Figures 1 to 6 at the end of the Results section.

**Model 1: Maternal mind-mindedness and infant HRV.** Figure 1 displays Model 1. The model closely fits the observed data, \( \chi^2(3) = 1.35, p = .718, \text{CFI} = 1, \text{RMSEA} = .00 \). Mothers’ appropriate, but not nonattuned mind-related, comments were moderately stable over time, \( \beta_{\text{appropriate}} = .32, SE = .09, p < .001; \beta_{\text{nonattuned}} = .05, SE = .10, p = .642 \). Mothers’ appropriate mind-related comments at 4 months predicted higher levels of baseline HRV at 12 months, \( \beta = .29, SE = .10, p = .004 \), as well as greater HRV decline during the stranger task, \( \beta = −.25, SE = .11, p = .021 \). Nonattuned comments at 4 months predicted lower levels of baseline HRV at 12 months, \( \beta = −.24, SE = .09, p = .011 \). Infants’ baseline HRV at 4 months did not predict mind-mindedness at 12 months. Mothers’ mind-mindedness at 12 months was unrelated to infant HRV at 12 months. Infants with higher HRV baseline levels showed a stronger decline in HRV levels during the stranger approach at 4 months, \( \beta = −.60, SE = .11, p < .001 \) and at 12 months \( \beta = −.57, SE = .11, p < .001 \), than infants with lower HRV baseline. Infants’ baseline HRV at 4 months was positively related to baseline HRV at 12 months, \( \beta = .25, SE = .12, p = .040 \).

**Model 2: Paternal mind-mindedness and infant HRV.** Figure 2 displays Model 2. The model closely fits the observed data, \( \chi^2(3) = 4.16, p = .527, \text{CFI} = 1, \text{RMSEA} = .00 \). Fathers’ appropriate and nonattuned mind-related comments were stable over time, \( \beta_{\text{appropriate}} = .25, SE = .10, p = .010; \beta_{\text{nonattuned}} = .39, SE = .09, p < .001 \). Fathers’ appropriate mind-related comments at 12 months were related to higher infant baseline HRV at 12 months, \( \beta = .29, SE = .10, p = .002 \), whereas fathers’ nonattuned comments at 12 months were related to lower baseline HRV at 12 months, \( \beta = −.23, SE = .10, p = .022 \). Infant HRV at 4 months did not predict paternal mind-mindedness at 12 months.

**Model 3: Independent effects of maternal and paternal mind-mindedness at 4 months.** Figure 3 displays Model 3, including mothers’ and fathers’ mind-mindedness.
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<table>
<thead>
<tr>
<th>Table 1. Descriptive Statistics for the Variables Included in the Path Analyses</th>
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<tr>
<td><strong>Infant</strong></td>
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<td>HRV baseline</td>
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<td>4 months</td>
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<td>12 months</td>
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<td>HRV decline</td>
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<td>4 months</td>
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<td><strong>Mother</strong></td>
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<td>Mind-mindedness a</td>
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<td>Appropriate MRC 4</td>
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<td>Nonattuned MRC 4</td>
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<td>Appropriate MRC 12</td>
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<td>Nonattuned MRC 12</td>
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<tr>
<td>Parenting quality</td>
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<tr>
<td><strong>Father</strong></td>
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<td>Nonattuned MRC 4</td>
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<tr>
<td>Appropriate MRC 12</td>
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<tr>
<td>Nonattuned MRC 12</td>
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<td>Parenting quality</td>
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Note. MRC = mind-related comments
a Descriptives for mind-related comments are displayed in percentages
Table 2. Pearson’s R Correlations (N)\(^a\) between Appropriate and Nonattuned Mind-Mindedness and Parenting Quality for Mothers and Fathers at 4 and 12 Months\(^b\)

<table>
<thead>
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<td>4 months</td>
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</tr>
<tr>
<td>1. Appropriate MRC</td>
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<td>.12 (110)</td>
<td>.24*(102)</td>
<td>.12 (102)</td>
<td>-.01 (103)</td>
</tr>
<tr>
<td>2. Nonattuned MRC</td>
<td>-.10 (114)</td>
<td>.12 (014)</td>
<td>.13 (102)</td>
<td>.42*** (102)</td>
<td>.09 (103)</td>
</tr>
<tr>
<td>12 months</td>
<td></td>
<td></td>
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<tr>
<td>3. Appropriate MRC</td>
<td>.33** (105)</td>
<td>.01 (105)</td>
<td>.22* (109)</td>
<td>.15 (113)</td>
<td>.31** (108)</td>
</tr>
<tr>
<td>4. Nonattuned MRC</td>
<td>.00 (105)</td>
<td>.01 (105)</td>
<td>-.11 (112)</td>
<td>.04 (109)</td>
<td>-.02 (108)</td>
</tr>
<tr>
<td>5. Parenting quality</td>
<td>.01 (106)</td>
<td>.00 (106)</td>
<td>.13 (106)</td>
<td>-.13 (106)</td>
<td>.16 (116)</td>
</tr>
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Note. \(^*\)p < .05, \(^**\)p < .01, \(^***\)p < .001, MRC = mind-related comments
\(^a\)The sample size (N) for the particular correlation is reported between parentheses
\(^b\)Correlations between the paternal variables are displayed above the diagonal, and correlations between the maternal variables are presented below the diagonal. The diagonal correlations display the concordance between mothers and fathers.
Table 3. Pearson’s R Correlations (N) among the HRV Measures and between Infant HRV at and Maternal and Paternal Mind-Mindedness at 4 and 12 months

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<tr>
<th></th>
<th>HRV bas 4</th>
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<th>HRV bas 12</th>
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<tr>
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<td></td>
<td>-.60***</td>
<td>.20</td>
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<td>HRV decline 4</td>
<td></td>
<td>.20</td>
<td>- .07</td>
<td>-.02</td>
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<td>HRV baseline 12</td>
<td></td>
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<td>-.48***</td>
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Mothers

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<td>Appropriate MRC 4</td>
<td>.17</td>
<td>-.19</td>
<td>.39***</td>
<td>-.32**</td>
</tr>
<tr>
<td>Nonattuned MRC 4</td>
<td>.12</td>
<td>.02</td>
<td>-.26**</td>
<td>.02</td>
</tr>
<tr>
<td>Appropriate MRC 12</td>
<td>.10</td>
<td>.00</td>
<td>.28**</td>
<td>-.14</td>
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<tr>
<td>Nonattuned MRC 12</td>
<td>.18</td>
<td>-.12</td>
<td>-.14</td>
<td>.07</td>
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<tr>
<td>Parenting quality 12</td>
<td>-.06</td>
<td>.16</td>
<td>.03</td>
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Fathers

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<td>Parenting quality 12</td>
<td>.02</td>
<td>.01</td>
<td>.28</td>
<td>-.03</td>
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Note. *p < .05, **p < .01, ***p < .001, HRV B = infants’ resting HRV (baseline), HRV dcl = infants’ HRV decline during the stranger task (compared to baseline), MRC = mind-related comments.
at 4 months predicting infant HRV at 12 months. Because all possible paths were
examined in this model, the model is fully saturated, and fit indices are not informative
(i.e., there is a perfect fit). Mothers’ appropriate mind-related comments at 4 months
predicted higher levels of baseline HRV at 12 months, $\beta = .41$, SE = .09, $p < .001$,
whereas mothers’ nonattuned mind-related comments predicted lower baseline HRV
at 12 months, $\beta = .19$, SE = .09, $p = .048$. Maternal appropriate comments no longer
predicted greater HRV decline, $\beta = .20$, SE = .11, $p = .070$.

**Model 4: Independent effects of maternal and paternal mind-mindedness at 12
months.** Figure 4 displays Model 4, including mothers’ and fathers’ mind- mindedness
at 12 months predicting infant HRV at 12 months. Again, the fit indices were not
informative because all possible paths were examined. Mothers’ appropriate mind-
related comments at 12 months predicted higher levels of baseline HRV at 12 months,
$\beta = .21$, SE = .10, $p = .031$. Fathers’ appropriate mind-related comments at 12 months
predicted higher levels of baseline HRV at 12 months, $\beta = .22$, SE = .10, $p = .025$,
whereas fathers’ nonattuned mind-related comments predicted lower baseline HRV
at 12 months, $\beta = -.24$, SE = .10, $p = .011$.

**Model 5: Mind-mindedness predicts infant HRV via parenting quality at 4 months.**
We first tested whether mind-mindedness at 4 months was associated with parenting
quality at the same age, to examine whether this, in turn, predicted infants’ HRV levels
at 12 months (i.e., a full mediation model). This model showed a poor fit to the observed
data, $\chi^2(12) = 40.67$, $p < .001$, CFI = .37, RMSEA = .14. We then added the direct effects
of mind-mindedness (4 months) on infant HRV at 12 months, $\chi^2(4) = 8.66$, $p = .070$, CFI
= .89, RMSEA = .09. A chi-square difference test of the full mediation model against
the partial mediation model was significant, $\chi^2(8) = 32.01$, $p < .001$, indicating that the
partial mediation model showed a better fit to the observed data than the full mediation
model (Kline, 2015). The estimates of the partial mediation model are presented in
Figure 5. Mind-mindedness at 4 months was unrelated to parenting quality at 4 months.
Mothers’ appropriate mind-related comments at 4 months predicted higher levels of
baseline HRV at 12 months, $\beta = .41$, SE = .09, $p < .001$, whereas mothers’ nonattuned
mind-related comments predicted lower baseline HRV at 12 months, $\beta = .19$, SE = .09,
$p = .048$. When fathers scored higher on parenting quality at 4 months, infants had
higher levels of baseline HRV at 12 months, $\beta = .20$, SE = .09, $p = .024$.

**Model 6: Mind-mindedness predicts infant HRV via parenting quality at 12
months.** We first examined whether mind-mindedness at 12 months predicted
parenting quality at 12 months, to examine whether this, in turn, predicted infants’
HRV levels at 12 months (i.e., a full mediation model). This model showed a satisfactory
fit to the observed data, $\chi^2(12) = 18.60$, $p < .001$, CFI = .85, RMSEA = .07. We added
to the model the direct effects of mind-mindedness (12 months) on infant HRV at 12
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months, \( \chi^2(4) = 2.14, p = .710, \text{CFI} = 1, \text{RMSEA} = .00 \). A chi-square difference test of the full mediation model against the partial mediation model was significant, \( \chi^2(8) = 16.46, p = .036 \). This indicates that the partial mediation model showed a better fit to the observed data than the full mediation model (Kline, 2015). The estimates of the partial mediation model are presented in Figure 6. Paternal appropriate mind-related comments were positively related to fathers’ parenting quality. In turn, fathers who showed higher levels of parenting quality at 12 months were more likely to have infants with higher baseline levels. The indirect effect of paternal appropriate mind-related comments on infant HRV via parenting quality was significant, \( \beta = .08, \text{CI 95\% [0.01,0.18]} \). The direct effect of fathers’ appropriate mind-related comments on infant HRV was no longer significant in this model. Fathers who made nonattuned mind-related comments were more likely to have infants with lower HRV baseline levels, \( \beta = .24, \text{SE} = .09, p = .009 \). Mothers’ appropriate mind-related comments positively related to infant baseline HRV at 12 months, \( \beta = .21, \text{SE} = .10, p = .031 \). Parenting quality of mothers was unrelated to maternal mind-mindedness and infant HRV.

**Robustness analyses**

Prior to the analyses, we checked whether any of the predictor variables were related to infant gender and the level of education of the parents. Since mothers with a higher education level made fewer nonattuned comments at 12 months, \( r(109) = -.20, p = .036 \), we reran the two maternal path analyses including mothers’ educational level as a covariate. The outcomes of these analyses were essentially similar to the outcomes presented in Figures 1 and 2.

**DISCUSSION**

The present study tested three hypotheses: (a) parents’ mind-mindedness at 4 and 12 months predicts infant HRV levels at 12 months over and above infants’ initial HRV levels at 4 months, (b) mothers’ and fathers’ mind-mindedness independently predict infant HRV, and (c) the effects of mind-mindedness on infant HRV (partially) operate through parenting behavior. With regard to the first hypothesis, we found that mothers’ higher proportions of appropriate mind-related comments during interactions with their infants at 4 and 12 months predicted infants’ higher baseline HRV at 12 months, whereas higher proportions of nonattuned comments at 4 months predicted lower baseline HRV at 12 months. Furthermore, we observed a larger HRV decline in infants during the stranger task at 12 months when mothers made more frequent appropriate mind-related comments at 4 months. For fathers, higher proportions of
Figuur 1. Standardized path coefficients for the relations between mothers’ mind-mindedness and infant HRV at 4 and 12 months.

Note. MRC = mind-related comments; *p < .05; **p < .01; ***p < .001; direct effects of infants’ baseline HRV and HRV decline at 4 months are presented below the variables at 12 months. For instance, the effects of baseline HRV and HRV decline on appropriate MRC were .08 and .02, respectively.
Figure 2. Standardized path coefficients for the relations between fathers’ mind-mindedness and infant HRV at 4 and 12 months.

Note: MRC = mind-related comments; *p < .05; **p < .01; ***p < .001; direct effects of infants’ baseline HRV and HRV decline at 4 months are presented below the variables at 12 months. For instance, the effects of baseline HRV and HRV decline on appropriate MRC were .08 and .02, respectively.
Figure 3. The direct effects of mothers’ and fathers’ mind-mindedness at 4 months on infant HRV at 12 months.

Note: MRC = mind-related comments; *p < .05; **p < .01; ***p < .001
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Figure 4. The direct effects of mothers’ and fathers’ mind-mindedness at 12 months on infant HRV at 12 months.

Note: MRC = mind-related comments; *p < .05; **p < .01; ***p < .001
Figure 5. Direct and indirect (via parenting quality) effects of maternal and paternal mind-mindedness at 4 months on infant HRV at 12 months

Note: MRC = mind-related comments; *p < .05; **p < .01; ***p < .001; the direct effects of mind-mindedness on baseline HRV and HRV decline are displayed below the variables (e.g., .39***; .19 refer to the effects of maternal appropriate mind-related comments on baseline HRV and HRV decline, respectively.
Figure 6. Direct and indirect (via parenting quality) effects of maternal and paternal mind-mindedness at 12 months on infant HRV at 12 months

Note: MRC = mind-related comments; *p < .05; **p < .01; ***p < .001; the direct effects of mind-mindedness on baseline HRV and HRV decline are displayed below the variables (e.g., .21*; −.01 refer to the effects of maternal appropriate mind-related comments on baseline HRV and HRV decline, respectively)
appropriate mind-related comments at 12 months were associated with infants' higher baseline HRV at 12 months, whereas higher proportions of nonattuned comments at 12 months were associated with lower baseline HRV at 12 months. Paternal nonattuned comments at 12 months were related to less HRV decline during the stranger task. Infants' baseline HRV and HRV decline at 4 months did not predict mothers' and fathers' mind-mindedness at 12 months.

With regard to the second hypothesis, we found concordance within couples regarding appropriate mind-related comments at 12 months (but not at 4 months). Parents thus start to become more alike in terms of their mind-mindedness. It may be that parents influence each other's mentalizing stance and mind-related speech throughout the first year of the infant's life. It could also be that the child's individual characteristics increasingly evoke higher or lower mind-mindedness in both parents, and thus couples' mind-mindedness starts to correlate at a later age (at least after 4 months). Despite the correlation between paternal and maternal appropriate mind-related speech at 12 months, mothers' and fathers' mind-mindedness independently predicted infant HRV. With regard to the third hypothesis, paternal, but not maternal, mind-mindedness showed an indirect effect on infant HRV via parenting quality. Fathers' appropriate mind-related comments at 12 months were positively related to parenting quality, which in turn positively related to infant baseline HRV.

We tested physiological emotion regulation capacity in two situations, during a baseline period and a potentially stressful situation. Infants' baseline HRV was found to be somewhat stable over time, which is in line with the majority of the studies conducted previously (e.g., Bar-Haim et al., 2000; Bornstein & Suess, 2000). The extent to which HRV decreased from baseline during the stranger task was not stable over time. These findings support the conception that baseline HRV reflects the infant's general capacity and flexibility to regulate arousal, while a decline in HRV reflects how the parasympathetic system reacts to a specific challenge (Appelhans & Luecken, 2006; Porges, 2011). Although the stranger approach task was similar during the two measurements, it may be processed and appraised differently at different ages. At 4 months, infants are able to recognize familiar and unfamiliar faces, but they do not seem to associate the recognition of particular individuals with the (helpful or disruptive) responses of these individuals, as they do when they are 12 months (Bushnell, 1998). Unfamiliarity with an individual may thus not be processed and perceived as equally "threatening" at 4 and 12 months of age. Hence, parasympathetic reactivity during a stranger task may be less stable over the infant's first year compared to parasympathetic activity during rest.

In line with prior research, appropriate mind-related comments were stable over time in both mothers and fathers (e.g., Kirk et al., 2015). Nonattuned comments were
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only stable for fathers. These comments occurred rather infrequently; 1% of the total amount of comments for both mothers and fathers. Visual inspection of the data, however, showed that for fathers there was a substantial group showing three or more nonattuned comments (16% at 4 months), whereas this group was much smaller for mothers (8% at 4 months). Similar percentages were found at 12 months. Thus, when parents made nonattuned comments, fathers expressed higher frequencies of nonattuned comments compared to mothers. The relatively small range and variation in maternal nonattuned comments may explain why no stability was found for mothers’ nonattuned comments from 4 to 12 months.

The outcome that both mothers’ and fathers’ appropriate and nonattuned mind-related comments were positively and negatively linked to infants’ baseline HRV supports the idea that caregivers shape the infant’s developing emotion regulation capacity (Eisenberg, Cumberland, & Spinrad, 1998). This notion that mind-mindedness is an important and unique facilitator of emotion regulation is further strengthened by the fact that mind-mindedness predicted infant HRV over and above parenting quality. According to attachment theory, emotion regulation skill is a product of the quality of an enduring infant–parent relationship (Fonagy et al., 2002). In that sense, the present results also connect to previous findings identifying mind-mindedness as a unique predictor of infants’ attachment security (Meins et al., 2001, 2012; Zeegers et al., 2017).

Appropriate and nonattuned comments made independent contributions to the prediction of emotion regulation, underlining the notion that the two indices represent two distinct dimensions of mind-mindedness (Meins, 2013): one dimension that reflects whether the parent is inclined to represent the infant’s mind explicitly and accurately, and one that reflects whether the parent attributes mental states to the infant that are not matched to the infant’s presumed state (Meins et al., 2012). The tendency to make frequent and appropriate comments on infants’ mental processes is thought to represent parents’ more general sensitive attitude, in contrast to nonattuned comments (Meins et al., 2012; Zeegers et al., 2017). Meins et al. have argued that parents may show sensitive behaviors despite the fact that their discourse shows a lack of attunement to the infant’s internal state. Nonattuned comments may be indicative of more subtle failures of attunement, different from the more obvious insensitive behaviors such as frightening, hostile, or intrusive behaviors. This nuance might be particularly important for understanding how parent–infant interactions contribute to differences in socioemotional development in normative samples (such as in the present study). Parents without mental health problems are less likely to display severe insensitive behaviors, but a lack of fine-grained attunement may still be present (Wan & Green, 2009). The more subtle failures of attunement may be observed better through analyzing the content of their speech than their behavior. The combination
of appropriate and nonattuned mind-related comments has been successfully used
to differentiate parents of children with different insecure attachment classifications
(Meins et al., 2012). The results of the present study are in accordance with these prior
results, indicating that appropriate and nonattuned mind-related comments uniquely
contribute to the prediction of infants’ emotional development.

We found different (independent) effects of mind-mindedness for mothers and
fathers. First, fathers’ appropriate and nonattuned mind-related speech related only
concurrently to infant HRV at 12 months, as opposed to the concurrent and predictive
effect of mothers’ mind-mindedness. Given the fact that there was considerable stability
in fathers’ mind-related comments, it was surprising that only the 12-month variable
was related to infant HRV. Because the path model simultaneously estimated the path
coefficients for all relations in the model, we checked the raw correlations. These also
showed no association between fathers’ mind-mindedness at 4 months and infants’
later HRV levels. The magnitude of the paternal and maternal path coefficients were very
similar, with appropriate comments showing larger effects than nonattuned comments.

Second, the effects of parents’ mind-mindedness on HRV decline during the stranger
approach also differed between mothers and fathers. Only for fathers, nonattuned
mind-related comments at 12 months were associated with less HRV decline during
the stranger task. Thus, when fathers tended to misinterpret the infant’s state of mind,
or project their own state of mind onto that of the child, their infants showed less
active emotion regulation during the stranger situation. On the other hand, only for
mothers, appropriate mind-related comments at 4 months predicted stronger HRV
decline. Mothers’ appropriate mindreading early in life may thus stimulate infants’
parasympathetic system to become more actively involved in regulation arousal during
stressful and unfamiliar social situations. Third, only fathers’ mind-mindedness at 12
months was related to infants’ HRV directly and indirectly via parenting quality at 12
months. Fathers’ tendency to form representations of the infant’s mind thus seemed
to connect to responsive, non-intrusive, affective parenting behavior, which in turn
explained part of the variation in infants’ emotion regulation.

Altogether the findings described above are in line with proposed paternal and
maternal differences regarding child development and the proposed unique role of
fathers in the prediction of children’s emotional development (e.g., Bögels & Perotti,
2011; Lamb, 2000; Paquette, 2004). From an evolutionary perspective, fathers are
considered to be more inclined to challenge their children, stimulate risk taking, and
more often engage in playful interactions with their children, whereas mothers tend to
have a more caring and nurturing parenting role (Möller, Majdandžić, de Vente, & Bögels,
2013). These roles imply that parents may impact their child’s development differently
at different age points. Four-month-old infants have fewer key skills (e.g., motor and
communication skills) that allow them to intentionally use parents to regulate their emotional states (Sroufe, 1997). The development of the young infant may therefore be particularly influenced by the extent to which parents adequately read the infant’s subtle cues and provide a caring response to these cues. On the other hand, the positive impact of parents who are challenging, yet in an attuned manner, may become more evident at a later age, when infants start to experience more efficacy in modulating their own and others’ behaviors (Majdandžić et al., 2016).

Most of the parents in this study worked at least three days per week. More fathers worked full-time than mothers. In the Netherlands, female employees are entitled to at least three to four months maternity leave, whereas male employees are entitled to up to two days of paternity leave after their partners have given birth. Mothers are therefore likely to spend more time with their infant in the first months. In the present study, mothers took care of their infant during weekdays more often than fathers (40% versus 11%). Getting to understand and respond appropriately to the emotional arousal of an infant may require time to develop, which mothers in the present sample may have had more than fathers. Furthermore, nursing mothers engage in an interaction that is critical in soothing arousal during the first months. Differences in the nature and quantity of infant–father and infant–mother interactions during the infant’s first months may thus also explain the earlier onset of the maternal effects.

Parenting quality at 4 months did not relate to appropriate mind-related comments at 4 months, whereas fathers’ parenting quality at 12 months did correlate with appropriate mind-related comments at 12 months. Thus, at 4 months, parents’ mind-minded stance is not (yet) guiding their parenting behaviors during interaction. One explanation is that at 4 months first-time parents are very new to parenting in general and they are just learning about the mind of their infant. For instance, parents could just be beginning to understand that their 4-month-old is highly sensitive to external stimuli and easily overaroused. Their behavior may not yet be guided by this kind of early “mental sensitivity”. Another explanation is that at 4 months, parenting is more non-verbal than at 12 months (e.g., comforting the baby when upset), and not yet guided by verbal comments about their mental states (e.g., “you’re upset and you need a hug”). At 12 months, fathers who tend to be attuned to their infant’s state of mind also tend to be more responsive and warm, and less intrusive and negative. This suggests that the fathers representational mindset and their actual behavior become synchronized throughout the first year of the infant’s life.

That the synchronization of mind-mindedness and parenting behavior was found in fathers but not in mothers is surprising considering a meta-analysis and review that suggest that mothers’ appropriate mind-related commenting is related to sensitive parenting typically assessed with the Ainsworth scales, Maternal Behavior Q-sort or
Chapter 4

the Emotional Availability Scales (McMahon & Bernier, 2017; Zeegers et al., 2017). The measure that we used in the present study, however, entailed a composite of multiple parenting behaviors (i.e., responsivity, intrusiveness, warmth and negativity). The responsivity measure reflected the degree to which the parent responded to the child's initiatives in a sensitive and child-focused manner, which is similar to parental sensitivity. We therefore checked post hoc the correlation between responsivity and maternal and paternal appropriate mind-mindedness. For fathers the correlation was significant, $r = .23$, $p = .016$. For mothers, the correlation was in the positive direction, but did not reach significance, $r = .15$, $p = .115$. Although meta-analytic evidence shows that the pooled correlation between appropriate mind-related comments and sensitivity is significant, the range of correlations among studies varies greatly, from $r = .14$ (Demers, Bernier, Tarabulsy, & Provost, 2010) to $r = .41$ (Rosenblum, McDonough, Sameroff, & Muzik, 2008; see appendix B of the supplementary materials). Whether these inconsistencies in findings are explained by, for instance, sample or methodological differences between studies is not clear yet, as the moderator analyses in Zeegers et al. (2017) did not point out clear moderators of this relation. The reasons for the varying correlations should therefore be further addressed in future research. Very few studies have investigated the (longitudinal) relation between mind-mindedness and parenting of fathers versus mothers, and future research is needed for a better understanding of differences in (the development of) mind-mindedness and parenting quality in fathers and mothers.

Infants' HRV at 4 months did not predict parents' mind-mindedness. As we outlined in the Introduction, infants' HRV at 4 months primarily seems to reflect their responsiveness to, or engagement with, the environment, in both positive and negative contexts (Beauchaine, 2001). The present results suggest that this type of early responsiveness does not shape whether and how accurately parents represent the mind of their child. This is in line with the prior finding that mind-mindedness is unrelated to infant temperament (Meins et al., 2011). However, we should not rule out the possibility that the relation between mind-mindedness and infant emotion regulation is transactional or bidirectional, as we found concurrent, and not predictive, associations between the paternal mind-mindedness indices and infant HRV. Thus, it seems realistic to expect that if parents' mind-mindedness is shaped by the child's characteristics, this is a gradual process occurring over a longer time span.

LIMITATIONS AND FUTURE DIRECTIONS

The current study has several limitations. First, although parents' mind-related comments were not predicted by infants' emotion regulation, the study was not
experimental, precluding conclusions about causality. Second, the sample consisted of a community sample of mothers and fathers with high socioeconomic status, and hence the results cannot be generalized to samples from a different socioeconomic background. Third, in the present study we did not control for infants’ respiration. Changes in respiratory patterns may influence HRV independent of cardiac autonomic activity (Quintana & Heathers, 2014). However, we used a short-term time-domain measure of HRV (RMSSD) in the present study which has been shown not to be influenced by respiration rate (Schipke, Arnold, & Pelzer, 1999).

The measure of parenting quality we used in this study is rather broad and it seems interesting to consider that, maybe in hindsight, it is too coarse-grained to grasp the link between mothers’ early (4-month) mind-mindedness and the infant’s development of emotion regulation. The body-based interactive processes between the parent and the infant play an important role in understanding the effects of parents’ mentalizing stance, especially in the case of very young infants. Parental Embodied Mentalization (PEM) is a construct developed to assess parental mentalization at the nonverbal and primarily unconscious level (Shai & Belsky, 2011). PEM refers to the parental capacity to implicitly conceive, comprehend, and extrapolate the infant’s mental states from the infant’s whole body kinaesthetic expressions and adjust their own kinaesthetic patterns accordingly (Shai & Belsky, 2011). The combination of parents’ implicit (PEM) and explicit (mind-mindedness) mentalization may shed further light on infant–parent processes that shape the infant’s emotion regulation.

Next to understanding how mind-mindedness operates indirectly, it seems relevant to gain more insight into the direct effects of mind-mindedness. For instance, is there an underlying shared genetic trait that explains the direct effects of mind-mindedness on HRV? Furthermore, little is known about when the effect of mental state language on the infant’s emotional development becomes apparent. Is exposure to mental state language already important even before the infant is able to fully decode parental speech? It may be that parental language has a stronger impact during the pre-verbal stage than appears at first sight. Previous studies have shown that from the age of 6 months infants show signs of understanding adult speech, and they begin to imitate speech as early as in the second half-year of life. Also, the ability to symbolize spoken language gradually starts to unfold before they turn 1 year old (e.g., Bates, 2014). This means that even before infants can speak, they begin to appreciate that reality can be represented through the use of abstract concepts (Piaget, 1950). Mind-related speech, which is the parent’s active validation and symbolization of the infant’s internal and physiological state, may therefore already influence the infant’s organization of emotional arousal through the symbolizing abilities of infants at a very young age.
A next step in this line of research is to address whether the effects of mind-mindedness extend to emotion regulation capacity in childhood, and to other facets of emotion regulation. For instance, is mind-mindedness also predictive of children’s cognitive and behavioral strategies to cope with emotions? Particularly from the time children become able to understand and produce spoken language, the impact of mind-mindedness may become more evident. The parent’s tendency to use mind-related speech while interacting with the child is thought to offer children verbal tools with which to progress from being externally regulated to self-regulated (Bernier, Carlson, & Whipple, 2010). First support for this notion comes from a study reporting that children whose mothers were more mind-minded when they were 12 months old performed better on working memory at 18 months, and were inclined to perform better on both conflict and impulse control at 26 months (Bernier et al., 2010). Second support for this notion comes from a study reporting that children whose fathers were more mind-minded when they were 18 months old performed better at an inhibitory control task (Gagné et al., 2018).

Lastly, another topic that has been left unstudied are the independent effects of parents’ mind-mindedness. We explored the effects of paternal and maternal mind-mindedness in isolation. However, parents form a dynamic system and may strengthen or compensate for each other’s influence on the infant’s development. For instance, having a mother who is unstable in interpreting the infant’s mind correctly (i.e., high in appropriate and nonattuned mind-related comments) in combination with a father who is not inclined to interpret the infant’s mind (i.e., low in appropriate and nonattuned mind-related comments) may result in more regulation problems compared to an infant that has either one of these parents in combination with a highly attuned parent (i.e., high in appropriate and low in nonattuned mind-related comments). This type of research would help to gain insight into familial risk factors.

CONCLUSION

Both parents’ appropriate and nonattuned mind-related commenting linked to the developing status of infants’ HRV levels, although the impact of mothers’ mind-mindedness may show an earlier onset. The effects of parental mind-mindedness held over and above the effects of parenting quality. The present study provides initial evidence that mothers’ and fathers’ tendency to make sense of their infant’s mind in an attuned manner influences the development of infants’ emotion regulation capacity throughout the first year of life.
Predicting infant physiological emoticon regulation
On the joint effects of mothers’ and fathers’ mind-mindedness on preschoolers’ social competence and behavior problems

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Chapter 5

ABSTRACT

Parental mind-mindedness, the parent’s propensity to treat the child as an intentional agent, has repeatedly shown to promote children’s development of social understanding and secure attachment. Less is known about whether the impact of maternal and paternal mind-mindedness extends to children’s social and behavior problems. We investigated the combined effect of mothers’ and fathers’ (N = 104) mind-mindedness at 4, 12, and 30 months on children’s social competence and externalizing and internalizing behavior problems at 4.5 years. Besides, we examined the stability, continuity, parental concordance, and inter-parental differences in the use of mind-related comments. Appropriate mind-mindedness (i.e., correct interpretations of the child’s mental states) and nonattuned mind-mindedness (i.e., misinterpretations of the child’s mental states) were observed during parent-child free-play interactions. Social competence, internalizing and externalizing behavior problems were assessed using both parents’ reports. Hierarchical multiple regression analyses showed that, at 12 months, infrequent use of appropriate mind-related comments of both parents predicted children’s externalizing problems, while their frequent use of nonattuned comments predicted children’s low social competence. Furthermore, mothers’ frequent use of nonattuned comments at 12 and 30 months and fathers’ nonattuned comments at 30 months predicted children’s externalizing behavior. The findings suggest that both parents’ low use of mind-related comments, and frequent misinterpretations of their child’s mind, may act as risk factors for later social and behavior problems of their child.
**INTRODUCTION**

In modern societies, children start already at an early age to be involved in complex social contexts, such as preschool education, school, sports clubs, and friend groups. At this stage of life, teachers, friends, and other adults and children are increasingly taking part in children's lives. Some children can fully participate and enjoy social interactions, whereas other children are socially less competent, or show externalizing or internalizing behaviors that prevent them from healthy interactions with others. Parent-child interactions in the first three years are likely to play a fundamental role in the child's socioemotional development, as well as in reducing or preventing behavior problems (e.g., Carpendale & Lewis, 2004; Lamb & Lewis, 2010; Möller, Majdandžić, de Vente, & Bögels, 2013). Increasing attention has been drawn to a specific aspect of parent-child interaction, parental mind-mindedness, which refers to parents' tendency to consider and to treat their children as individuals with an independent mind, rather than as entities with needs that must be met (Meins, 1999, 2013).

Past research has demonstrated that maternal mind-mindedness in infancy is a predictor of child social understanding development, parent-child secure attachment (for a review, see McMahon & Bernier, 2017; Zeegers, Colonna, Stams, & Meins, 2017), language development, and school readiness (Bernier et al. 2017; Meins et al. 2013b). Less is known about the predictive value of mind-mindedness on children's social competence and behavior problems. Mind-mindedness is regarded as a manifestation of parents' ability to “tune in” to what the child is thinking and feeling (Meins, 2013). Doing so, parents directly enhance child trust in them, as well as self-regulation and socio-cognitive development (McMahon & Bernier, 2017). For these reasons, parents' mind-mindedness is expected to promote socioemotional development and to reduce the risk of emotional, social, and behavior problems.

The concept mind-mindedness grew out of research aiming to study why infants become (in)securely attached to their caregivers (Meins, 2013). The assessment approach of mind-mindedness during infancy entails free-play observations of caregiver-infant interaction, after which trained observers code how often the caregiver makes explicit appropriate and nonattuned mind-related comments toward the infant (Meins & Fernyhough, 2015). Caregivers' comments are mind-related when they refer to the infant's mental states (e.g., cognitions, emotions, desires). Mind-related comments are, in turn, appropriate when they are correct reflections of the putative mental states of the infant (e.g., the mother saying “Oh darling, you are so sad” when the child is displaying sadness). In contrast, mind-related comments are nonattuned when there is no correspondence between the caregiver’s interpretation and the observable behavior.
of the infant (e.g., the mother saying “You like this turtle” when the child is actively engaged in playing with a different toy).

In general, about 6 to 8% of parents’ comments toward their baby during free-play situations are appropriate mind-related references. Nonattuned mind-related comments are produced far less frequently; they generally constitute around 1–2% of parents’ total amount of comments during free-play interactions (Arnott & Meins, 2007; Kirk et al., 2015; Meins et al., 2003, 2012; Zeegers et al., 2017). In some studies it was reported that nonattuned comments occurred too infrequent to be included in the analyses (i.e., > 90% of the participants made no such comments at all); this was, for instance, the case in a low-risk sample (e.g., Bernier et al., 2017), or in professional caregivers (e.g., Colonnesi et al., 2017). The remaining comments of parents during interactions (± 90%) are not mind-related. These comments typically refer to the perception of the child, to what the child is saying or doing, to the parent’s mind or behavior, or to general conditions (e.g., “The sun is shining today”).

Appropriate and nonattuned mind-related comments are regarded as two orthogonal categories of comments (Meins 2013), as they are typically unrelated to each other (Meins et al. 2012). Moreover, meta-analytic data revealed that while mothers’ use of appropriate mind-related comments is positively associated with sensitive behavior ($r = 0.30$), mothers’ use of nonattuned comments is not related to (in)sensitive behavior ($r = 0.13$; Zeegers et al., 2017). For these reasons, appropriate and nonattuned mind-mindedness are commonly regarded as two distinct predictors of child outcomes (Meins et al. 2011). Parents with more optimal mind-mindedness often produce appropriate mind-related comments and seldom nonattuned mind-related comments.

Parental mind-mindedness is found to be stable in mothers during the first two years of life (Kirk et al., 2015; McMahon et al., 2016; Meins et al., 2011) and in the preschool years (Illingworth et al., 2016). No studies, however, have explored the temporal stability of mind-related comments in the transition from infancy to toddlerhood, which seems to be relevant for two reasons. First, stability from infancy to toddlerhood would confirm that mind-mindedness is a stable characteristic of the parent-child relationship (Kirk et al., 2015; Meins et al., 2011). Second, temporal stability would demonstrate the validity of measuring mind-related comments using an observation-based measure also beyond infancy, when children are able to communicate their thoughts and feelings verbally, and parents are therefore less challenged in interpreting children’s behaviors in terms of mental states. To date, four studies used observation-based measures of mind-mindedness with children of 2 to 10 years. In two studies mothers’ mind-mindedness was observed in parents of children aged between 19 months and 10 years (Fishburn, 2017; Illingworth et al., 2016), using the coding system of Meins and Fernyhough (2015). In one study the Meins and Fernyhough coding system was used to observe interactions
between professional caregivers and children of 3 years (Colonnesi et al., 2017). In another study, a different observational assessment method was used to assess mind-mindedness in mothers and fathers of 4-year-old children (Lundy, 2013). Although these studies provide initial evidence of the possibility to measure mind-mindedness with observations after infancy, they did not test the temporal stability of observation-based measures of mind-mindedness from infancy till toddlerhood.

Mothers’ and Fathers’ Mind-Mindedness

Research on the similarities and differences between mothers’ and fathers’ mind-mindedness is very limited. While mothers’ use of mind-related comments has been extensively investigated for almost 20 years, only a few studies explored both fathers’ and mothers’ spontaneous use of mind-related comments (Arnott & Meins, 2007; Lundy, 2003, 2013), providing some evidence of concordance and differences between partners. Concordance refers to a positive association between fathers and mothers in the use of mind-related comments toward their child. Arnott and Meins (2007) reported a significant concordance between mothers’ and fathers’ appropriate mind-related comments at the age of 6 months ($r = 0.44$), while no concordance was found for nonattuned mind-related comments ($r = 0.06$). Similarly, Lundy (2013) found a significant concordance within mother-father couples in the use of mind-related comments with their 4-year-olds ($r = 0.39$). Concordance in mind-mindedness between parents suggests that parents influence each other and adopt similar modes of reading the inner states of their child (Arnott & Meins, 2007).

Besides concordance, mothers and fathers could also differ from each other in how often and how accurate they comment on their infant’s mind. Arnott and Meins (2007) found no differences between maternal and paternal use of appropriate mind-related comments during the interactions with their 6-month-old infant. Fathers, however, displayed more nonattuned comments than mothers. Furthermore, fathers, but not mothers, who displayed more appropriate comments also produced more nonattuned comments. Lundy (2003) explored differences between mothers’ and fathers’ use of mind-related comments, using a similar coding system as Meins and Fernyhough (2015), in which only appropriate comments were coded. Also in this study, no differences were found between fathers and mothers in the overall number of appropriate mind-related comments toward their 6-month-old baby.

Due to limited empirical evidence and inconclusive findings, both the concordance and differences in the use of appropriate and nonattuned mind-mindedness between parents need to be further investigated. More importantly, since children typically have two parents, the joint effect of couples’ mind-mindedness should be investigated. A parent’s mind-mindedness may impact the child’s development independently of the
other parent, as well as a parent may compensate or reinforce the impact of the other parent's mind-mindedness.

Parents’ Mind-Mindedness and Children’s Social Competence and Behavior Problems

An almost unexplored aspect of mind-mindedness is its predictive value on children’s development of social competence. Social competence refers to the ability to take the perspective of others, comfort and assist them, being collaborative and helpful, use negotiation, accept compromises, and be happy with one's own accomplishments (Luteijn et al., 2000). Social competence has been found to be associated with emotion regulation abilities (Blair et al., 2015), attachment security (Groh et al., 2014), and Theory of mind (Devine et al., 2016), and all these three aspects have been found to be predicted by mothers’ mind-mindedness (e.g., Crucianelli et al., 2018; McMahon & Newey, 2018 for emotion regulation; Meins et al., 2003 for attachment security; Kirk et al., 2015; Laranjo et al., 2014; Lundy, 2013; Meins et al., 2013a, b for Theory of mind). One could, therefore, expect that parents’ mind-mindedness can stimulate children’s social competence by improving their early socioemotional as well as their socio-cognitive development.

While a high level of mind-mindedness can stimulate a healthy social development in children, a low level of mind-mindedness can be a risk factor for children’s behavior problems (Meins et al., 2013a, b). Only a few recent studies have explored the association between mothers’ use of mind-related comments and children’s behavior problems. Meins et al. (2013a, b) report a negative association between mothers’ use of appropriate mind-related comments toward their 8-month-old infant and externalizing and internalizing behaviors at 4 years, but only in families with low SES. Camisasca et al. (2018) also found significant concurrent negative associations between maternal appropriate mind-mindedness and children’s internalizing and externalizing problems at 17 months. In contrast, Centifanti et al. (2016) found no association between maternal use of appropriate mind-related comments at 8 months and children’s behavior problems at 5 years. In the study of Easterbrooks et al. (2017) no direct relation was found between teen-mothers’ use of appropriate mind-related comments at 12 months and children’s behavior problems one year later. Taken together, these studies partially support the idea of an association between the use of appropriate mind-related comments and children’s later behavior problems.

Two crucial aspects of mind-mindedness need further attention. First, the relation between nonattuned mind-mindedness and behavior problems is yet unexplored, despite its acknowledged negative impact on children’s development of secure attachment (Meins et al., 2012; Zeegers et al., 2017), and early emotion regulation (Crucianelli et al., 2018; McMahon & Newey, 2018; Zeegers et al., 2018). Parents’
continuous misunderstanding of the child’s inner states may hinder the quality of the relationship and the child’s subsequent socio-emotional development. Second, since infants are usually exposed to both mothers’ and fathers’ mind-mindedness from birth, the impact of both parents, as well as the possible interaction between parents, should be taken into account when exploring the impact of mind-mindedness on children’s development of social competence and behavior problems.

The Present Study
The present study investigated to what extent mothers’ and fathers’ use of appropriate and nonattuned mind-related comments in early infancy (4 months), late infancy (12 months) and toddlerhood (30 months), as well as the interaction between mothers’ and fathers’ mind-mindedness, predict children’s social competence and behavior problems at 4.5 years. Before testing the main hypotheses, we tested the stability (rank order stability over time) and continuity (mean level stability across time) of parents’ mind-mindedness in the first three years, as well as fathers’ and mothers’ concordance (correlation) and differences (in levels) in the use of appropriate and nonattuned mind-mindedness.

We expected both mothers’ and fathers’ appropriate mind-mindedness to predict higher levels of social competence and fewer behavior problems at 4.5 years, and both mothers’ and fathers’ nonattuned mind-mindedness to predict children’s lower levels of social competence and more behavior problems at 4.5 years. Furthermore, the interaction between fathers’ and mothers’ mind-mindedness was investigated to test whether better social competence and fewer behavior problems were predicted by high levels of appropriate and low levels of nonattuned mind-mindedness in one or both parents. These analyses provided insight into how the combination of mothers’ and fathers’ levels of mind-mindedness predicts children’s social competence and behavior problems.

METHODS
Participants
The sample consisted of 104 first-born children (55 girls) and their parents participating in a longitudinal study on the antecedents of anxiety from infancy to middle childhood (de Vente et al. 2011). The parents were recruited during the pregnancy of their first child through obstetrician offices, advertisements in magazines, at pregnancy courses, and baby shops. One-hundred-and-one parents reported being married or having a cohabitation agreement while information about three couples was missing.
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The average length of their relationship was 6.23 years (SD = 3.60). The data of the present study are based on four measurements: 4 (4 m), 12 (12 m), 30 (30 m) months, and 4.5 years (4.5 y). The original sample consisted of 151 parent couples who started participating in the study during pregnancy (i.e., questionnaires). Fourteen families dropped out before T1 because they found participation with their young baby too time-consuming. Sample size dropped to 120 families at T4. The main reasons, as reported by the participants, were finding participation too time-consuming or having moved out of the area. Inclusion criteria for the present study were: availability of the data at 4.5 y of at least one of the two parents (dependent variables), and availability of mind-mindedness data for at least two of the three measurement times of at least one of the two parents (4 m, 12 m, and 30 m). We performed t-tests to examine significant differences between the sample with full data and the excluded sample within the same measurement on the levels of appropriate and nonattuned mind-mindedness. We applied a false discovery rate of 0.05 (Benjamini and Hochberg 1995) to correct for the vast number of comparisons (12). The analyses yielded no differences between the full and excluded sample.

The mean age of the children (in months) was: 3.73 (SD = 0.42) at 4 m, 11.87 (SD = 0.76) at 12 m, 29.59 (SD = 0.60) at 30 m, and 53.41 (SD = 0.63) at 4.5 y. About 93% of the mothers and 96% of the fathers were born in the Netherlands, and all parents spoke fluent Dutch or English. Mothers’ and fathers’ average age at 4 m was 31.37 years (SD = 4.34) and 34.10 years (SD = 4.90), respectively. The majority of parents had a high educational level (postsecondary school education or university): 81.2% of the mothers and 65.2% of the fathers; 15.8% of the mothers and 30.8% of the fathers had a medium level of education (secondary school); and 3.0% of the mothers and 6.7% of the fathers had a low level of education (basic school to lower secondary school).

Procedure

Each mother and father independently visited the Family lab of the Research Institute of Child Development and Education (UvA) with their child at 4 m, 12 m, and 30 m. During each visit, we conducted a free-play task for the assessment of mind-mindedness. At 4.5 y both parents were asked to fill out questionnaires to assess their child’s social competence and behavior problems.

Measures

Mind-Mindedness. At 4 m, mothers’ and fathers’ mind-mindedness was assessed during a 5-min free-play session, 2.5 min without toys and 2.5 min with a box of age-appropriate toys. Parents were instructed to play with their child as if they were at home. At the 12 m and 30 m measurements, parental mind-mindedness was assessed
similarly, but the free play session lasted for 10 min and began with the parent and child seated on a play mat in the center of the room. Each comment of the parent was transcribed and coded by trained observers by watching the filmed interaction (training intraclass correlation coefficient (ICC) > 0.80) using Meins and Fernyhough’s guidelines (2015). First, each comment of the parent was classified as either directed at the child’s mental state or not (i.e., mind-related or not mind-related). Mind-related comments were comments that referred to the child’s emotions (e.g., “You are frustrated”), cognitions (e.g., “You remembered how to make this puzzle”), desires/preferences (“You like to play with the ball”), epistemic states (“You are teasing me”), or comments that were clearly dialogue intended to be spoken by the infant (e.g., the mother says: “That’s a teddy bear, Mummy”). Second, each mind-related comment was coded as appropriate if: (a) the trained coder agreed with the parent’s reading of the infant’s internal state, and/or (b) the internal state comment linked the infant’s current activity with similar events in the past or future, or (c) the parent verbalized what the child might say if he/she could speak. Comments were classified as nonattuned when the coder believed: (a) the parent misread the internal state of the child, or (b) the comment referred to a past or future event that had no apparent relation to the infant’s current activity. After categorizing each comment, percentages of mind-mindedness were calculated ($(N$ of appropriate or nonattuned mind-related comments/total number of comments)*100; Meins & Fernyhough, 2015). These percentage scores of appropriate and nonattuned mind-mindedness were used in the analyses.

Inter-rater reliability was assessed on 110 out of 584 transcripts (19%). First, we assessed the inter-rater agreement on the number of mind-related comments using ICCs (two-way random effects model with an absolute agreement definition). Inter-rater agreement at 4 m was ICC$_{father} = 0.75$, ICC$_{mother} = 0.88$; at 12 m ICC$_{father} = 0.84$, ICC$_{mother} = 0.84$; and at 30 m ICC$_{father} = 0.86$, ICC$_{mother} = 0.86$. Next, we assessed the inter-rater agreement on appropriate and nonattuned comments by calculating Cohen’s Kappa. Inter-rater agreement at 4 m was $\kappa_{father} = 0.82$; $\kappa_{mother} = 0.85$, at 12 m $\kappa_{father} = 0.92$; $\kappa_{mother} = 0.88$, and at 30 m: $\kappa_{mother} = 0.79$; $\kappa_{father} = 0.82$. Disagreements were resolved through discussion.

Parents’ use of nonattuned mind-related comments was sufficiently frequent to be included in the analyses: the number of mothers who produced at least one nonattuned mind-related comment was 27 at 4 m, 31 at 12 m, and 29 at 30 m, while the number of fathers who produced at least one nonattuned mind-related comment was 34 at 4 m, 47 at 12 m, and 27 at 30 m.

**Social Competence and Behavior Evaluation-30 (SCBE-30) (4.5y).** Fathers’ and mother’s ratings on the Social Competence and Behavior Evaluation-30 for preschoolers (SCBE-
30; LaFreniere & Dumas, 1996) were used to assess children’s social competence and behavior problems. The SCBE-30 is a 30-item questionnaire designed to assess child emotional and behavior problems and social skills (Likert scale from 1 (never) to 4 (always)). The questionnaire includes three sub-scales: social competence (i.e., positive qualities in a child’s social adaptation), externalizing behavior (i.e., angry, aggressive, egotistical, oppositional), and internalizing behavior (i.e., depressive, anxious, isolated, dependent). A previous validation study has shown good internal consistency and construct validity (Kotler and McMahon 2002). In the present study, reliability and correlations between parents were: $\alpha_{\text{mother}} = 0.74; \alpha_{\text{father}} = 0.75, r(104) = 0.36, p < 0.001$ for social competence; $\alpha_{\text{mother}} = 0.78; \alpha_{\text{father}} = 0.78, r(104) = 0.34, p < 0.001$ for externalizing behavior; and $\alpha_{\text{mother}} = 0.82; \alpha_{\text{father}} = 0.74, r(104) = 0.40, p < 0.001$ for internalizing behavior.

**Children Social Behavior Questionnaire (CSBQ) (4.5 y).** Child social behavior was also measured using parents’ ratings on the Children Social Behavior Questionnaire (CSBQ; Luteijn et al., 2000; Luteijn et al., 2002). The CSBQ assesses a broad range of behavior and emotional problems that are typical, but not necessarily specific, of children with a milder form of PDD (Pervasive Developmental Disorder). The parent report includes 49 items that are rated on a three-point scale (0 = does not apply; 1 = sometimes or somewhat applies; 2 = clearly or often applies). The questionnaire comprises six subscales (behaviors not appropriate to the situation, withdrawal, orientation problems, difficulties understanding social information, stereotyped behaviors, and fear of and resistance to change), and a total score of social difficulties. For the present study, we used the total score as a general measure of children’s social difficulties. Psychometric qualities of the questionnaire were reported to be good (Luteijn et al., 2000, 2002). Reliability in the present study was high: $\alpha_{\text{mother}} = 0.91; \alpha_{\text{father}} = 0.91$, and the correlation between parents was $r(97) = 0.26, p = 0.009$. In the present study, 31% ($n = 32$) of the children scored above the clinical cut-off of >23 (95th percentile; Luman et al., 2009) for social behavior problems.

**Statistical Approach**

**Study Variables.** Mothers’ and fathers’ percentages of appropriate and nonattuned mind-related comments (at 4 m, 12 m, 30 m) were used as measures of their level of mind-mindedness. Children’s social competence index (at 4.5 y) was created by combining (after z transformations) the scores of the scale social competence of the SCBE-30 with the reversed score of the CSBQ, $r(103) = 0.51, p = 0.001$. The scales of externalizing behavior and internalizing behavior of the SCBE-30 were used as indexes of children’s behavior problems. Since mothers’ and fathers’ scores of social competence, externalizing behavior and internalizing behavior were positively and significantly
associated (see previous two paragraphs), we averaged them into composite scores to generate robust measures of children’s behavior and to avoid multiple comparisons. Moreover, the results obtained with the composite measures were consistent with the results obtained with the single reporter measures.

**Missing Value Analysis and Data Screening.** Of the 104 participants, 4 m data on mind-mindedness was available for 96 mothers and 95 fathers. The 12 m data on mind-mindedness was available for 97 mothers and 98 fathers, and 30 m data on mind-mindedness was available for 100 mothers and 98 fathers. The scores on mind-mindedness were missing due to: no lab visit at one of the time points (n = 14), parents speaking foreign languages during the interaction (n = 6), and technical problems (n = 20). Because only 4.75% of the data had missing values, only predictors had missing values, and values were missing completely at random (Little MCAR test was not significant, $\chi^2$(151) = 171.82, $p = 0.118$), missing values were estimated by using the SPSS Expectation Maximization (EM) procedure (Graham, 2009).

Fathers’ and mothers’ percentages of appropriate mind-related comments were normally distributed (values of skewness/$SE_{\text{skew}}$ and kurtosis/$SE_{\text{kurt}}$ were between −1.96 and + 1.96), while the percentages of nonattuned mind-related comments were positively skewed. Children’s scores on social competence and internalizing behavior were normally distributed. We detected one outlier (+ 3 SD) for externalizing behavior. The value was winsorized by modifying its value to the closest observed values. Afterward, children’s score on externalizing behavior was normally distributed.

**Data Analyses**

In order to investigate the temporal stability of mothers’ and fathers’ use of appropriate and nonattuned mind-related comments from 4 m to 30 m, four autoregressive models using structural equation modeling were conducted (Bollen & Curran, 2004). The Lavaan package was used in the statistical software program R to analyze the model. The concordance between parents was investigated using Pearson’s correlations. Temporal continuity (mean level stability) of appropriate and nonattuned mind-mindedness over time, and differences between fathers and mothers at different ages, we tested using repeated measures ANOVAs on parental mind-related comments with parent (mother and father) and time (4 m, 12 m, and 30 m) as within-subjects variables.

Next, three-steps hierarchical linear regression analyses were performed to investigate whether mothers’ and fathers’ use of appropriate and nonattuned mind-related comments at 4 m, 12 m, and 30 m predict children’s social competence, and externalizing and internalizing behaviors. Following a chronological order, fathers’ and mothers’ mind-related comments at 4 m were entered at step 1, the same variables at 12
m were entered at step 2, and at 30 m at step 3. An interaction term (mother x father) was added to all three steps to test whether one parent’s mind-mindedness compensates for or ameliorates the effect of the other parent’s mind-mindedness. A significant regression model indicated at which age parents’ mind-mindedness significantly contributed to the variance in children’s competence and behavior problems. Significant interactions were further examined using the macro PROCESS 3.1 (Hayes 2013), using the Pick-a-point technique to probe the effect. The Pick-a-point technique allowed us to ascertain whether one parent’s (i.e., mother) use of mind-related comments predicted children’s social competence and behavior problems when the other parent’s (i.e., father) use of mind-related comments was low (1 SD below the mean), medium number (mean), and high (1 SD above the mean).

Preliminary tests on the assumption for the autoregressive models and multiple regressions indicated that the collinearity statistics were all within acceptable limits. Since the percentages of nonattuned mind-mindedness were not normally distributed, log-transformation of the data was applied prior to the autoregressive analyses and multiple regressions only (Tabachnick & Fidell, 2013, pp. 86–88). After the transformation, residual and scatter plots showed that the assumptions of normality, linearity, and homoscedasticity were all satisfied. The Mahalanobis distance scores indicated no multivariate outliers.

**RESULTS**

Table 1 shows the descriptive statistics and zero-order correlations of the study variables. Preliminary analyses on the impact of child sex, parents’ age, level of mothers’ education, and length of the relationship revealed no significant effects on the study variables, range r from −0.17 to 0.15, p from 0.092 to 0.132. A significant correlation was found between fathers’ education and children’s social competence, $r(103) = 0.26, p = 0.008$. Girls were rated more socially competent than boys ($M_{\text{girls}} = 3.04, SD = 0.35; M_{\text{boys}} = 2.85, SD = 0.33), t(102) = 2.96, p = 0.004$. Regression analyses on social competence were, therefore, conducted with and without controlling for child’s sex and fathers’ education (at step 1), leading to similar results. The results are presented without controlling for child’s sex and fathers’ education.

**Mothers’ and Fathers’ Mind-Mindedness**

**Temporal Stability.** Figures 1 presents the autoregressive models showing the temporal stability of parents’ mind-related comments over time. Mothers’ use of
appropriate mind-related comments was stable from 4m to 12m, as well as from 12m to 30m. Mothers’ nonattuned comments, on the contrary, were unstable over time. Fathers’ appropriate mind-related comments were stable from 4m to 12m, but not from 12m to 30m, and their nonattuned comments were stable from 4m to 12m, and from 12m to 30m.

**Concordance between parents.** Couple concordance for appropriate mind related comments was not significant at 4 m, \( r(103) = .05, p = .631 \), significant at 12 m, \( r(103) = .26, p = .009 \), and not significant at 30m, \( r(103) = .07, p = .515 \). Couple concordance for nonattuned mind related comments was not significant at 4m, \( r(103) = .07, p = .515 \), and at 12m, \( r(103) = -.00, p = .994 \), but significant at 30m, \( r(103) = .23, p = .019 \).

**Temporal continuity and differences between parents.** Lastly, we tested the temporal continuity as well as differences between fathers’ and mothers’ use of appropriate and nonattuned mind-related comments across time. For appropriate mind-related comments, a significant effect was found for time, \( F(2, 206) = 61.45, p < .001, \eta_p^2 = .37 \). Sidak’s pairwise comparisons showed that parents produced significantly more appropriate mind-related comments at 4m than at 12m (\( M_{4m} = 7.74, SE = 0.39 \), \( M_{12m} = 5.32, SE = 0.26 \), \( p < .001 \), more at 12m than at 30m (\( M_{30m} = 3.88, SE = 0.16 \), \( p < .001 \)), and more at 4m than at 30m, \( p < .001 \). Mothers and fathers did not differ in the amount of appropriate mind-related comments, \( F(1, 103) = 1.89, p = .172, \eta_p^2 = .02 \). The interaction effect between parent gender and time was not significant, \( F(2, 206) = 0.04, p = .915, \eta_p^2 = .00 \). To conclude, on average, fathers and mothers showed similar temporal patterns in their production of appropriate mind-related comments, with a significant decrease from 4m to 30m.

For parents’ nonattuned mind-related comments, a significant effect of time was found, \( F(2, 206) = 19.73, p < .001, \eta_p^2 = .16 \). Parents produced significantly more nonattuned mind-related comments at 4m than at 12m (\( M_{4m} = 1.05, SE = 0.14 \), \( M_{12m} = 0.63, SE = 0.07 \), \( p = .006 \), at 12m than at 30m (\( M_{30m} = 0.30, SE = 0.04 \), \( p < .001 \), and at 4m than at 30m, \( p < .001 \). A significant effect of parent gender was also found, \( F(1, 103) = 18.69, p < .001, \eta^2 = .16 \). On average, fathers produced more nonattuned mind-related comments than mothers (\( M_{father} = 0.90, SE = 0.11 \), \( M_{mother} = 0.42, SE = 0.04 \), \( p < .001 \). These results were qualified by a significant interaction effect between parent gender and time, \( F(2, 180) = 5.97, p = .003, \eta_p^2 = .06 \). At the age of 4m and 12m fathers produced significantly more nonattuned mind-related comments than mothers, \( p = .002 \) and \( p < .001 \), respectively, while no significant difference was found between parents at 30m, \( p = .230 \). Thus, a general decrease of nonattuned mind-related comments was found from 4m to 30m for both parents. On average, fathers produced more nonattuned comments than mothers at 4m and 12m, while no difference was found at 30m.
Table 1. Descriptive Statistics and Correlations of the Study Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>M</th>
<th>SD</th>
<th>Range</th>
<th>AMRC 12m</th>
<th>AMRC 30m</th>
<th>AMRC 4m</th>
<th>NAMRC 12m</th>
<th>NAMRC 30m</th>
<th>NAMRC 4m</th>
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<th>Extern 4.5y</th>
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Note: AMRC = Percentage of appropriate mind-related comments; NAMRC = Percentage of nonattuned mind-related comments; SocComp = Social Competence (SC = Social competence in SCBE-30; SP (not-reversed) = in CSBQ); Intern = Internalizing behavior. * p < .05; ** p < .01.
Predicting child behavior problems and social competence

Mothers

\[ \text{AMRC 4m} \rightarrow \text{AMRC 12m} \rightarrow \text{AMRC 30m} \]
\[ \text{AMRC 4m} \rightarrow \text{NAMRC 12m} \rightarrow \text{NAMRC 30m} \]

Fathers

\[ \text{AMRC 4m} \rightarrow \text{AMRC 12m} \rightarrow \text{AMRC 30m} \]
\[ \text{NAMRC 4m} \rightarrow \text{NAMRC 12m} \rightarrow \text{NAMRC 30m} \]

Figure 1. Autoregressive Model Testing Mother and Father Stability in the use of appropriate and nonattuned mind-related comments at 4m (4 months), 12m (12 months), and 30m (30 months).

Note. AMRC = Appropriate Mind-related comments; NAMRC = Nonattuned mind-related comments. *p < .05; **p < .01, ***p < .001.
Prediction of Children’s Social Competence and Behavior Problems

**Appropriate mind-mindedness.** Table 2 summarizes the hierarchical regression analyses of the predictive values of fathers’ and mothers’ appropriate mind-mindedness on children’s social competence, externalizing and internalizing behaviors at 4.5y. Parental appropriate mind-mindedness at 4m, 12m, and 30m (step1, step 2 and step 3) accounted for nonsignificant proportions of the variance in children’s social competence and internalizing behavior. Concerning the prediction of children’s externalizing behavior, the model including appropriate mind-mindedness of both parents at 30m was significant (step 3), explaining 17% of the total variation in externalizing behavior. Besides, a significant interaction was found between appropriate mind-related comments of mothers and fathers.

The significance of this interaction effect was confirmed by the PROCESS moderation analysis in which we added mothers’ appropriate mind-related comments at 30m as predictor of children’s externalizing behavior, fathers’ level of appropriate mind-mindedness (low, medium, high) at 30m as moderator, and mothers’ and fathers’ (appropriate and nonattuned) mind-mindedness at 4m and at 12m and their interactions as covariates, $B = .02$ (SE < .01), $t(94) = 3.02, p = .003, 95\% CI [-.01, .03]$. We probed the interaction with the pick-a-point approach (Figure 2a). When fathers’ appropriate mind-mindedness was low, mothers’ use of appropriate mind-related comments was significantly negatively related to children’s externalizing behavior, $B = -.04$ (SE = .02), $t(100) = -2.53, p = .013, 95\% CI [-.07, -.01]$. When fathers’ appropriate mind-mindedness was medium or high, no significant association was found between mothers’ use of appropriate mind-related comments and children’s externalizing behavior, $B = -.00$ (SE = .01), $t(100) = -0.01, p = .989, 95\% CI [-.03, .01], and b = .04$ (SE = .02), $t(100) = 1.88, p = .064, 95\% CI [-.00, .08], respectively.

To further understand the interplay between mothers’ and fathers’ mind-mindedness, we again probed the same interaction with fathers’ use of appropriate mind-related comments as predictor of children’s externalizing behavior, and mothers’ level of appropriate mind-mindedness as moderator, and mothers’ and fathers’ (appropriate and nonattuned) mind-mindedness and their interactions at 4m and at 12m as covariates (Figure 2b). When mothers’ appropriate mind-mindedness was low, a significant negative association was found between fathers’ use of appropriate mind-related comments at 30m and children’s externalizing behavior, $B = -.06$ (SE = .02), $t(94) = -3.11, p = .002, 95\% CI [-.10, -.02]$. There was no significant association between fathers’ use of appropriate mind-related comments and children’s externalizing behavior when mothers’ appropriate mind-mindedness was medium, $B = -.02$ (SE = .01), $t(94) = -1.34, p = .182, 95 \% CI [-.05, .01], or high, $B = .02$ (SE = .02), $t(94) = 1.20, p = .235, 95\% CI [-.02, .06]. To summarize, children’s externalizing behavior at 4.5y...
Predicting child behavior problems and social competence

Table 2. Hierarchical Multiple Regressions for Parents’ Appropriate Mind-Mindedness at 4m (step 1), 12m (step 2) and 30m (step 3) as predictors of Children’s Social Competence, Externalizing and Internalizing problems

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<td>F</td>
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Coefficients

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<tr>
<td></td>
<td>-.13</td>
<td>-.15</td>
<td>-.29**</td>
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Note: AMRC = Appropriate mind related comments; *p < .05; **p < .01.
Table 3. Hierarchical Multiple Regressions for Parents’ Maternal Nonattuned Mind-Mindedness at 4m (step 1), 12m (step 2) and 30m (step 3) as predictors of Children’s Social Competence, Externalizing and Internalizing problems

<table>
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<td>$F \Delta R$</td>
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Coefficients

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Note. NAMRC = Nonattuned mind-related comments; *p < .05; **p < .01.
Predicting child behavior problems and social competence

was predicted by low levels of appropriate mind-mindedness in both parents, but not
by a low level of appropriate mind-mindedness in only one parent or high levels in both
parents.

**Nonattuned mind-mindedness.** Results of the hierarchical regression analyses
on the predictive values of fathers’ and mothers’ nonattuned mind-mindedness on
children’s social competence and externalizing and internalizing problems are reported
in Table 3. The model predicting children’s social competence was significant at step
2, explaining 13% of the variance. The standardized coefficients show that mothers’
and fathers’ nonattuned mind-mindedness at 12m was significantly negatively related
to children’s social competence at 4.5y. The model remained significant at step 3, but
parents’ mind-mindedness at 30m did not have an effect above and beyond the effect
of 12m ($\Delta R = .05$). Also, the model predicting children’s externalizing and internalizing
was significant at step 2, explaining 13% of the variance. Although this model was
also significant at step 3, again, no significant additional variance was explained by
parents’ mind-mindedness at 30m ($\Delta R = .04$). In both models, at step 3, mothers’
use of nonattuned mind-related comments was a significant predictor of behavior
problems. Additionally, fathers’ use of nonattuned mind-related comments at 30m

**Figure 2.** (a) Simple slopes plot of mothers appropriate mind-related comments at 30m predicting
children’s externalizing behavior for 1 SD below the mean (Low), the mean (Medium), and 1 SD
above the mean (High) of fathers’ appropriate mind-related comments; b) Simple slopes plot of
fathers’ appropriate mind-related comments (AMRC) at 30 months predicting children’s exter-
nalizing behavior for 1 SD below the mean (Low), the mean (Medium), and 1 SD above the mean
(High) of mothers’ appropriate mind-related comments.

Note: AMRC: appropriate mind-related comments.
became a significant predictor of externalizing problems. The model predicting children’s internalizing problems was not significant. To summarize, children’s social competence at 4.5y was predicted by lower levels of nonattuned mind-mindedness in mothers and fathers at 12m. The effect of mothers remained significant at 30m. Children’s externalizing behavior was predicted by high levels of nonattuned mind-mindedness in mothers at 12m and 30m and in fathers at 30m. No significant association was found between children’s internalizing behavior and parents’ nonattuned mind-mindedness.

**DISCUSSION**

This prospective longitudinal study investigated: a) the stability and continuity of maternal and paternal mind-mindedness from infancy to toddlerhood; b) the concordance and differences between mothers and fathers in mind-mindedness, and c) whether parents’ mind-mindedness predicts children’s social competence and behavior problems at 4.5y. Mothers’ appropriate mind-related comments showed moderate stability from 4m to 12m and from 12m to 30m, whereas their nonattuned comments were unstable over time. Fathers’ appropriate mind-related comments showed moderate stability from 4m to 12m but not from 12m to 30m, whereas their nonattuned comments showed strong stability from 4m to 12m and from 12m to 30m. Concerning the continuity, both parents’ use of appropriate and nonattuned mind-mindedness decreased across age. Concordance within couples was only found for appropriate mind-related comments at 12m, and nonattuned mind-related comments at 30m. We found no differences between parents in the quantity of production of appropriate mind-mindedness. Fathers, however, produced on average more nonattuned mind-related comments than mothers at 4m and 12m. These findings add to scant data about the stability and continuity of mind-mindedness (McMahon et al., 2016; Meins et al., 2011) and about differences and similarities between parents (Arnott & Meins, 2007; Lundy, 2003; 2013). Except for fathers’ higher levels of nonattuned mindedness than mothers in the first year, differences between parents seem more due to individual characteristics than to sex. These results suggest that parents expose the child to various forms of mind-related speech, affecting the child in unique and sometimes complementary ways.

When looking at the predictive value of mind-mindedness, mothers and fathers seem to compensate each other in preventing externalizing problems. That is, only when both parents showed low proportions of appropriate mind-related speech at 30m, children had higher levels of externalizing problems at 4.5y. Furthermore, less social competence was predicted by mothers’ and fathers’ nonattuned mind-related comments at 12m, and externalizing problems were predicted by mothers’ nonattuned
mind-mindedness at 12m and by fathers’ nonattuned mind-mindedness at 30m. No predictive value of parents’ mind-mindedness was found for internalizing problems. These results, their relevance, and their implications will be further discussed in the following sections.

**Temporal Stability, Parental Concordance, and Differences between Parents**

The temporal stability of mothers for appropriate, but not for nonattuned, mind-mindedness confirms previous findings in the first two years of life (Kirk et al., 2015; McMahon et al., 2016; Meins et al., 2011), and add to previous studies by extending the stability of mind-mindedness until 30m. In other words, mothers who explicitly demonstrate their understanding of the child’s mental states in the first year of life, also maintain this tendency during toddlerhood, after children start to speak. For fathers, the use of appropriate mind-related comments was found to be stable only during infancy, while their use of nonattuned mind-related comments remained stable till 30m. Thus, when fathers tend to misread their infant’s thoughts and feelings in the first months, they appear more likely to continue misreading in the years ahead. Further, for both fathers and mothers, we found no direct temporal associations between mind-related comments from 4m to 30m (i.e., without the mediation of 12m), suggesting a truly sequential nature of parents’ mind-mindedness from infancy to toddlerhood, and the possible influence of other factors such as shared parenting experiences, children’s language, and their socioemotional development. These factors and their interactions may make the long term temporal stability of parents’ mind-mindedness weaker. The results add to the recent growing body of research on the applicability of observation-based measures of mind-mindedness in infancy and beyond (Colonnesi et al., 2017; Fishburn, 2017; Ilingworth et al., 2015; Lundy, 2013), and offer some evidence about the differences between fathers and mothers.

Concerning the temporal continuity, for both parents, the proportions of appropriate and nonattuned mind-mindedness show a temporal pattern of decrease from 4m to 30m, even though they remain positively associated with the previous assessments. This pattern may be the result of changes in the development of parent-child interactions. From the second year of life, infants become increasingly able to communicate in an intentional way (Carpendale & Lewis, 2004), and before 30m, the acquisition of language occurs. As children communicate their perspectives and mental states more explicitly, parents’ tendency to explicate their appreciation of the child’s mental states might decrease (Meins & Fernyhough, 2015). Besides, when the child grows up parents’ language becomes more complex and repetitions of comments decrease (i.e., repetitions in observations with infants are counted as additional mind-related comments). Also, the interactive context changes from an almost exclusive face-to-face setting at 4m
to a more interactive and varied setting at 12m and 30m, in which the child becomes increasingly free to explore and the parent can alternate face-to-face episodes with moments of observation of the child’s exploration of the environment.

Concordance between parents was found only for appropriate mind-related comments at 12m, and for nonattuned mind-related comments at 30m, with small to medium effect sizes. The lack of concordance at 4m might be explained by the impact of the possible antecedents of mind-mindedness, like parents’ own state of mind as a result of past attachment experiences (Arnott & Meins, 2007; Bernier & Dozier, 2003; Demers, Bernier, Tarabulsy, & Provost, 2010), individual mentalizing capacities (Sharp & Fonagy, 2008). Thus, at the beginning of parenthood, mind-mindedness could be seen primarily as a specific trait of a parent (Meins, 1999; Meins et al., 2011). By the age of 12m, parents have gotten to know their (first-born) infant better and have had more time to adopt similar modes of interacting with their infant and being attuned to the infant’s mental states (Arnott & Meins, 2007; Deschênes, Bernier, Jarry-Boileau, & St-Laurent, 2014; Lundy, 2013). When the child is 30m, couple’s concordance in the use of appropriate mind-mindedness might decrease because the relationship between the child and each parent has become more distinguished and unique. Concordance for nonattuned mind-mindedness, however, might increase as a result of characteristics of the child that have the same impact on the relationship with both parents (e.g., children with a difficult temperament or delayed development of socio-cognitive or language skills). These findings suggest that parents’ mind-mindedness is a unique characteristic intertwined with the development of parent-child relationships (Meins, Fernyhough, & Harris-Waller, 2014).

Fathers and mothers produced similar amounts of appropriate mind-related comments during all three assessment time-points, confirming previous results (Arnott & Meins, 2007; Lundy, 2003; 2013). In general, fathers and mothers seem to be similar in how often they are attuned to their child’s mental states. Fathers’ involvement in child-rearing has substantially increased in the last decades, reducing differences between parents in time spent with their child as well as in the quality of their relationship with the child (Cabrera, Tamis-LeMonda, Bradley, Hoffert, & Lamb, 2000). Fathers in the present study, however, did produce at 4m and 12m a higher number of nonattuned mind-related comments than mothers. This result is in line with previous findings on fathers’ mind-mindedness (Arnott & Meins, 2007), and with the assumption that mothers, as early primary caregivers, generally preserve a more accurate understanding of their child’s inner states (Hallers-Haalboom et al., 2014).
Predicting Social Competence and Behavior Problems

This study found that when both parents were low in appropriate mind-mindedness at 12m, their child more often showed externalizing problems at 4.5 years. Moreover, the results show that when one parent is low but the other is average or high in appropriate mind-mindedness, the lack of one parent’s appropriate mind-mindedness does not predict the child’s externalizing problems. The results suggest a joint effect of mothers’ and fathers’ appropriate mind-mindedness on the development of children’s behavior problems. The results only partially align with Meins et al. (2013) who reported that maternal mind-mindedness associated positively with externalizing behavior problems in low, but not in high, SES families. In the present study’s sample, consisting of primarily medium to high SES families, there was also no relation between a single parent’s mind-mindedness and children’s behavior problems. Possibly in high SES families there is less risk of accumulating factors that can impede the child’s development, and one parent might still compensate for the other parent’s lack of mind-mindedness, protecting the child from developing externalizing problems. Although these findings should be replicated in samples that are more heterogeneous in terms of SES, they indicate the importance of studying the joint effect of parents’ mind-mindedness on children’s socioemotional development.

Proportions of nonattuned mind-related comments predicted lower social competence as well as more externalizing behavior at 4.5y. These results indicate that mothers’, as well as fathers’, frequent misinterpretations of their child’s behavior and mind have a predictive value in the onset of child psychopathology. Nonattuned mind-related speech could lay a foundation for problems in social interactions and communication. Mind-mindedness offers, already from infancy, a meeting of minds between the parent and the infant, a way to share intentionality and emotions. Regular misinterpretation of the child’s mental states might hinder children in developing the capacity to understand their own mental states appropriately and to recognize the same mental states in others (Fonagy, Gergely, Jurist, & Target, 2002). In turn, children’s difficulty with comprehending their own and others’ mental states is associated with lower social competence and more behavior problems (Centifanti et al., 2016; Liddle & Nettle, 2006).

The association between parents’ early nonattuned mind-mindedness and insecure attachment may also underlie the results mentioned above. For example, Meins et al. (2012) found that nonattuned, but not appropriate, mind-mindedness discriminates between insecure-avoidant, insecure-resistant, and insecure-disorganized child-mother relationships. Similarly, in a recent meta-analysis, nonattuned mind-mindedness predicted children’s insecure attachment more strongly than the absence of appropriate comments ($r = .45$ versus $r = .26$; Zeegers et al., 2017). Moreover, McMahon and Newey
Chapter 5

(2018) found that mothers’ use of nonattuned mind-related comments during a stressful situation (Still-Face Paradigm) was associated with dysregulated affect in their 6-month-old infants. Only when children are securely attached, they feel comfortable to explore their environment freely, engaging more easily in new social experiences. Further, only when children are securely attached, they are able to regulate their emotions adequately through the contact with the caregiver, which later turns into healthy self-regulation. Indeed, insecurely attached children are at higher risk for emotion regulation problems, as well as externalizing and internalizing behavior problems (Colonnese et al., 2012; Fearon, Bakermans-Kranenburg, Van IJzendoorn, Lapsley, & Roisman, 2010). A recent meta-analysis compared the levels of behavior problems in securely and insecurely attached children (Madigan, Brumariu, Villani, Atkinson, & Lyons-Ruth, 2016), and reported medium effect sizes. Insecurely attached children presented more internalizing (d = .58) and externalizing problems (d = .49) than securely attached children. Insecure attachment may, therefore, be one of the mechanisms linking parental mind-mindedness to children’s behavior problems. Future research on the association between parents’ mind-mindedness and children’s difficulties should, therefore, include a measure of attachment, and should examine parents’ spontaneous use of mind-related comments in attachment-activating rather than free-play contexts, to increase the specificity and sensitivity of the measure (Bigelow, Power, Bulmer, & Gerrior, 2015; McMahon & Bernier, 2017; Milligan et al., 2015; McMahon & Newey, 2018).

A relevant issue is whether parents’ mind-mindedness predicts children’s social competence, internalizing, and externalizing problems over and above more established predictors, such as parental sensitivity, supportive behavior, or warmth (e.g., Besemer, Loeber, Hinshaw, & Pardini, 2016; Pinquart, 2017a; 2017b). The assessment of mind-mindedness originated from research that attempted to refine the operationalization of parental sensitivity and therefore partially taps into the same concept (see Zeegers et al., 2017). For this reason, studies have focused mainly on comparing these two parenting features as predictors of child development. A meta-analytic study supported a model in which mind-mindedness uniquely predicted infant-parent attachment security, over and above parental sensitivity (Zeegers et al., 2017). Also, at 6 months, mothers’ use of nonattuned mind-related comments has been shown to correlate with infants’ negative affect, independent of maternal emotional availability (McMahon & Newey, 2018); mothers’ appropriate mind-mindedness at 12 months has shown to predict children’s effort control and school readiness, independent of mothers’ sensitive behavior (Bernier et al., 2017); in low-SES families, mothers’ use of appropriate mind-related comments in the first year of life predicted fewer behavior problems at 61 months, again, independent of mothers’ sensitive behavior (Meins et al., 2013). Lastly, a recent study found that mind-mindedness at 4 and 12 months predicted infants’ physiological emotion regulation over
and above parenting quality (i.e., responsiveness, non-intrusiveness, warmth/affectionality, and positivity; Zeegers et al., 2018). Although the findings of Zeegers et al. (2018) suggest that the impact of parental mind-mindedness on child development might be independent of other parenting dimensions, more research is necessary to test the overlap between mind-mindedness and other parenting dimensions as a predictor of children’s social and behavior problems.

Although we did not find that parents’ use of mind-related comments predicted children’s internalizing behavior, we cannot exclude the presence of this association for two main reasons. First, children’s internalizing problems, such as anxiety and depression, generally show their onset in later childhood and during the transition to adolescence (Bongers, Koot, Van der Ende, & Verhulst, 2003). Second, children’s internalizing behaviors might be, because of their nature, less obvious and detectable than externalizing behaviors, increasing the possibility that emotional problems were underreported. Parent reports should, therefore, be combined with other assessments such as observational measures or teachers’ reports. The outcome that the regression model of nonattuned mind-mindedness predicting internalizing problems was nearly significant supports these notions, and points out that the relation between mind-mindedness and internalizing problems requires further study.

LIMITATIONS

Our findings should be interpreted in light of some limitations. The parents who participated in this study were relatively highly educated. Therefore, the results have limited generalizability to a low- or middle-educated population. Another important limitation is that children’s social competence and behavior problems were assessed using parental reports. Although we averaged parents’ scores to obtain a more robust measure of child behavior, it could be that parents’ level of mind-mindedness influences their ability to evaluate their child’s behavior. Moreover, we did not test the possible moderation effects of children’s individual characteristics such as language, cognitive development, or temperament. These characteristics might impact how susceptible children are to parental behavior, including mind-mindedness (Pluess & Belsky, 2009). Finally, parents’ use of nonattuned mind-related comments was infrequent: its effect should, therefore, be interpreted with caution.
CONCLUSION

This study highlights the combined impact of fathers’ and mothers’ mind-mindedness on children’s early social competence and behavior problems. Our findings support the assumption that mind-mindedness is not a unique characteristic of the mother-infant relationship, but a characteristic of both parents-child relationship. Parental mind-mindedness seems to evolve from infancy to childhood, maintaining some stability but also changing, presumably because mind-mindedness is increasingly influenced by interactions among family members (i.e., parent-child, parent-parent). Along the same line, both mothers’ and fathers’ mind-mindedness in infancy and toddlerhood can be risk factors for psychopathology in early childhood.
Predicting child behavior problems and social competence
Evaluating Mindful with your toddler: feasibility, acceptability, and parent reported effects

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Mindfulness (2018), 1-15
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ABSTRACT

Objectives: This study examined the effectiveness of Mindful with your toddler, a 9-week mindful parenting group training for mother-toddler dyads experiencing (co-)regulation difficulties. Methods: Eighteen clinically referred mothers and toddlers (18-48 months) with (co-)regulation problems participated in groups, each comprising of 3 to 6 dyads. At waitlist, pretest and posttest, mothers completed questionnaires on parenting (overreactivity, parental stress, sense of incompetence), psychopathology (internalizing and externalizing), partner relationship, mindful parenting (listening with full attention, compassion for child, non-judgmental acceptance of parental functioning), mindfulness (acting with awareness, non-judging of inner experience, non-reactivity), self-compassion, and child outcomes (psychopathology and dysregulation) and mother-toddler free play observations were conducted, and coded for maternal sensitivity and acceptance. Questionnaires were completed again at 2-month and 8-month follow-up. Results: No significant differences occurred between waitlist and pretest, except for a deterioration in listening with full attention, and an improvement in compassion for child. Between pretest and posttest, observed maternal sensitivity and acceptance improved (medium effect sizes). Child psychopathology, maternal listening with full attention, acting with awareness, non-reactivity and self-compassion also improved (medium effect sizes). Effects were stable or further improved during follow-up (medium/large effect sizes). Improvement in child dysregulation, maternal internalizing psychopathology, maternal stress, sense of parental incompetence, non-judgmental acceptance of parental functioning, non-judging of inner experience was only seen at 2- and 8-month follow-up (medium/large effect sizes). No changes in maternal externalizing psychopathology, overreactivity, compassion for child, and partner relationship occurred. Conclusions: Mindful with your toddler is a promising intervention for mothers with toddlers with (co-)regulation problems.
INTRODUCTION

Self-regulation is the ability to control or direct attention, thoughts and emotions and to adjust behavior to adapt to a given situation (McClelland & Cameron 2012). The toddler years are essential in the development of self-regulation in children (Garon et al. 2008). It is a period in which children progress from being externally regulated to being self-regulated. Toddlers develop a desire to do things independently, and they take steps in the development of goal directed behavior (Whitebread & Basilio 2012). At the same time, toddlers become more able to comply with requests or inhibit something that has been prohibited, they become more capable of controlling emotions, more aware of how others feel, and show more prosocial behavior (Whitebread & Basilio 2012). The development of self-regulation goes hand-in-hand with increasing cognitive capacities, and is influenced by the temperament of the child (Horton et al. 2015; Jahromi et al. 2004). The development of self-regulation however, is not just an unfolding of the potential of the child, but is being affected by, and affects its environment (Kiss et al. 2014). Regulation is enabled by well-attuned regulation by others at the beginning of life (Kochanska et al. 2000). Especially in the first few years, children need help in regulating their emotional and cognitive states and their behaviors by, in most cases the parents, and mostly the mother (von Suchodoletz et al. 2011). In a process of alternating other- and self-regulation, children gradually progress from being, primarily, externally regulated to mostly self-regulated. When a mother’s (or other primary attachment figure’s) availability or capability to help her child regulate is insufficient, this can have negative consequences in terms of social, emotional, cognitive and motor development of the child (NICHD 2004). In case of problems in regulation, early intervention and support for the mother-child dyad is important to reestablish a well-functioning co-regulation relationship, in which the child can learn to trust on the mother’s availability and ability to support him in his regulation when he needs it, and by regulating her own reactive response to the child’s dysregulation.

That parents are important in facilitating healthy self-regulation capacity is underlined by a body of studies showing that parental or parenting features predict or associate with young children’s development of self-regulation. First of all, certain parental qualities, such as sensitivity or responsiveness (Bernier et al. 2010; Kochanska et al. 2000), acceptance (Kliewer et al. 1996), and mind-mindedness (Bernier et al. 2010; Zeegers et al., 2018), and parental control contribute to the development of self-regulation in young children. For instance, parents’ sensitivity, their ability to understand the child’s signals and respond to them appropriately, has shown to affect infants’ affect and self-regulation capacity across the first years of life (Bernier et al. 2010; Kochanska et al. 2000). Parents who are able to appropriately interpret and respond to their infant’s...
cues seem better able to adjust themselves and the environment in a way that allows the infant to regulate arousal. Another factor of importance for the development of regulation in children is the regulatory capacity of the parent itself (Morris et al. 2007). Parental overreactivity was found to be associated with children’s negative emotionality (Lipscomb et al. 2011), and a moderator of genetic influences in children’s negative emotionality and externalizing problems (Lipscomb et al. 2012). Further, parental mental health status is of influence; parental psychopathology is a risk factor for problems in the development of self-regulation in children (Kim et al. 2012). Family factors have also shown to affect self-regulation. The partner relationship between parents affects the regulatory processes between parent and child in the development of child self-regulation (Frankel et al. 2015). The combination of the above described child, parenting, parent and family factors may contribute to either a predominantly well-functioning co-regulatory relationship between a parent and toddler, or, in case of accumulating risk factors, to escalating co-regulatory difficulties between parent and child, and dysregulation in the child, which both have been identified as risk factors for later behavior problems (NICHD 2004; Geeraerts et al. 2015).

The behavior that is associated with developmental needs that toddlers have (for example a high need for both autonomy, and support and co-regulation) may pose specific challenges to the parents. Both the toddler and his parents may experience complicated emotions when he does not have the social and communicative abilities to make his wishes clear, negotiate in an appropriate manner, or when his regulatory abilities fall short in controlling his anger, resulting in tantrums or aggressive outbursts. Most parents recognize these behaviors as age-appropriate, but this knowledge does not necessarily protect all parents from stress, or give them the appropriate regulatory and parenting abilities. When, for example, a tempered boy reminds his mother of her abusive father, she will experience stress when her son starts screaming, which will elicit a fight or flight response, and undermine her possibilities to stay calm, sensitive and persistent, and help her son to regulate his anger. Age-appropriate difficulties may, when parents consistently miss the abilities to deal with them, develop into longer lasting behavior problems (Campbell et al. 2000). High parental stress and child behavior problems have a transactional relationship (Neece et al. 2012). Also, low parental self-efficacy is predictive of child behavior problems, and vice versa (Jones & Prinz 2005). Although some degree of parental stress and feelings of inadequacy may be normal in reaction to challenging toddler behavior, it is important to be alert to signs that mothers are not able to regulate their stress and feelings of insecurity, resulting in persisting and high levels of parental stress and feelings of inadequacy.

When problems arise in co-regulation, this means that the bidirectional linkage of oscillating emotional channels between mother and child does no longer contribute
to emotional and physiological stability for both (Butler & Randall 2012), and that regular imbalance arises, that is not easily resolved. Intervention programs aimed at reestablishing well-functioning regulation between mother and child are scarce. When co-regulation difficulties are associated with maternal mental health problems, interventions are oftentimes focused on relieving psychopathology (Murray et al. 2014). However, even when the mother’s mental health problems diminish, this does not necessarily mean that mother and infant are capable to reestablish a well-functioning co-regulation relationship (Murray et al. 2014). After individual treatment, a mother may still feel insecure in her ability to be there for her child, which may form a vicious circle with the child’s lack of reaching out to the mother. When co-regulation difficulties are associated with specific child behavior problems, such as problems with sleeping or temper tantrums, oftentimes parenting interventions are offered. Parenting programs can be very effective when parents are able to carry out the advice they receive (Kaminski et al. 2008). However, this may be difficult for parents who experience high levels of stress in the face of family adversity (Lundahl et al. 2006). For example, a parent may be advised to bring their toddler back to bed every time he gets up in the evening, and to calmly say that it is time for sleep. Although the advice may be correct and helpful for most parents, the implementation may be very difficult for parents feeling overwhelmed by, for example, anxiety (‘I may harm my child by not giving him what he needs’), frustration (‘He is bullying me by not listening!’), or despair (‘I can’t do it anymore, I’m giving up’). Parents having difficulties regulating their own emotions, will also have more difficulties helping their toddler regulate during these moments.

The self-regulatory capacity of the mother is an important factor in successful co-regulation between mother and child (Lotzin et al. 2015). Many of the mothers with difficulties in self-regulation have a history of difficulties in the co-regulation with their attachment figures (Lopez & Brennan 2000). They may have experienced insecure attachment and may have had, during their own development, too little experiences in which they were helped in regulating their emotions and behavior in a healthy way, and in which they were able to internalize well-functioning regulatory capacities. For these mothers, therapy can be a corrective experience, in which a secure ‘other,’ the therapist, may offer experiences of being helped with regulation, which can form the basis of the development of effective self-regulative strategies (Mallinckrodt et al. 2009). However, corrective experiences should not only be looked for in relation to others; mothers may also learn how to give themselves the experience of being supported and cared for in times of stress (Snyder et al. 2012). Mothers can learn this by practicing mindfulness. Mindfulness can be defined as “paying attention in a particular way: on purpose, in the present moment, and non-judgmentally” (Kabat-Zinn 1994, p. 4) and can be practiced during meditations. How can practicing mindfulness become a corrective experience
that these women may need? First of all, in meditating, they may learn to become aware and open to their experience, including experiences of stress. They may learn to tolerate the emotions that accompany the experience of stress, rather than avoid them. They may become aware of the types of thoughts that arise under stress, such as self-critical and catastrophizing thoughts, and how they enhance suffering, of their ways of coping with stress, and of the consequences of these coping strategies. They may learn to adapt their inner attitude towards more supportiveness and friendliness and become more flexible in their ways of coping (Farb et al. 2014). Altogether, this may support the self-regulation capacity of mothers.

Mindfulness is not only being used to learn to regulate their own stress more efficiently, but also to improve co-regulation, for example in parent-child dyads (Duncan et al. 2009). Bögels et al. (2014) reported that parents with children with mental health problems who participated in a Mindful Parenting training learned to regulate their own emotions and behavior better (decreased parental psychopathology), to regulate stress in relationship to their child better (decreased parental stress), to change their parenting style to one that is more supportive to the child (decreased rejection), and that improved co-regulation by the parents supported children in the development of self-regulatory abilities (decreased child psychopathology). Similar effects have been shown in studies in which parents of children with ADHD, autism, and other developmental disabilities were offered mindfulness (e.g. Benn et al. 2012; Dykens et al. 2014). Mindfulness in parenting is also hypothesized to reduce parental preoccupation with aspects of their children they find complicated and improve acceptance, and to improve co-parenting (Bögels et al. 2010).

A mindful parenting intervention that is specifically directed at improving parental self-regulation and parent-child co-regulation might be a suitable intervention for mothers and toddlers who experience regulatory difficulties. For mothers with infants aged 0 to 18 months, the Mindful with your Baby intervention was developed, aimed at offering mothers of babies tools they could use for both self-regulation and co-regulation in relationship to their babies (Potharst et al. 2017). The first results on the effectiveness were hopeful: mothers improved not only in their general functioning (self-reported psychopathology, well-being and mindfulness), but also in parenting and relating to their baby (self-reported parental stress and confidence, responsivity and hostility towards their infant). Also the babies reacted to the intervention in a positive way: their (mother-reported) positive affectivity improved. An important element of Mindful with your Baby was the presence of the babies in most of the sessions. This helped the mothers generalize what had been learned to the home situation with their child. A limitation of this study was the use of questionnaires only, while these are not sufficient to reliably measure quality of parent-child interaction (Miron et al. 2009).
The promising results of the Mindful with your baby intervention lead to the question whether similar effects could be maintained for mothers and their toddlers. Such a training should, just as the Mindful with your baby training, invite the toddlers in part of the training, so that not only self-regulatory abilities can be practiced during training sessions, but also co-regulatory abilities. In the current study, a newly developed mindful parenting group training for mothers with toddlers present is evaluated: Mindful with your toddler. The goal is to evaluate the effects of Mindful with your toddler in mother-toddler dyads who were referred to a mental health clinic because of regulation problems (co-regulation problems and/or self-regulation problems of mother and/or child). We used a longitudinal design, with a waitlist, pretest, posttest, 2-month and 8-month follow-up to study the treatment effects. We hypothesized that Mindful with your toddler would be feasible, acceptable, and effective in improving observed maternal sensitivity and acceptance of the child, and mother-rated child dysregulation and psychopathology, maternal overreactivity, parenting stress, parenting sense of competence, maternal psychopathology, partner relationship, mindful parenting, mindfulness, and self-compassion, as compared to waitlist, and that these effects would remain after the training had ended.

**METHOD**

**Participants**

Twenty-two mothers ($M_{age} = 37.3$ years; $SD = 3.9$) with 18-to-48-month-old toddlers ($M_{age} = 2.4$ years; $SD = .6$); 15 boys (68%) and 7 girls; 17 firstborns (77%) were referred to Mindful with your toddler because of stress related to motherhood. Most mothers and babies lived with the father of the toddler ($n = 17; 77$%). One mother had divorced recently (5%), one lived together with the father of her second child, which was not the father of the participating toddler (5%), one ended the relationship with the father during the pregnancy (5%), one never had a relationship with the father, but had an agreement with the father to have a child together (5%), and one had a donor, who did not take on a father role (5%). The mothers’ ethnicities were Dutch ($n = 15; 68$%), European ($n = 5; 23$%), and non-European ($n = 2; 9$%). With regard to the level of education, 11 (50%) mothers had a master degree, 9 (41%) a bachelor degree, and 2 (9%) a high school diploma. Nine mothers (41%) were working at the time of the training, 5 (23%) were on sick leave, 7 (32%) were stay-at-home mothers, and 1 (5%) was on parental leave. The majority of mothers (16; 73%) had had psychological or pedagogic support (often Infant Mental Health (IMH) care) in the waitlist period, prior to Mindful with your toddler.
Mothers and toddlers were admitted to the training because of regulation problems (co-regulation problems and/or self-regulation problems of mother and/or child). Examples of problems that mother and child were admitted with were: maternal overreactivity (7; 32%), separation anxiety/demandingness of the child (9; 41%), child sleeping problems (4; 18%), child eating problems (3; 14%), excessive crying (3; 14%). Fourteen (64%) of the mothers had a mental disorder (obtained by clinical assessment); depression (5; 23%), anxiety disorder (5; 23%) or post-traumatic stress disorder (4; 18%). Many mothers had other stress factors as well, such as relationship problems with the father of the child (7; 32%).

Four mothers had already participated in a Mindful with your baby (Potharst et al, 2017) training. The reasons that they wanted to participate in this training as well were: (a) a more problematic relationship with the toddler than with the baby, (b) recently heightened stress because of a divorce, (c) many sessions missed in the Mindful with your baby training because of health problems, and (d) severe mother-child relationship problems that had not improved sufficiently. Mothers that had already participated in the video-observations for the purpose of effectiveness research of Mindful with your baby, did not participate in the video observations again. Another mother had participated in, and dropped out of a Mindful Parenting training in a non-clinical (preventive) setting, before she participated in the Mindful with your toddler training.

Mindful with your toddler was provided in secondary mental health care centers. The starting dates of the trainings were between February 2016 and February 2018. Twenty mother-toddler dyads participated in one of five Mindful with your toddler group trainings consisting of three to six dyads. Two English speaking mothers were given the training partly with the two of them (because of a lack of other English speaking mothers), and partly individually (because of a bad match between the toddlers, one of which hurt the other, and because of practical difficulties to do the sessions together). For these two mothers, the training sessions thus deviated from the regular group training, which led us to exclude these mothers from the analyses.

Two participants (9%) did not finish the training. One participant dropped out because she was in a turbulent time, with her son having medical problems, receiving a diagnosis of autism, besides the diagnosis of developmental delay that he already had, and a transfer of schools. The other participant dropped out after missing a few sessions because of illness. Because both drop-outs did not complete the posttest and follow-up measurements, they were also excluded from the analyses. Therefore, of the 22 training participants, 18 were also research participants. Of these 18 research participants, thirteen mothers (72%) received at least two sessions of other forms of psychological or pedagogic support during the training. During the first two months after the training, 11 mothers (61%) received at least two sessions of other forms of support.
Procedure

Assessments. A quasi-experimental design was used: in order to control for the effects of time and assessment, a waitlist assessment was administered when parents had to wait at least 5 weeks before starting the training. The mean waiting time for those who had to wait was 7.9 weeks (SD 1.2). Pretest assessment was administered in the week before the start of the training. Posttest and follow-up assessments were administered directly after, two months and eight months after the training, respectively. Questionnaires were completed at home online by the participating mother. Of the research participants, 78% completed waitlist, 94% pretest, 100% posttest, and 94% 2-month follow-up. The 8-month follow-up has not yet been administered to the last group. Of the 14 research participants that had been administered the 8-month follow-up, participation rate was 86%. The exact number of questionnaires completed per measurement occasion is displayed in Table 1. Home-visits were conducted at three measurement occasions (waitlist, pretest, posttest) to record 10-minute free-play sessions between the mother and child.

Training. The Mindful with your toddler program is, just as the Mindful with your baby (Potharst et al. 2017) program, an adaptation for mothers with a toddler of the Mindful Parenting training (Bögels & Restifo 2013), which is based on MBSR (Kabat-Zinn 1990) and MBCT (Segal et al. 2002). Mindful with your toddler is adapted to the presence of the toddlers in half of the sessions, and the themes that play a role for most mothers with a toddler. The Mindful with your toddler training consists of nine weekly 2-hour sessions, plus a follow-up session nine weeks later. Groups were led by a mindfulness trainer (EP), who was responsible for offering the meditations, inquiries and psycho-education, and an Infant Mental Health (IMH) specialist, who monitored the well-being of all mother-toddler dyads, and the well-being of the toddlers during the formal meditations.

As opposed to the Mindful with your Baby training, in which both mothers and babies participate after the first moms-only session, the toddlers only join the training after session four. Compared to babies, toddlers can make an appeal to their mothers quite strongly, and the interaction patterns between mothers and toddlers exist longer, and may have become inflexible. In order to learn to apply mindfulness in this relationship, the foundations of mindfulness practice need to be laid. In the first three sessions, mothers learn to meditate, to apply mindfulness in their daily lives, with a special focus on the use of the foundational attitudes of mindfulness, such as acceptance, patience, and trust, in relation to themselves. In the fourth session, the group prepares for the arrival of the toddlers the week after. Part of the preparation is psycho-education about the Circle of Security (Powell et al. 2013). Mothers are explained that, in order to feel emotionally secure in relationship to their parent, children have a need for both a secure
Table 1 Means and standard deviations of all dependent measures at all measurement occasions, the Mindful with your toddler training took place between pre-test and post-test.

<table>
<thead>
<tr>
<th>Outcome variable</th>
<th>Waitlist</th>
<th>Pretest</th>
<th>Posttest</th>
<th>2-month follow-up</th>
<th>8-month follow-up</th>
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<tr>
<td></td>
<td>n</td>
<td>M (SD)</td>
<td>n</td>
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<td><strong>Parent child interaction observations</strong></td>
<td></td>
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<tr>
<td>Sensitivity</td>
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<td>6.4 (1.6)</td>
<td>14</td>
<td>6.4 (2.1)</td>
<td>14</td>
</tr>
<tr>
<td>Acceptance</td>
<td>10</td>
<td>6.7 (1.7)</td>
<td>14</td>
<td>6.3 (2.3)</td>
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<td>54.25 (8.9)</td>
<td>15</td>
<td>51.1 (9.2)</td>
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<td>15</td>
<td>0.5 (.3)</td>
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<td>Parental overreactivity (PSI)</td>
<td>13</td>
<td>3.1 (1.0)</td>
<td>16</td>
<td>2.8 (.9)</td>
<td>16</td>
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<td>2.8 (.9)</td>
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<td>Sense of incompetence in parenting (PSI)</td>
<td>14</td>
<td>2.8 (1.0)</td>
<td>17</td>
<td>2.9 (1.0)</td>
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<tr>
<td>Maternal internalizing psychopathology (ASR)</td>
<td>13</td>
<td>65.2 (17.1)</td>
<td>15</td>
<td>67.7 (11.5)</td>
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<td>Maternal externalizing psychopathology (ASR)</td>
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<td>- Listening with full attention</td>
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<td>- Compassion for the child</td>
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<td>- Acceptance of par. functioning</td>
<td>11</td>
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<td></td>
<td>Waitlist</td>
<td>Pretest</td>
<td>Posttest</td>
<td>2-month follow-up</td>
<td>8-month follow-up</td>
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<td>Mindfulness (FFMQ-SF)</td>
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<td>- Acting with awareness</td>
<td>14</td>
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<td>17</td>
<td>2.8 (.8)</td>
<td>18</td>
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<td></td>
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<tr>
<td>- Non-judging of inner experience</td>
<td>14</td>
<td>3.4 (1.0)</td>
<td>17</td>
<td>3.0 (1.1)</td>
<td>18</td>
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<td></td>
<td></td>
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<tr>
<td>- Non-reactivity</td>
<td>14</td>
<td>2.6 (1.1)</td>
<td>17</td>
<td>2.5 (1.0)</td>
<td>18</td>
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<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Self-compassion (SCS-3)</td>
<td>13</td>
<td>3.6 (1.9)</td>
<td>17</td>
<td>3.2 (1.5)</td>
<td>15</td>
</tr>
<tr>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

Data are presented as mean (standard deviation). ASR, CBCL total and VGFO scores are T scores, and other scales are mean item scores (scale ranges were 0-2 for CBCL dysregulation, 1-5 for the VGFO, IM-P, FFMQ, and SCS-3, and 1-6 for the PSI, and 1-7 for PS).
base, supporting their exploration, and a safe haven, welcoming them when they need comfort.

From session five on, when the toddlers join the training, the intervention becomes an ‘on-the-job-training.’ The mothers practice with bringing awareness to (the experience of) their child, to their own experience in the presence of the child, and to the relationship with the child. They also practice applying mindfulness in stressful situations, which arise spontaneously when bringing the toddlers into the room. The sessions with the toddlers are started with a song in which every mother and child is welcomed, and explanation to mother and children about the program of the session, and is followed by formal meditation. In the introduction of this meditation, mothers are explained that this meditation is different from the formal meditations that they have become acquainted with, in which they were invited to bring their full attention, from moment to moment, to their body or their breath. In this meditation, mothers are invited to bring their attention to themselves only in moment they feel the space to do so, when child is secure in the situation. Hearing sounds or feeling being touched by their child are not seen as distraction, but as a part of the meditation. After the formal meditation, inquiry, a discussion of the home practice, and a short break, the theme of the session is introduced, for example Parenting patterns, or Stability and flexibility. A small activity between mother and child is introduced, in which the mothers can practice awareness of the theme that has just been introduced. Then the mothers practice a watching meditation with focus on the toddler, in which the mothers learn to (a) intentionally bring their attention to their toddler, concerning not only what the mother sees and hears the toddler do, but also to what the toddler’s experience may be like, (b) to notice their own inner reaction to whatever they observe in each moment, and (c) practice a beginner’s mind, and other attitudinal qualities towards themselves and their children while watching. In the inquiry, mothers reflect about their own experience and on what their child may have experienced. The session is ended with a goodbye song for all mother-child dyads. Nine weeks after the end of the training, a follow-up session takes place with mothers only, in which they meditate together, share experiences from the last two months, and renew their intention for meditation and mindful parenting.

Measures

**Sensitivity and acceptance.** Sensitivity was assessed during the 10-minute free play sessions recorded at home. Mothers were asked to play with their child with (5 minutes) and without (5 minutes) age-appropriate toys. Maternal sensitivity and acceptance were assessed using the scale descriptions of Ainsworth (1969). The first scale, sensitivity versus insensitivity, captured whether a mother was sensitive or insensitive to the signals of her child. Sensitive mothers made themselves available to perceive child
signals, attributed meaning to these signals by acting promptly and appropriately upon them. The second scale, acceptance versus rejection, captured whether a mother showed acceptance of the child’s initiatives and positive and negative feelings, showing patience, positive affectivity and warmth towards the child. Video-observations were coded by four trained coders who were blind to the measurement occasion. Twenty percent of the observations were coded to assess interrater agreement. The intra-class correlation among the coders was excellent (ICC = .83) for the sensitivity versus insensitivity scale and good (ICC = .76) for the acceptance versus rejection scale (Cicchetti, 1994). After satisfactory ICC between the coders had been established, every video-fragment was coded twice, by two different observers. Differences in scores were resolved by discussion.

Child dysregulation and psychopathology. Toddlers’ dysregulation was operationalized using three subscales of the Dutch version of the preschool Child Behavior Checklist (CBCL 1½ - 5, Achenbach & Rescorla, 2000), namely Anxious/Depressed, Aggressive behavior, and Attention problems were used, and were summed up to a Dysregulation Score (Geeraerts et al. 2015). Child psychopathology was measured using the total score of the CBCL 1½ - 5. Problem behavior of the toddlers was rated by the mother on a 3-point scale: 0 (not true), 1 (somewhat or sometimes true), 2 (very true or often true). Good psychometric properties have been shown for the American version of the CBCL 1½ - 5 (Achenbach & Rescorla, 2000). In the current study, pretest Cronbach’s alpha of the dysregulation score was .91, and of the total scale .92.

Overreactivity. The subscale Overreactivity of the Dutch version of the Parenting Scale (Arnold et al. 1993) was used to measure maternal overreactivity, a harsh, coercive and authoritarian form of parenting. This subscale contains of 10 items that are rated on a 7-point Likert scale presented between two counterparts. A higher score represents increased overreactivity. The Parenting scale possesses adequate reliability and validity (Arnold et al. 1993). The current study showed an internal consistency (Cronbach’s alpha) of .78 at pretest.

Parenting stress and Sense of incompetence. Parenting stress was assessed with the Dutch Parenting Stress Index (PSI, Brock et al. 1992), based on the American Parenting Stress Index (Abidin 1983). We used a combination of the short form of the PSI, and 7 extra items needed for the 15-item subscale Sense of incompetence, measuring the extent to which the parent feels incompetent in parenting the child. The items were rated on a 6-point Likert scale, ranging from 1 (totally disagree) to 6 (totally agree). The Dutch PSI possesses good reliability (Brock et al. 1992). In the current study, Cronbach’s alphas at pretest were .91 for the short form and .87 for subscale Sense of incompetence.
Maternal psychopathology. Mothers’ psychopathology was assessed with a Dutch version of the Adult Self Report (ASR; Achenbach & Rescorla 2003). This self-report scale for adults (18 to 59 years) contains 126 items on problem behaviors, which are rated on a three-point scale: 0 (not true), 1 (somewhat or sometimes true), 2 (very true or often true). In this study, the Internalizing Score and Externalizing Score are reported. Those are regarded as subclinical and clinical when T-scores exceed 59 and 63, respectively. Good psychometric properties have been shown for the American version of the ASR (Achenbach & Rescorla 2003). In the current study, Cronbach’s alpha of .94 and .82 for the Internalizing and Externalizing scale respectively.

Partner relationship. Partner relationship and parental cooperation was measured by the subscale Partner relation of the Dutch questionnaire Vragenlijst Gezinsfunctioneren voor Ouders (VGFO; translated Questionnaire Family Functioning for Parents, Veerman et al. 2012). The VGFO aims to measure different aspects of problematic family functioning. This subscale consists of 5 items that are rated on a 4-point Likert scale, ranging from 1 (does not apply) to 4 (applies completely). Subscales are regarded as subclinical and clinical when they are below 37 and 34 respectively. The psychometric properties of the original scale were good (Veerman et al. 2012). In the current study, internal consistency (Cronbach’s alpha) was .92 at pretest.

Mindful parenting. To measure mindful parenting, the Dutch version (De Bruin et al. 2014) of the Interpersonal Mindfulness in Parenting scale (IM-P; Duncan 2009) was used. The 29 items were scored on a 5-point Likert scale, ranging from 1 (never true) to 5 (always true). In a Dutch validation study, a factor analysis revealed a structure of six dimensions (Listening with full attention, Compassion for the child, Non-judgmental acceptance of parental functioning, Emotional non-reactivity in parenting, Emotional awareness of the child, and Emotional awareness of the self), the first five of which showed satisfactory reliability (De Bruin et al. 2014). In the current study, internal consistency (Cronbach’s alpha) of the total scale was .87 at pretest, and .88, .79, .84, .59, .38, and .13, respectively. Because of the weak internal consistency of the last three subscales in the current study, only the first three subscales were analyzed.

Mindfulness. Mindfulness was assessed using the short form (Bohlmeijer et al. 2011) of the Dutch version of the five facet mindfulness questionnaire (FFMQ, De Bruin et al. 2012). Items were scored on a 5-point Likert scale ranging from 1 (never or very rarely true) to 5 (very often or always true). Although the short form comprises of only 24 of the original 39 items, the short form also showed a five factor structure (Bohlmeijer et al. 2011). Of the five, only three were measured in this study: Acting with awareness, Non-judging of inner experience, and Non-reactivity (Truijens et al. 2016). The psychometric properties of the original scale were good in both a meditating as a non-meditating
sample (De Bruin et al. 2012). In the current study, pretest Crohnbach’s alphas were .82, .94 and .88 for the subscales, respectively.

**Self-compassion.** To measure self-compassion, the 3-item Self-Compassion Scale (SCS-3) was used (Raes and Neff, unpublished manuscript). The three items represent the three different subscales of the Self-Compassion Scale (SCS, Neff 2003a): Common humanity, Overidentification, and Self-judgment. The items were scored on a 5-point Likert scale, ranging from 1 (almost never) to 5 (almost always). The internal consistency of this 3-item scale (Crohnbach’s alpha) was found to be .74, and the correlation with the total score of the 12-item short form of the SCS .90 (Raes and Neff, unpublished manuscript). In the current study, the Crohnbach’s alpha was .70 at pretest.

**Evaluation.** At posttest, participants completed a program evaluation with multiple choice questions, which was an adapted version of the stress reduction program evaluation, developed at the Center for Mindfulness of the University of Massachusetts medical school, to evaluate how they appreciated Mindful with your toddler (see Table 2 for the questions).

**Data analyses**

Inspection of distribution of differences (scores posttest minus pretest) indicated sufficient normality; skewness and kurtosis of all variables were < |2| (Garson, 2012), except for Ainsworth Scale Sensitivity, and FFMQ Total score and subscales Acting with awareness and Non-judging of inner experiences. Of the FFMQ total scale and subscale Non-judging of inner experience, one outlier (> 3.29 SD) was replaced by the next most extreme value at the end of the distribution of the difference scores of these (sub)scales (Tabachnick & Fidell 2013). Hypotheses on the effects of the training on all outcomes were tested with multilevel regression models. In contrast to ANOVA, which requires deletion of cases with missing data because matching of measurement occasions is used to estimate parameters, in multilevel analyses all cases can be included, even those with missing data, because the models are fitted by maximum likelihood (Bagiella et al. 2000). The structure of the multilevel models for both mother and toddler questionnaire data consisted of the repeated measurements of these outcomes across the measurement points (at waitlist, pretest, posttest, 8-week and 8-month follow-up; fixed effects, level 1) which were nested within the mother-toddler dyad (level 2). For the observational data, the structure consisted of repeated measures of the sensitivity and acceptance scores (waitlist, pretest, posttest) were nested within the mother-toddler dyad. Measurement occasions were dummy coded with pretest scores as reference. The intercept was a random effect in all models. Scores on all outcomes were standardized across assessments. The multilevel models equation can be found as a footnote in Table 3, which displays the results of the multilevel analyses. Parameter estimates can be
<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you feel you got something of lasting value as a result of taking this training?</td>
<td>18 (100%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>How often per week did you usually practice the formal meditations at home?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>0 (0%)</td>
<td>4 (22%)</td>
</tr>
<tr>
<td>1-2 times</td>
<td>8 (44%)</td>
<td>8 (44%)</td>
</tr>
<tr>
<td>3-4 times</td>
<td></td>
<td>6 (33%)</td>
</tr>
<tr>
<td>5-7 times</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has there been change as a result of the training in...</td>
<td>Clear</td>
<td>Some</td>
</tr>
<tr>
<td>... how often you give your child conscious attention?</td>
<td>3 (17%)</td>
<td>8 (44%)</td>
</tr>
<tr>
<td>... knowing how to take better care of yourself?</td>
<td>6 (33%)</td>
<td>11 (61%)</td>
</tr>
<tr>
<td>... actually taking better care of yourself?</td>
<td>4 (22%)</td>
<td>13 (72%)</td>
</tr>
<tr>
<td>... awareness of what is stressful in your life?</td>
<td>7 (39%)</td>
<td>9 (50%)</td>
</tr>
<tr>
<td>... awareness of stressful parenting situations at the time they are happening?</td>
<td>5 (28%)</td>
<td>11 (61%)</td>
</tr>
<tr>
<td>... the frequency of parental stress?</td>
<td>3 (17%)</td>
<td>9 (50%)</td>
</tr>
<tr>
<td>... the intensity of parenting stress or frustration?</td>
<td>4 (22%)</td>
<td>10 (56%)</td>
</tr>
<tr>
<td>... dealing with emotions while taking care of or parenting your child?</td>
<td>5 (28%)</td>
<td>11 (61%)</td>
</tr>
<tr>
<td>... the ability to handle stressful parenting situations appropriately?</td>
<td>4 (22%)</td>
<td>12 (67%)</td>
</tr>
<tr>
<td>... being content with the relationship with your child?</td>
<td>6 (33%)</td>
<td>10 (56%)</td>
</tr>
<tr>
<td>... the confidence you have in yourself as a mother?</td>
<td>6 (33%)</td>
<td>9 (50%)</td>
</tr>
<tr>
<td>... feeling hopeful as a mother?</td>
<td>5 (28%)</td>
<td>10 (56%)</td>
</tr>
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</table>
Table 2 (continued)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Likert scale ranging from 1 (not important) to 10 (enormously important)</th>
</tr>
</thead>
<tbody>
<tr>
<td>How important has the training been for you?</td>
<td>8.7 (1.3)</td>
</tr>
<tr>
<td>Meditation while seated in the group?</td>
<td>Meditation for self-compassion?</td>
</tr>
<tr>
<td>Meditation while seated at home?</td>
<td>8.0 (1.5)</td>
</tr>
<tr>
<td>Breathing space?</td>
<td>Breathing space?</td>
</tr>
<tr>
<td>Meditation while seated at home?</td>
<td>7.6 (1.6)</td>
</tr>
<tr>
<td>Awareness in daily parenting</td>
<td>Awareness in daily parenting</td>
</tr>
<tr>
<td>Bodyscan in the group?</td>
<td>Group discussions and education</td>
</tr>
<tr>
<td>Bodyscan at home?</td>
<td>8.3 (1.2)</td>
</tr>
<tr>
<td>The diaries</td>
<td>The diaries</td>
</tr>
<tr>
<td>Seeing meditation with focus on your toddler?</td>
<td>8.9 (1.0)</td>
</tr>
<tr>
<td>The texts in the workbook</td>
<td>The texts in the workbook</td>
</tr>
</tbody>
</table>

Note. Data are presented as n (%) or mean (standard deviation).
interpreted as effect sizes. Effects were regarded as significant when \( p < .05 \). Cohen's \( d \) effect sizes were based on mean scores of the comparison between the measurement occasions and pretest, and the pooled standard deviations. For child outcomes, it was checked whether child age was a significant covariate. A reliable change index was calculated for all participants on all outcome measures to get a better understanding of how many mothers showed a clinically significant improvement after the training.

**RESULTS**

**Feasibility and acceptability**

Attendance rates of the mothers who finished the training were acceptable (84%). Acceptability was high as well, which was shown by the results of the evaluation, that was completed at posttest by all (100%) research participants (see Table 2).

**Direct and delayed effects**

Mean scores (SD) on all outcome measures at pretest, posttest, 2-month follow-up and 8-month follow-up are displayed in Table 1. Results of multilevel models of treatment outcome predicted by measurement occasion are displayed in Table 3. No significant differences were seen in outcomes between waitlist and pretest assessment, except for a deterioration in listening with full attention (large effect size), and an improvement in compassion for the child (small effect size). Compared to pretest, at posttest mothers were more sensitive, and more accepting towards their child (medium effect sizes). Child psychopathology had decreased at posttest (medium effect size) and this effect was maintained at 2-month and 8-month follow-up. At post-test, a borderline significant improvement in child dysregulation was revealed (small effect size), and this effect was significant at 2-month and 8-month follow-up (medium effect sizes). It was checked whether this improvement in child behavior problems and child dysregulation was related to the age of the children. When child age was added to these two models, this variable was non-significant, while the effects of measurement occasion were similar to the original models. Regarding outcomes in maternal functioning: maternal overreactivity did not improve significantly. Parenting stress a borderline significant improvement at post-test (small effect size). At 2-month follow-up, both parenting stress and sense of incompetence were improved (large effect sizes), but this effect decreased at 8-month follow-up (small to medium effect sizes). Mothers’ own internalizing psychopathology showed a borderline significant improvement at post-test (medium to large effect size), and this effect was significant at 2-month and 8-month follow-up (medium to large effect sizes). A borderline significant
Improvement in maternal externalizing psychopathology only occurred at 8-month follow-up (medium effect size). There was no improvement in partner relationship. Regarding mindful parenting abilities, there was an improvement in Listening with full attention (small effect at all measurement occasions), no improvement in Compassion for the child, and an improvement in Non-judgmental acceptance of parental functioning at 2-month follow-up only (medium effect size). General mindfulness abilities (Acting with awareness, Non-judging of inner experience, and Non-reactivity) showed a borderline significant or significant improvements at post-test (small to medium effect sizes). At 2-month and 8-month follow-up, mindfulness abilities showed significant improvements (medium to large effect sizes). At posttest, an improvement in self-compassion (medium effect size) and further improvement in the follow-up period (large to very large effect sizes) was revealed.

We checked whether previous participation in a mindful parenting training made a difference in outcomes. We repeated the multilevel analyses excluding the five participants that had already followed a mindful parenting training, resulting in somewhat better outcomes than in the full group. Parameter estimates (β’s) differed with at least .15 from parameter estimates in the full group for the following outcomes: child psychopathology and dysregulation (at posttest and 2-month follow-up), parental stress (at post-test) and sense of incompetence (at posttest, and both follow-up occasions), maternal internalizing (2- and 8-month follow-up) and externalizing psychopathology (2-month follow-up), listening with full attention and compassion with the child (2- and 8-month follow-up), non-judging of inner experience (posttest) and acting with awareness (posttest and 2-month follow-up). There was one variable that showed a slightly worse outcome for the subgroup of mothers without mindful parenting experience: improvement of self-compassion was smaller and non-significant at post-test only.

Clinical significance

To assess the clinical significance of the current study’s results, the reliable change index indicating the number and percentage of significant improvement or deterioration on all mother reported outcomes was calculated and displayed in Table 4. At posttest the average percentage of children that showed significant improvement on the two child outcomes was 16%, with a range of 13% to 19%, and the average percentage of mothers that showed significant improvement on the 13 mother outcomes was 26%, with a range of 11% to 47%. At 2-month follow-up, the average percentage of children that showed significant improvement was 17%, with a range of 13% to 20%, and the average percentage of mothers that showed significant improvement was 37%, with a range of 13% to 65%. At 8-month follow-up, the average percentage of children that
Table 3 Parameter estimates (and standard errors) and $F$ values of multilevel models\(^1\) of treatment outcome predicted by measurement occasion (deviations from pretest), and Cohen’s $d$ values of comparisons between pre-test and the other measurement occasions.

<table>
<thead>
<tr>
<th></th>
<th>Intercept</th>
<th>Waitlist</th>
<th>Posttest</th>
<th>2-month follow-up</th>
<th>8-month follow-up</th>
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<tbody>
<tr>
<td></td>
<td>$n$</td>
<td>$\beta$ (SE)</td>
<td>$t$</td>
<td>$\beta$ (SE)</td>
<td>$t$</td>
</tr>
<tr>
<td><strong>Mother child interaction</strong></td>
<td></td>
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<tr>
<td><strong>Sensitivity</strong></td>
<td>14</td>
<td>-.20 (.27)</td>
<td>- .72</td>
<td>.00 (.25)</td>
<td>.01</td>
</tr>
<tr>
<td>95% CI</td>
<td></td>
<td>[.77, .37]</td>
<td>[-.51, .52]</td>
<td>[.10, 1.02]</td>
<td></td>
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<tr>
<td><strong>Acceptance</strong></td>
<td>14</td>
<td>-.39 (.27)</td>
<td>-1.47</td>
<td>.24 (.25)</td>
<td>.94</td>
</tr>
<tr>
<td>95% CI</td>
<td></td>
<td>[-.94, .16]</td>
<td>[-.28, .76]</td>
<td>[.30, 1.23]</td>
<td></td>
</tr>
<tr>
<td><strong>Mother report</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Child psychopathology</strong></td>
<td>(CBCL)</td>
<td>16</td>
<td>.29 (.24)</td>
<td>1.23</td>
<td>.38 (.22)</td>
</tr>
<tr>
<td>95% CI</td>
<td></td>
<td>[-.19, .78]</td>
<td>[-.06, .82]</td>
<td>[-.87, -.07]</td>
<td>[-.96, -.13]</td>
</tr>
<tr>
<td><strong>Dysregulation</strong></td>
<td>16</td>
<td>.27 (.24)</td>
<td>1.09</td>
<td>.22 (.23)</td>
<td>.94</td>
</tr>
<tr>
<td>95% CI</td>
<td></td>
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<td>[-.24, .68]</td>
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<th>8-month follow-up</th>
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<td>t</td>
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<td>-.22 (.26)</td>
<td>-.83</td>
<td>.07 (.19)</td>
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<tr>
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95% CI = 95% Confidence Interval
Table 3 (continued)

<table>
<thead>
<tr>
<th></th>
<th>Intercept</th>
<th>Waitlist</th>
<th>Posttest</th>
<th>8-month follow-up</th>
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<td>n</td>
<td>β (SE)</td>
<td>t</td>
<td>β (SE)</td>
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<td>95% CI</td>
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<td>-1.64</td>
<td>.35 (.22)</td>
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<td>[-.09, .79]</td>
<td>[.18, 1.01]</td>
<td>[.05, 1.14]</td>
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<td></td>
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<td>- .45 (.22)</td>
<td>-2.07*</td>
<td>.02 (.24)</td>
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<td>95% CI</td>
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<td>[-.47, .51]</td>
<td>[.19, 1.10]</td>
<td>[.57, 1.49]</td>
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<tr>
<td>Self-compassion (SCS-3)</td>
<td>18</td>
<td>- .45 (.23)</td>
<td>-1.97*</td>
<td>.27 (.22)</td>
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<td>95% CI</td>
<td>[-.92, .01]</td>
<td>[-.17, .71]</td>
<td>[.06, .90]</td>
<td>[.35, 1.16]</td>
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</tbody>
</table>

†: p < .10; *: p < .05, **: p < .01, β = Parameter estimate, d = Cohen’s d

1 The multilevel equations that were used were at level 1: \( Y_{ij} = \beta_0 + \beta_1 t_1 + \beta_2 t_2 + \beta_3 t_3 + \beta_4 t_4 + \beta_5 t_5 + \epsilon_{ij} \) where \( y \) is the dependent variable measured at Level 1 (Time) (i) nested within Level 2 (Individuals) (j). Regression parameters \( \beta_0 \) intercept and \( \beta_1 \) slope correspond with the level 1 predictor and \( \epsilon_{ij} \) is random error at Level 1. At level 2, the beta coefficients at level 1 are treated as outcomes to be predicted: \( \beta_{00} + \beta_{0} \) intercept for \( \beta_{00} \), \( U_{0j} \) is the random intercept of the level 2 unit (individual).
Table 4 Reliable change index indicating the number (and percentage) of mothers/children showing significant improvement and deterioration on mother reported outcomes at posttest, 2-month follow-up, and 8-months follow-up, as compared to pretest.

<table>
<thead>
<tr>
<th>Outcome variable</th>
<th>Pretest</th>
<th>Posttest</th>
<th>2-month follow-up</th>
<th>8-month follow-up</th>
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<tr>
<td></td>
<td>n</td>
<td>Improvement</td>
<td>Deterioration</td>
<td>n</td>
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<td>Child psychopathology (CBCL 1,5 – 5)</td>
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<td>2 (13%)</td>
<td>0 (0%)</td>
<td>15</td>
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<tr>
<td>- Dysregulation</td>
<td>16</td>
<td>3 (19%)</td>
<td>3 (19%)</td>
<td>15</td>
</tr>
<tr>
<td>Parental overreactivity (PS)</td>
<td>15</td>
<td>5 (33%)</td>
<td>3 (18%)</td>
<td>14</td>
</tr>
<tr>
<td>Parenting stress (PSI)</td>
<td>18</td>
<td>6 (33%)</td>
<td>2 (11%)</td>
<td>17</td>
</tr>
<tr>
<td>Sense of incompetence (PSI)</td>
<td>18</td>
<td>6 (33%)</td>
<td>2 (0%)</td>
<td>17</td>
</tr>
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<td>Maternal internalizing psychopathology (ASR)</td>
<td>16</td>
<td>6 (38%)</td>
<td>1 (6%)</td>
<td>15</td>
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<tr>
<td>Maternal externalizing psychopathology (ASR)</td>
<td>16</td>
<td>5 (31%)</td>
<td>0 (0%)</td>
<td>15</td>
</tr>
<tr>
<td>Partner relationship (VGFO)</td>
<td>9</td>
<td>1 (11%)</td>
<td>0 (0%)</td>
<td>8</td>
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<tr>
<td>- Listening with full attention</td>
<td>15</td>
<td>5 (33%)</td>
<td>0 (0%)</td>
<td>15</td>
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<tr>
<td>- Compassion for the child</td>
<td>15</td>
<td>7 (47%)</td>
<td>0 (0%)</td>
<td>15</td>
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<tr>
<td>- Acceptance of par. functioning</td>
<td>15</td>
<td>2 (13%)</td>
<td>1 (7%)</td>
<td>15</td>
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<tr>
<td>Mindfulness (FFMQ-SF)</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>- Acting with awareness</td>
<td>18</td>
<td>4 (22%)</td>
<td>0 (0%)</td>
<td>17</td>
</tr>
<tr>
<td>- Non-judging of inner experience</td>
<td>18</td>
<td>4 (22%)</td>
<td>1 (6%)</td>
<td>17</td>
</tr>
<tr>
<td>- Non-reactivity</td>
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<td>5 (28%)</td>
<td>2 (11%)</td>
<td>17</td>
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<tr>
<td>Self-compassion (SCS-3)</td>
<td>15</td>
<td>5 (33%)</td>
<td>1 (7%)</td>
<td>17</td>
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Reliable change index was calculated, on the basis of measurement occasion scores, and on standard deviations and test-retest reliability scores of norm groups (CBCL, ASR, PS, and PSI). If test-retest reliability of a norm group was not available, Cronbach’s alpha of a norm group was used (VGFO, IM-P, FFMQ, SCS-3).
Chapter 6

showed significant improvement was 9% (9% for both outcomes), and the average percentage of mothers that showed significant improvement was 44%, with a range of 22% to 60%.

**DISCUSSION**

In this study, we aimed to evaluate Mindful with your toddler, a mindful parenting training for mothers with toddlers aged 18 to 48 months with (co-)regulation problems. We hypothesized that Mindful with your toddler would be feasible and acceptable for participants, and would improve objective indicators of maternal sensitivity and acceptance of the child, as well as subjectively measured child dysregulation and psychopathology, maternal overreactivity, parenting stress, sense of incompetence in parenting, maternal internalizing and externalizing psychopathology, partner relationship, mindfulness, and self-compassion.

The results suggest that Mindful with your baby was a feasible and acceptable program for mothers and toddlers with regulation problems. Drop-out (9%) and attendance rates (84%) were acceptable. Our clinical impression was that some mothers did experience anxiety about bringing in their toddlers, and were worried about problem behavior they may show in the group. This did not withhold the mothers to come to the training, but it was a topic of conversation and inquiry during the training. Participants rated the training as a whole as very important, with an average of 8.7 (scale 1-10).

Observed maternal sensitivity increased during the training (medium effect size), while it did not during the waitlist period. Other studies on the effectiveness of mindful parenting trainings showed that parents recognized changes in their parenting qualities (Bögels et al. 2013; Pothast et al. 2017). The current study confirmed this improvement with more an objective measure of maternal sensitivity, objective in the sense of measuring observed behavior by raters who were blind to measurement occasion. The effect size that was shown in the current study is comparable to the change that was seen in studies on interventions that focus exclusively on improving maternal sensitivity (i.e., interventions that also target other parenting abilities/problems typically show lower effect sizes; Bakermans-Kranenburg et al. 2003). Although the Mindful with your toddler program did not target sensitive parenting behavior specifically, the training may have provided the mothers with attitudinal qualities and coping tools necessary to become more sensitive. That is, the program focused on training mothers’ stress-/self-regulation next to training their awareness of the child’s signals (which is an essential component of sensitive parenting; Ainsworth et al. 1974). The focus on the child’s signals was not only with the aim of reacting more sensitively, but also directed at becoming
aware of what effect those signals had on them, in order to postpone reactivity. It is clear from other studies that stress reduces people’s ability to take another individual’s (i.e., the child’s) perspective (e.g., Luyten & Fonagy 2015). It may be necessary for mothers with (co-)regulation problems to receive tools for coping with their own stress in order to subsequently become able to respond to the child’s signals in an attuned way. The combination of focusing on stress-reduction and awareness of the child’s cues and their effects, could thus be beneficial and not necessarily downgrade the intervention effects on sensitivity. Future studies should address to what extent these two parental features (awareness of self, awareness of other) affect each other throughout the training, and whether the awareness of self reinforces a more functional awareness of the other and thus a better sensitivity.

Observed maternal acceptance of the child also increased during the training (medium to large effect), while it did not change in the waitlist period. The effect size of acceptance was slightly larger than the effect size of sensitivity (Cohen's d was .74 and .57 respectively). The acceptance ratings may capture mindful parenting qualities better than the sensitivity ratings: it encompasses for example patience and acceptance of both feelings (positive and negative) and initiatives of the child. Mothers also repeatedly practice not only with paying attention on purpose, but also with a certain attentional quality, that encompasses a sense of acceptance.

Other examples of intervention programs that aim to improve parent-child interaction child regulation, and that have shown to be effective are Parent-Child Interaction Therapy (PCIT; McNeil & Hembree-Kigin, 2010) and the Attachment and Biobehavioral Catch-up Intervention (ABC; Dozier et al. 2005). When Mindful with your toddler is compared to these interventions, an important similarity is the emphasis on the importance of looking at the child’s signals. The main difference lies in the behavioral components of the programs. In PCIT and ABC, parents are taught to exhibit, and receive feedback on certain parenting behaviors; the explicit goal is behavioral change in parents. In Mindful with your toddler, the emphasis is on awareness of the self and the child, and on acceptance of the inner experience of both the self and the child. Behavioral change is not instructed, but may arise spontaneously out of this heightened awareness and acceptance. In future research, it may be interesting to compare these two strategies and the working mechanisms, and look at what the added value of one of the two might be to the other.

Maternal sensitivity and acceptance is found to support children’s development of self-regulation (Bernier et al. 2010; Kochanska et al., 2000). In the current study, improvement of child psychopathology was observed, and a delayed improvement of child dysregulation. Both improvements were maintained at 8 months. Statistically correcting for the age of the child did not make a difference in these effects. The
difference in behavior in the children was reported by the participants of the training only, which makes it possible that merely a change in perception by the mother was measured. Although such a change in perception is also a favorable outcome, it is important to include more objective measures of child dysregulation and psychopathology in future research, such as partner or professional caregiver rating, or observation measures.

Maternal stress and sense of incompetence showed a delayed improvement, but the significant decrease at 2-month follow-up did last up to 8-month follow-up. A delayed effect on parenting stress was also seen in a study on the effectiveness of Mindful with your baby (Potharst et al. 2017). Parental overreactivity did not decrease significantly during or after the Mindful with your toddler training. Other studies have found that overreactivity in mothers increases in the toddler years (e.g. Lipscomb et al. 2011). An increase in overreactivity with age of the child, may have prevented a significant improvement. There was a decrease in self-rated internalizing psychopathology over time. This was not the case for externalizing psychopathology. However, the average externalizing score was in the normal range before the training already. This was also the case for partner relationship: the average score was in the normal range before the training and no significant improvements during or after the training. The fact that the partner does not have an active role in the training may be due to this. Future research could examine the feasibility and acceptability of Mindful with your toddler for (groups of) couples and their child, or of the effects of an additional Mindful with your baby or toddler for fathers.

Of the three mindful parenting abilities that were reported in this study, Listening with full attention, Compassion for the child and Non-judgmental acceptance of parental functioning, only Listening with full attention was improved at all three measurement occasions. Possibly, this ability is strengthened by the meditation in which mothers watch their child with full attention. The average score on Compassion for the child was already relatively high at pretest, and did not improve significantly during or after the training, just as in a previous the study on Mindful with your baby (Potharst et al. 2017).

Self-compassion and non-judging of inner experience may be seen as indices for the relationship with the self (Neff, 2003b). Directly after the training, these outcomes improved, and they continued to improve in the next months after the training. So, not only did mothers become more sensitive to, and accepting of their children, but also to and of themselves. Probably, the fact that the training is given in a group helps, which supports the mothers to recognize common humanity. Given the fact that these mothers show sustained improvement in self-compassion and non-judging of inner experience, they do not seem to need the group in the longer term to be more kind to themselves. Long-term improvements (not only seen in the average scores of the group as a whole, but also in the percentages of mothers that showed improvement in the follow-up
period), are also seen on acting with awareness and non-reactivity. This means that the mothers show sustained ability to be aware of what they do, and are allowing of the experiences they have, without being carried away by them.

**LIMITATIONS**

The findings of the current study should be interpreted considering the following limitations. Although this study did encompass a within-person waitlist, participants were not randomized between waitlist and intervention, which limits conclusions that can be drawn about the effectiveness of the training. This study did encompass objective measures of parental qualities in the participants (observed sensitivity and acceptance), but did not include objective measures of child functioning. Future research could encompass both behavior observation and multi-informant approaches. A further recommendation is to follow-up on the change in sensitivity and acceptance on a longer term. The sample size of the current study was small. Replications with larger sample sizes are needed to confirm study outcomes. Larger sample sizes may also offer possibilities to examine working mechanisms (e.g., perform moderator effects). Another limitation is that a large proportion of participants (72% of the research participants) received other forms of psychological or pedagogic support during the training, which makes it unclear whether improvements in functioning during the Mindful with your toddler training can be attributed solely to this training. However, a similar proportion of participants received (73%) this kind of support in the waitlist period, and no significant changes were observed from the waitlist to pretest measurements. This supports the idea that Mindful with your toddler was of added value besides the other support that mothers received.

In conclusion, this study offered the Mindful with your toddler training to mothers and toddlers with (co-)regulation problems, and provided first evidence supporting that Mindful with your toddler has the potency to improve maternal co-regulatory abilities (improved observed sensitivity and acceptance towards their toddler), maternal self-regulation (improved internalizing psychopathology, non-reactivity, non-judging of inner experience and self-compassion), and toddler self-regulation (improved dysregulation and psychopathology). Improved (co-)regulation in the mother-toddler dyad may have decreased maternal parenting stress and lack of confidence. Future studies should repeat the current study in a larger sample in order to examine the possible working mechanisms of the training.
Evaluating Mindful with Your Baby/Toddler: Observational Changes in Maternal Sensitivity, Acceptance, Mind-Mindedness, and Dyadic Synchrony

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E. S. Potharst
I. K. Verina-Skiba
E. Aktar
M. Goris
S. M. Bögels
C. Colonnesi

Frontiers in Psychology (2019), in press
ABSTRACT

Studies on the effectiveness of mindful parenting interventions predominantly focused on self-report measures of parenting, whereas observational assessments of change are lacking. The present study examined whether the Mindful with your baby/toddler training leads to observed changes in maternal behavior and mother–child interaction quality. Mindful with your baby/toddler is a 8- or 9-week mindful parenting training for clinically referred mothers of young children (aged 0–48 months), who experience parental stress, mother–child interaction problems, and/or whose children experience regulation problems. The study involved a quasi-experimental non-random design including a sample of 50 mothers who were diagnosed with a mood disorder (n = 21, 42%), an anxiety disorder (n = 7, 14%), post-traumatic stress disorder (n = 6, 12%), or other disorder (n = 7, 14%). Mothers completed a parental stress questionnaire and participated in home observations with their babies (n = 36) or toddlers (n = 14) during a waitlist, pretest, and posttest assessment. Maternal sensitivity, acceptance, and mind-mindedness were coded from free-play interactions and dyadic synchrony was coded from face-to-face interactions. Sensitivity and acceptance were coded with the Ainsworth’s maternal sensitivity scales. Mind-mindedness was assessed by calculating frequency and proportions of appropriate and nonattuned mind-related comments. Dyadic synchrony was operationalized by co-occurrences of gazes and positive facial expressions and maternal and child responsiveness in vocal interaction within the dyad. Coders were blind to the measurement moment. From waitlist to pretest, no significant improvements were observed. At posttest, mothers reported less parenting stress, and were observed to show more accepting behavior and make less nonattuned comments than at pretest, and children showed higher levels of responsiveness. The outcomes suggest that the Mindful with your baby/toddler training affects not only maternal stress, but also maternal behavior, particularly (over)reactive parenting behaviors, which resulted in more acceptance, better attunement to child’s mental world, and more “space” for children to respond to their mothers during interactions. Mindful with your baby/toddler may be a suitable intervention for mothers of young children with (a combination of) maternal psychopathology, parental stress, and problems in the parent–child interaction and child regulation problems.
INTRODUCTION

In Western society and in today’s media, the transition into motherhood (or having another baby) is represented as a joyful and exciting time as this is assumed to be a period of emotional growth that emerges naturally (Winson, 2009). For many mothers, this idealistic image is not a close representation of their experience of this transition, as having a baby can be stressful and challenging (Ben-Ari et al., 2009; Kwon et al., 2013). Stress in mothers involves the extent to which mothers perceive themselves as having access to the resources required to carry out the parenting role (Belsky, 1984). Mothers of newborn children often juggle between holding on to their old life and adapting to newly gained responsibilities, including the regulation of the child sleeping and eating pattern, continuous availability, and regular worries about their infants’ health and development (Hung, 2007). These newly gained responsibilities affect career paths, sleeping patterns, romantic relations, and identities, that can get lost in the role of being a mother (Dew & Wilcox, 2011; Epifanio et al., 2015). Further, toddlerhood places distinctive tasks and challenges on parents with regard to the different developmental needs of children, such as the onset of independence, willfulness, and social competence (Edwards & Liu, 2002; Kwon et al., 2013). Thus, whereas being a mother is expected to bring joy, motherhood in the early years also brings distress upon a lot of mothers.

Elevated or recurrent levels of stress can lead to chronic stress, which increases the risk of mental health problems (Lupien et al., 2009). A remarkable high percentage of the new mothers develops depression (19.2%) or anxiety disorder (11.1%) in the first 3 months after child birth (Gaynes et al., 2005; Reck et al., 2008), and during toddlerhood elevated stress levels continue to predict depression and anxiety (Mathiesen et al., 1999). Stress and mental health problems are not only harmful to caregivers themselves, but also to children. The high rate of psychopathology and impaired functioning in the offspring of caregivers with, for instance, anxiety or depression, compared with caregivers without mental health problems is one of the best reproduced findings in psychiatry (e.g., Eley et al., 2015; Weissman et al., 2016). Anxious, depressed, or highly distressed parents have shown to lack frequent mentalizing and sensitive parenting behaviors during interactions (Nicol-Harper et al., 2007; Feldman et al., 2009; Pawlby et al., 2010; McMahon & Meins, 2012), which may evoke poor quality of parent–child interactions (Crnic et al., 2005). Low-quality interactions, in turn, impede the child’s optimal development and increases the risk of socioemotional problems, such as perceived temperamental difficulties and insecure attachment representations (Crnic et al., 2005; Henrichs et al., 2009). Understanding how we may prevent or reduce parental stress seems therefore an important goal for mental health care sciences.
Mindfulness is awareness that arises through paying attention in the present moment to whatever appears and observing it non-judgmentally and without reactivity (Brown & Ryan, 2003; Kabat-Zinn, 2003; Creswell & Lindsay, 2014). Practice in mindfulness meditation have been shown to be effective in improving stress regulation (Khoury et al., 2015). The past two decades, the application of mindfulness in the context of parenting stress (i.e., mindful parenting) is growing (Bögels et al., 2010). Mindful parenting interventions are relationally oriented and aim to stimulate parents to focus mindful attention on parent–child interactions (Cohen & Semple, 2010). During mindful parenting training, parents learn to observe and listen to their child in a special way: deliberately, with full attention, and without judgment. Further, they learn to recognize and to make a distinction between their own emotions and those of the child, to lower parental reactivity in parent–child interactions, and to feel compassionate for themselves and their child (Duncan et al., 2015).

An adaptation of mindful parenting addressing mothers who experience stress in taking care of their young children is the Mindful with your baby/toddler training (Potharst et al., 2017, 2018). Mindful with your baby/toddler is a group training (Bögels & Restifo, 2013), involving meditation exercises based on mindfulness-based stress reduction training (MBSR; Kabat-Zinn, 1990), and mindfulness-based cognitive therapy (MBCT; Segal et al., 2002, 2012). The training is adapted to the context of parenting in early childhood and to the presence of the young children in the training. Other important elements of the training are inquiry, in which participants share their experiences during mediations, and psycho-education about themes related to both mindfulness and child development (i.e., the circle of security is introduced as a frame of reference for looking at attachment-related behavior of the children; Powell et al., 2013). In the Mindful with your baby/toddler training, parents not only learn to increase their awareness of inner experiences in the present moment, but also in the presence of, and in relation to their child. They learn to be attentive to their child and the child’s signals, and practice mindfulness in stressful situations (Potharst et al., 2017, 2018). Having their child by their side during the training (in most of the sessions) helps mothers to apply what they learn during training to daily life experiences with their child.

Two previous studies on the effects of the Mindful with your baby/toddler training on mother and child outcomes showed positive effects on a wide variety of mother and child outcomes (Potharst et al., 2017, 2018). In the first study including 37 mothers and their 0 to 18-months-old infants, mothers reported significantly higher scores on questionnaires on mindfulness, self-compassion, mindful parenting, as well as on well-being, psychopathology, parental confidence, responsivity, and hostility at posttest, 8-week follow-up, and 1-year follow-up (Potharst et al., 2017). In the second study (Potharst et al., 2018), including 18 mother–toddler dyads (aged 18–48
months), mothers reported positive changes in child psychopathology, mindfulness (awareness and non-reactivity), and self-compassion and these changes sustained or further improved during the follow-up period. Further, mothers reported lower levels of child dysregulation, maternal internalizing psychopathology, maternal stress, sense of incompetence, and higher levels of non-judging of inner experience, but only at the 2- and 8-months follow-up. Mothers also showed more sensitive and accepting behaviors during observations at posttest in this study.

These two studies provided first indications that the Mindful with your baby/toddler training may be beneficial, not only for the mother, but also for the mother–child relationship. However, the results on the mother–child relationship were either based on a small sample size (N = 18) of mother–toddler dyads, or based on maternal self-report, while this is not sufficient to measure parent–child interaction (Miron et al., 2009). When investigating change in complex transactional relationships such as the mother–child relationship, survey data may be biased by social-desirability of participants, or bias in interpretations of questions, and limitations with regard to the operationalization of complex relational constructs (Hops et al., 1995; Dishion & Granic, 2004; Morsbach & Prinz, 2006). Since mindful parenting interventions are designed to bring about changes in the parent–child relationship, observational measures of both parenting behavior and the parent–child relationship quality should be included in effectiveness studies (Duncan et al., 2015).

In the present study we, therefore, investigated the effects of the Mindful with your baby/toddler training observing different features of parenting behaviors and the interaction quality between mothers and their child. More specifically, we have focused on the following dimensions that have been shown to be particularly important for children’s early development and that are likely to change from mindful parenting training: parental sensitivity, acceptance, mind-mindedness, and dyadic synchrony. Below, we first briefly explain these parenting behaviors and characteristics, as well as their importance in predicting adaptive child development. We then explain why and how mindful parenting training in general, and the Mindful with your baby/toddler training in particular, might lead to changes in these behaviors and characteristics.

Parental sensitivity refers to the parent’s ability to interpret the child’s (behavioral, physical, and emotional) signals and respond to them in an appropriate and prompt manner. This concept has grown out of observational research attempting to understand variations in children’s secure attachment to their parents (Ainsworth, 1969; Ainsworth et al., 1974, 1978). Sensitivity is assessed from home-based observations of parent–child interaction, by rating the entirety of parenting behaviors shown during the interactions on a scale from 1 to 9 (Ainsworth et al., 1974). From the same home observations, Ainsworth (1969) developed a scale of acceptance versus rejection. A
Chapter 7

parent is accepting when there is sufficient balance between positive and negative feelings of the parent toward the child. The accepting parent respects the child’s desire for autonomy, mastery, and negative emotion (anger and frustration). Acceptance furthermore encapsulates the parent’s ability to empathize with the child, without losing touch with his or her own positive and negative emotions (Ainsworth, 1969). The importance of sensitive and accepting caregiving with regard to children’s adaptive and healthy development has become clear from a large body of research over the past decades. Parental sensitivity and acceptance have shown to predict a wide variety of positive child outcomes, most important children’s secure attachment, affect/stress regulation, and social-emotional competence understanding (e.g., Volling et al., 2002; Hughes et al., 2005; Khaleque & Rohner, 2012; Putnick et al., 2015; Taylor-Colls & Fearon, 2015; Zeegers et al., 2017).

Mind-mindedness is defined as parents’ tendency to treat their child as a mental agent, an individual with autonomous thoughts, feelings, and desires (Meins, 1997, 2013). This concept also grew out of observational research attempting to understand variations in (in)secure child–parent attachments (Meins, 1997; Meins et al., 2001). In early childhood, mind-mindedness is assessed as parents’ tendency to comment appropriately or in a nonattuned manner on their infant’s presumed internal states during a free-play situation (Meins et al., 2001; Meins and Fernyhough, 2015). The appropriate and nonattuned indices reflect two orthogonal dimensions of mind-mindedness, unrelated to each other in mothers (Meins et al., 2003, 2012). Appropriate mind-related comments reflect attunement to and validation of the infant’s internal state. Nonattuned comments reflect the extent to which misinterpretations of the infant’s state emerge, and/or when parents project their own state of mind or impose their own agenda on the infant (Meins, 2013). Greater mind-mindedness is indicated by high levels of appropriate mind-related comments or low levels of nonattuned mind-related comments. Mind-mindedness has shown to be lower in mothers with mental disorders, mothers who experience parenting stress, and in adolescent mothers (Pawlby et al., 2010; McMahon & Meins, 2012; Crugnola et al., 2014). Moreover, next to sensitivity, mind-mindedness has also shown to be an important and independent predictor of secure attachment, emotion regulation, socioemotional functioning in early childhood (Meins et al., 2002; Laranjo et al., 2008; Bernier et al., 2010; Zeegers et al., 2017, 2018).

Dyadic synchrony involves the co-occurrence and coordination of attention (gaze), emotional expressions, and vocalizations during the parent–child interaction (Yale et al., 2003; Colonnesi et al., 2012; Beebe et al., 2016). The general concept of dyadic synchrony refers to an array of interactive behaviors between parent and child such as responsivenes, reciprocity, mutuality, and shared emotion, typically assessed during face-to-face interactions. In the present study we focus on two forms of parents’ and
Evaluating Mindful with you baby/toddler training

Children's temporal coordination of behaviors. First, the temporal contingency of facial expressions and gaze (Yale et al., 2003; Colonnesi et al., 2012). Second, the turn-taking in vocal interaction (Feldstein et al., 1993; Gratier et al., 2015; Beebe et al., 2016), assessing how often the vocalizations of the mother were followed directly by vocalizations of the child and vice versa. Both the synchronous timing and the vocal turn-taking are considered to be important determinants of the quality of early parent–child interaction. That is, both provide children with opportunities to experience the mutual regulation of positive arousal, and to construct the structure of contingency and coordination characteristic of adult communication (Feldman et al., 1999; Leclère et al., 2014). Symptoms of depression, anxiety, and distress in mothers were shown to be related to disturbances in dyadic synchrony (Feldman, 2007), which is directly linked to infants’ current and later social, emotional, and psychological functioning (Feldman et al., 1999; Moore & Calkins, 2004; Feldman, 2007; Lindsey et al., 2009; Leclère et al., 2014).

Considering the core elements of mindful parenting interventions, and more specifically the core elements of the Mindful with your baby/toddler training, there are several reasons why it is important to study the effects of training on mothers’ sensitivity, acceptance, mind-mindedness, and dyadic synchrony. First of all, the Mindful with your baby/toddler training involves practice in listening to the child with full attention through mindfulness meditation (Potharst et al., 2017). These practices are thought to improve parents’ attention and receptive awareness to the experiences of the present moment (Brown & Ryan, 2003; Baer & Krietemeyer, 2006). The mindfulness meditations in Mindful with your baby/toddler also aim to improve parents’ self-control and to reduce their immediate reactions to their own thoughts, or feelings and external child-related events. Additionally, parents get the opportunity to practice being attentive to their own and to the child’s inner states by means of individual, and mother–child watching meditations, as well as the inquiry afterward (Siegel & Hartzell, 2003). These mindful parenting abilities all underlie parents’ tendency to form correct interpretations of children’s behavioral and verbal signals. That is, they reduce the use and influence of automatic cognitive processes, preventing bias in the interpretations of signals (Duncan et al., 2009). In turn, an appropriate interpretation of the child’s signals is at the heart of the concepts of maternal sensitivity and mind-mindedness (Ainsworth et al., 1974; Meins et al., 2001; Meins, 2013). Therefore, mothers are expected to show less insensitive behaviors and greater levels of mind-mindedness after the training.

Another important focus of the Mindful with your baby/toddler training is teaching parents to take a non-judgmental and compassionate stance toward their child’s and their own traits, attributes, and behaviors, which leads to the lower rejecting and dismissing parenting behaviors, as well as respect for the child’s autonomy (Ainsworth, 1969; Duncan et al., 2009; Bögels & Restifo, 2013). We, therefore, expect that after
the training mothers will be more accepting as rated by independent observers. Furthermore, higher levels of compassion for the self and child should also come forward in positive changes in parental acceptance, as more self-compassion would lead to more positive, and less negative, affection in the parent–child relationship (Ainsworth, 1969).

Lastly, the above described mindful parenting behaviors and abilities can also lead to more implicit and embodied forms of attuned caregiving. As mindful parents are sensitive both to the content of conversations as well as their child’s tone of voice, facial expressions, and body language (Duncan et al., 2009), this might also be reflected in more synchronous timing of facial expressions and gazing (Siegel & Hartzell, 2003). We, furthermore, expected that mothers would show less turn-taking behaviors, as they were stimulated to be attentive to the present moment, in a non-judgmental and non-reactive manner. Additionally, we expected that children would show higher levels of turn-taking (responsiveness) as a result of increases in mothers’ mindful attitude and lower (over)active parenting during mother–child interactions.

The present study evaluated the effects of the Mindful with your baby/toddler training for mothers of young children (aged 0–48 months), who experience parental stress, mother–child interaction problems, and/or whose children experience regulation problems. A quasi-experimental design was used, with a waitlist assessment, pretest, and posttest. On the basis of the above-mentioned literature, we hypothesized that the Mindful with your baby/toddler training would be effective in reducing parenting stress, but also in improving observed maternal sensitivity, acceptance, mind-mindedness, and mother–child synchrony.

MATERIALS AND METHODS

Study Design and Procedure

The present study had a quasi-experimental design, consisting of three measurement waves (waitlist, pretest, and posttest). During these waves home visits were conducted to record mother–child free-play sessions and face-to-face interactions. Furthermore, mothers filled out online questionnaires on their levels of parenting stress. The waitlist assessment was administered at least 5 weeks before starting the Mindful with your baby/toddler training. The mean waiting time for those who had to wait was 7.60 weeks (SD = 1.30). The home observations were repeated the week before the start of the training (pretest), and the week directly after the training (posttest). The home observations were coded by trained coders who were blinded to the measurement occasions (waitlist, pretest, and posttest).
Data of the present study were collected from 15 group trainings, which consisted of three to six mother–child dyads and started between October 2015 and February 2018. The intervention took place at a community child mental health center or a mindfulness center. Fifty mothers with their infants (N = 36) or toddlers (N = 14) were admitted to Mindful with your baby/toddler because of parental stress and/or mother–child interaction problems and/or child regulation problems. They were referred by general practitioners, midwives, or mental health care providers or they could enroll themselves.

Mothers were asked to participate in this research before the start of the training and gave informed consent. The study was approved by the ethical committee of the Faculty of Social and Behavioral Sciences at the University of Amsterdam. The mother–toddler dyads that took part in the current study were also part of an earlier study on the self-reported effects of the Mindful with your toddler training (Potharst et al., 2018). Part of the data on sensitivity, acceptance, and parenting stress was also presented in this article.

**Instruments**

**Parenting Stress.** Parenting stress was assessed with the Dutch Parenting Stress Index-Short Form (PSI-SF, Brock et al., 1992), based on the American Parenting Stress Index (Abidin, 1983). The Dutch PSI-SF originally consists of 25 item, for example, “Considering only this child, parenthood is more difficult than I thought it would be.” Items are rated on a 6-point Likert scale, ranging from 1 (totally disagree) to 6 (totally agree). We removed two items, since they were not suitable for measuring parenting stress within the infant–caregiver relationship (i.e., “My child’s attention fades more often than I thought” and “When I prohibit something, later, my child will do this again”). In the analyses, we used mothers’ average item score as outcome measure (i.e., sumscore divided by 23). The Dutch PSI possesses good reliability, with reliability estimates ranging between $\alpha = 0.92$ and $\alpha = 0.95$ (Brock et al., 1992; Egberink et al., 2014). In the present study, internal consistency for the total score at pretest was $\alpha = 0.92$.

**Sensitivity and Acceptance.** Sensitivity and acceptance were assessed from the 10-min free play sessions recorded at home. Mothers were instructed to play with their child with (5 min), and without (5 min) age-appropriate toys. Both scales were assessed using the scale of Ainsworth (1969). The first scale, sensitivity versus insensitivity, captures whether a mother is sensitive or insensitive to the signals of her child. Sensitive mothers made themselves available to perceive child signals, attributed meaning to these signals by acting promptly and appropriately upon them. For instance, a low score was given when a mother initiated a new toy when the child was still actively engaged with another toy. The second scale, acceptance versus rejection, captured whether a
mother showed acceptance of the child’s initiatives and positive and negative feelings, while showing patience, positive affectivity, and warmth toward the child. For instance, a low score was given when mothers told their children to be quiet when they started crying. Video-observations were coded by four trained coders who evaluated every free-play session by assigning a score from 1 (highly insensitive/rejecting) to 9 (highly sensitive/accepting).

Twenty percent of the observations were coded to assess inter-rater agreement. The intra-class correlation (ICC) among the coders was excellent (ICC = 0.83) for the sensitivity versus insensitivity scale and good (ICC = 0.76) for the acceptance versus rejection scale (Cicchetti, 1994). To prevent bias from single raters, every video-fragment was coded twice, by two different observers. Differences in scores were resolved by discussion.

**Mind-Mindedness.** Mothers’ mind-mindedness was assessed from the same 10-min free-play session as used to assess maternal sensitivity. Each spoken word or sentence of the mother was transcribed and coded by two independent observers using a translated version of the mind-mindedness coding manual (Meins & Fernyhough, 2015). The mind-related comments were categorized according to the specific state the parent referred to. Categories were cognitions (e.g., “you recognize this toy from home”), likes and dislikes (e.g., “you don’t like this ball”), emotions (e.g., “you’re excited to play with these toys”), and epistemic states (i.e., “are you teasing me?”). Comments that were obviously meant to be dialogue said/thought by the infant (e.g., “Mommy, can you help me?”) were also classified as mind-related.

Second, mind-related comments were classified as being appropriate or nonattuned. Appropriate comments are those for which: (a) the trained coder agreed with the parent’s reading of the infant’s internal state, (b) the internal state comment linked the infant’s current activity with similar events in the past or future, or (c) the parent voiced (using the first person) what the child might say if he or she could speak. Comments were classified as nonattuned when the coder believed (a) the parent misread the internal state of the child, or (b) the comment referred to a past or future event that had no obvious relation to the infant’s current activity (e.g., “I’m sure you would like to feed the ducks later”). We calculated mind-mindedness in terms of the frequencies of mothers’ appropriate and nonattuned mind-related comments. Additionally, in order to control for maternal verbosity, we calculated proportions of mind-related comments by dividing the total amount of appropriate or nonattuned comments by the total amount of comments a mother made during the free-play session (Meins & Fernyhough, 2015).

Twenty percent of the observations was randomly selected to calculate the inter-rater agreement. The inter-rater agreement was $\kappa = 0.97$ for mind-related comments and $\kappa = 0.87$ for appropriateness of mind-related comments, which can both be classified
as “almost perfect agreement” (Landis & Koch, 1977). Disagreements were resolved by discussion.

**Dyadic Synchrony.** In order to observe dyadic synchrony, 4-min face-to-face interactions were recorded (Tronick et al., 1978). The child was placed in a seat in front of the mother (keeping a 30–50-cm distance), and the mother was instructed to talk to and play with her child, as she would normally do at home, without objects. A dual lens camera recorded both the mother’s and the infant’s face and upper body. Three trained observers coded infants’ gaze direction facial expression and vocalizations independently of one another on a 1 s time base (state event; event with a start time and an end time) using The Observer XT 13.0 (Zimmerman et al., 2009). The inter-rater agreement in this observation could also be classified as “almost perfect” (Landis & Koch, 1977): \( \kappa = 0.88 \) for gazing, \( \kappa = 0.89 \) for facial expressions, and \( \kappa = 0.87 \) for vocalizations. Dyadic synchrony was studied by examining the temporal coordination and the interactive contingency of the following three behaviors (Harrist & Waugh, 2002):

**Gaze.** The coding for children’s gaze included: (a) gaze at the parent when children were looking at their parent’s face or hands, and (b) gaze elsewhere referred to children looking away or non-observable looking. Similarly, the coding for mother’s gazing included: (a) gaze at the child when mothers were looking at their children’s face or hands, and (b) gaze otherwise referred to mothers looking away or non-observable looking. Gaze otherwise was not included in the further analysis, but it represents the remaining time of the observation (240 s).

**Positive facial expressions.** We coded the emotional valance of mothers’ and children’s facial expressions (positive, neutral, and negative). Earlier studies showed that in typical interactions mothers’ facial expressions are predominantly positive, and rarely and negative in face-to-face interactions (Aktar et al., 2017). If present, negative facial expressions often occur reflect the child’s negative affect. We, therefore, only examined the co-occurrence of positive facial expressions in the current study. In line with this earlier evidence, less than 1% of maternal facial expressions during pretest were negative in the current study. We coded positive facial expressions in terms of closed and open smiles identified by raising corners of the lips, constriction of the eyes, raising of the cheeks, and opening of the mouth (Ekman & Friesen, 1978; Messinger et al., 2001).

**Vocalizations.** included verbalizations (words or sentences) and vocalizations: positive vocalizations such as chuckling, giggling, or laughing; neutral vocalizations such as babble; and negative vocalizations such as crying or fussing. For the analyses, positive and negative vocalizations were added up to a total vocalization score. Vegetative and reflexive vocalizations (hiccups, coughs, burps, etc.) were not coded. The singular behavior of mother and child and their time-based co-occurrences were
computed using the software for the collection and analysis of observational data, The Observer. With regard to dyadic synchrony, the following co-occurrences of pairs of behaviors were coded: (a) coordination of gaze: temporal co-occurrence of child gazing toward mother and mother gazing toward the child (in seconds; Lotzin et al., 2015); (b) coordination of positive facial expression: temporal co-occurrence of mother and child both displaying positive facial expressions (in seconds; Riehle et al., 2017); (c) coordination of positive facial expression during gaze: temporal co-occurrence of children’s positive facial expression when gazing toward mother and mother’s positive facial expression when gazing toward the child (in seconds; Weinberg & Tronick, 1994).

With regard to the turn-taking vocal interaction between mother and child, the following turn-taking sequences were coded: (a) maternal responsiveness, mother responds to child’s vocalization when the mother’s vocalization happens within 2 s after the child’s vocalization (frequencies; Lammertink et al., 2016); (b) child responsiveness, child responds to mother’s vocalization when the child’s vocalization happens within 2 s after the mother’s vocalization.

For the variables coordination of gaze, positive facial expressions, and positive facial expressions percentages were calculated dividing the duration of the behavior (in seconds) by the total duration of the observation * 100. Percentages of maternal responsiveness were calculated by dividing the number of maternal vocalizations after child vocalizations by the total number of child vocalizations. Percentages of child responsiveness were calculated by dividing the number of child vocalizations after maternal vocalizations by the total number of maternal vocalizations.

**Intervention**

The Mindful with your baby training and the Mindful with your toddler training are similar to each other in terms of aims, as well as in the mindfulness exercises. The training consists of eight (babies) or nine (toddlers) weekly sessions of 2 h, and an additional follow-up session 2 months later. The sessions are carried out in small groups with a maximum of six dyads per group. Each group is led by an experienced Mindful with your baby/toddler trainer (EP or IV). Other than the number of sessions, the infant and toddler training programs differ with regard to the presence of the children. In the Mindful with your baby training, the babies are present in all sessions, except for the first and the fifth session. The first session allows for a clear introduction in, and deeper understanding of mindfulness and the fifth session allows for a possibility to focus on learning self-compassion with full attention. In the Mindful with your toddler training, the toddlers join the training after Session 4, so from Session 5 to 9. The sessions without the toddlers are needed to lay a foundation in mindfulness abilities, before mothers are asked to apply these abilities with their toddler, which appeared to be more challenging.
in toddlers than in babies. Toddlers can make an appeal to their mothers quite strongly and directly, and this may make it harder for mothers to keep an observational stance while interacting with them. Also, toddlers explore more actively than babies, which brings about themes like conflicts between children, limit setting, shame about a child’s behavior, etc. The sessions with the children allow for mothers to directly apply their learned mindfulness skills when they are in their parental role, making what is learned in the training more generalizable to the parent’s everyday life.

The content of the training programs is described more elaborate in Potharst et al. (2017, 2018). Structural components of the training are formal mindfulness meditations based on MBSR (Kabat-Zinn, 1990) and MBCT (Segal et al., 2012). Another import component of the trainings involves meditations in which mothers focus on their child. This is done by watching meditations, in which mothers are asked to watch every step and behavior of the child with curiosity, and to empathize with the intentions and the discoveries of the child.

In the present study, trainers were accompanied by an Infant Mental Health Specialist (IMH-specialist) or psychologist in training. The IMH-specialist is responsible for the well-being of the mother–child dyads: she can observe the mother–child interaction, offer (emotional) support, and be available for discussion and evaluation with the trainer after the training sessions. However, for both IMH-specialists and the psychologists in training, the main task involved watching, and being available for the children during the meditation sessions in which the mothers close their eyes, and making sure the children were both emotionally and physically safe (e.g., by giving explanation of what happens to the children or by warning the mindful parenting trainer or a parent when the meditation lasts too long for a particular child). We examined whether the difference in professional training of the second trainer affected the outcomes (see the section “Results”).

**Data Analyses**

The repeated measurements before and after the training led to a hierarchical dataset. We, therefore, used multilevel regression models consisting of repeated measurements of time (level 1), nested in mother–child dyads (level 2) to analyze the data. Next to accounting for nested data, an advantage of multilevel regression analyses is that missing data can be handled, and imputation is not needed (Kreft & De Leeuw, 1998). Analyses were ran with 50 families that completed at least the waitlist/pretest and posttest measures. Further, analyses were run with and without standardized scores on the continuous outcome measures. This way we could report on the unstandardized regression estimates (β) as well as the standardized estimates (β, which could be interpreted as effect size). The random effects of intercept and
time on the outcome measure were tested in each model ($p < 0.050$). Additionally, to study if the treatment outcomes from the main multilevel analyses differed across the infant or toddler training, we reran the reported models after including the type of group (baby or toddler), and (in a separate model) the presence of second trainer (IMH specialist or psychologist in training), as well the interaction effect between time and group/trainer as covariates. Second, we tested whether adding random slopes to the models improved the fit of the model to the observed data, which would indicate that mothers show variation in their change from pre- to posttest. To correct for the multiple comparisons, a false discovery rate (FDR) of 0.05 was applied (Benjamini & Hochberg, 1995). The FDR determines the expected proportion of false discoveries among significant findings, yielding a $q$-value based on the $p$-values of the multiple comparisons. $P$-values below the set $q$-value are considered statistically significant.

RESULTS

Participants

Fifty mothers ($M_{age} = 35.06$ years; $SD = 4.19$) with their infants ($n = 36; M_{age} = 9.57$ months; $SD = 5.38$; 20 boys) or toddlers ($N = 14; M_{age} = 2.50$ years; $SD = 0.57$; 10 boys) participated in the Mindful with your baby/toddler training. Thirty-three children (66%) were firstborn. The mothers’ ethnicities were Dutch ($N = 36; 72$%), European-other ($N = 3; 6$%), and non-European ($N = 11; 22$%), and 22 (44%) mothers obtained a University degree, 23 (46%) a college degree, 2 (4%) secondary vocational education degree, and 2 (4%) a high school diploma. During the training, 24 mothers (48%) were working, 13 (26%) were on sick leave or without a job, 10 (20%) were stay-at-home mothers, 1 (2%) was a student, and 1 (2%) was on parental leave. Based on clinical assessment during the intake sessions, mothers were diagnosed with a depression (21 mothers, 42%), anxiety disorder (17 mothers, 34%), post-traumatic stress disorder (PTSD) (6 mothers, 12%), or another disorder, such as an obsessive compulsive disorder or attention deficit hyperactivity disorder (7 mothers, 14%). Some mothers had more than one diagnosis. Fifteen mothers (30%) had no diagnosis. In the waitlist period, prior to the Mindful with your baby/toddler training, 62% (31 mothers) received psychological treatment or parenting support (often IMH treatment).

Response Rates

Figure 1 displays a flow chart of the participants at each measurement time. Three mothers did not want to participate in the home observations. For these mothers only demographic data and questionnaire data were available. With regard to the
Evaluating Mindful with you baby/toddler

observational data, missing data on the mind-mindedness and sensitivity variables were due to technical problems or to mothers speaking a foreign language during the play. Missing variables on face-to-face interactions were more frequent due to technical difficulties or unclear recordings. In order to code synchrony in facial expressions and gaze, mother and child need to be recorded simultaneously by both lenses. Due to movement of the child and/or mother, some videos could not be coded due to poor recording. The dyads that did not not differ significantly from the dyads that did have recordings on any of the other observational have have face-to-face recordings did not differ significantly from the dyads that did have recordings on any of the other observational measures at waitlist, pretest, and posttest.. With regard to the data on sensitivity and mind-mindedness, 68% of the mothers were observed during the waitlist assessment, 92% during posttest, and 92% during follow-up. For dyadic synchrony, 50% of the mother–child dyads were observed during the waitlist assessment, 68% during pretest, and 68% during posttest. Exact numbers on the available data are presented in Table 1.

Preliminary Analyses

The means and standard deviations of the outcome variables are presented in Table 1. The residuals of the analyses were normally distributed (Tabachnick & Fidell, 2013). We checked whether any of the outcome measures correlated with demographic variables of the mothers [age, educational level, nationality (Dutch/non-Dutch) at pretest. Mothers with a higher educational level were rated as more sensitive and accepting than mothers with a lower educational level at pretest, \( r = 0.57 \) and \( r = 0.50 \). We therefore added educational level as a covariate to the analyses. We examined whether the analyses with and without educational level as a covariate yielded different results, which was not the case. Therefore, we report the results of the main analyses without educational level as a covariate.

Effects of the Training

Table 2 presents the results of multilevel models with random intercepts of treatment outcome predicted by measurement occasion without any covariates. As we applied an FDR of 0.05, we reported the significance of effects in Table 2 when the \( p \)-values were below the set \( q \)-values. There were no significant changes on the outcome measures from waitlist to pretest. Mothers reported less parenting stress from pre- to posttest (small to moderate effect size). Compared to pretest, at posttest mothers were more accepting toward their child (small to medium effect size) and produced less nonattuned mind-related comments (large effect size). Children showed more responsiveness in turn-taking at posttest compared to pretest, as they were more likely to vocalize after the
Table 1 Means and standard deviations of all observational outcome measures at three measurement occasions

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<td>M (SD)</td>
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<td>M (SD)</td>
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<tr>
<td><strong>Parent-child observations</strong></td>
<td></td>
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</tr>
<tr>
<td>Sensitivity</td>
<td>34</td>
<td>6.02 (1.75)</td>
<td>46</td>
<td>5.82 (1.88)</td>
<td>46</td>
<td>6.28 (1.85)</td>
</tr>
<tr>
<td>Acceptance</td>
<td>34</td>
<td>6.35 (1.91)</td>
<td>46</td>
<td>5.89 (1.93)</td>
<td>46</td>
<td>6.78 (1.59)</td>
</tr>
<tr>
<td>Appropriate mind-related comments (frequencies)</td>
<td>34</td>
<td>6.44 (5.72)</td>
<td>46</td>
<td>6.30 (4.49)</td>
<td>46</td>
<td>5.93 (3.73)</td>
</tr>
<tr>
<td>Nonattuned mind-related comments (frequencies)</td>
<td>34</td>
<td>2.71 (3.16)</td>
<td>46</td>
<td>2.41 (2.36)</td>
<td>46</td>
<td>0.91 (1.33)</td>
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<tr>
<td>Appropriate mind-related comments (%)</td>
<td>34</td>
<td>4.88 (3.66)</td>
<td>46</td>
<td>4.92 (2.75)</td>
<td>46</td>
<td>4.70 (2.78)</td>
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<tr>
<td>Nonattuned mind-related comments (%)</td>
<td>34</td>
<td>2.28 (2.49)</td>
<td>46</td>
<td>2.06 (1.98)</td>
<td>46</td>
<td>0.70 (0.10)</td>
</tr>
<tr>
<td>Coordination of positive facial expressions (%)</td>
<td>25</td>
<td>12.20 (12.15)</td>
<td>34</td>
<td>17.26 (15.38)</td>
<td>34</td>
<td>16.27 (17.03)</td>
</tr>
<tr>
<td>Coordination of gaze (%)</td>
<td>25</td>
<td>36.87 (22.87)</td>
<td>34</td>
<td>42.19 (23.32)</td>
<td>34</td>
<td>39.35 (24.69)</td>
</tr>
<tr>
<td>Coordination of positive facial expressions and gaze (%)</td>
<td>25</td>
<td>6.60 (8.60)</td>
<td>34</td>
<td>10.98 (9.80)</td>
<td>34</td>
<td>9.17 (12.11)</td>
</tr>
<tr>
<td>Turn-taking (child responsiveness) (%)</td>
<td>25</td>
<td>15.48 (8.64)</td>
<td>34</td>
<td>16.00 (10.88)</td>
<td>34</td>
<td>20.14 (11.62)</td>
</tr>
<tr>
<td>Turn-taking (maternal responsiveness) (%)</td>
<td>25</td>
<td>45.12 (20.23)</td>
<td>34</td>
<td>53.58 (24.70)</td>
<td>34</td>
<td>45.92 (18.34)</td>
</tr>
</tbody>
</table>

Note. Data are presented as mean (standard deviation), n = number of available cases.
Table 2. Unstandardized and standardized parameter estimates and F values of multilevel models of observational outcomes predicted by measurement occasion (deviations from pretest).

<table>
<thead>
<tr>
<th>Observations</th>
<th>Waitlist</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (SE)</td>
<td>β</td>
</tr>
<tr>
<td>Appropriate mind-related comments (frequencies)</td>
<td>0.21 (0.77)</td>
<td>0.05</td>
</tr>
<tr>
<td>Nonattuned mind-related comments (frequencies)</td>
<td>-0.26 (0.45)</td>
<td>-0.10</td>
</tr>
<tr>
<td>Appropriate mind-related comments (%)</td>
<td>0.17 (0.55)</td>
<td>0.06</td>
</tr>
<tr>
<td>Nonattuned mind-related comments (%)</td>
<td>-0.23 (0.35)</td>
<td>0.12</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>-0.08 (0.28)</td>
<td>-0.04</td>
</tr>
<tr>
<td>Acceptance</td>
<td>-0.36 (0.30)</td>
<td>-0.19</td>
</tr>
<tr>
<td>Coordination of gaze</td>
<td>2.42 (5.46)</td>
<td>0.10</td>
</tr>
<tr>
<td>Coordination of positive facial expressions</td>
<td>4.81 (3.31)</td>
<td>0.32</td>
</tr>
<tr>
<td>Coordination of positive expressions during gaze</td>
<td>3.09 (2.13)</td>
<td>0.30</td>
</tr>
<tr>
<td>Turn-taking (child responsiveness)</td>
<td>0.87 (2.19)</td>
<td>0.09</td>
</tr>
<tr>
<td>Turn-taking (maternal responsiveness)</td>
<td>7.20 (4.79)</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Note. B = the unstandardized parameter coefficient of the waitlist, post-test and follow-up relative to the pre-test. SE = standard error of parameter estimate, β = the standardized beta coefficient, † = p < .1, * = p < .05, ** = p < .01, *** = p < .001. The parameter coefficients should be interpreted as relative to the pretest measurement.
mother had vocalized (small to medium effect size). There were no pretest to posttest changes in the synchrony of facial expressions, gazing, and facial expressions during gazing. We added random slopes to each model to test whether mothers showed variation in their response to the intervention (i.e., some mothers might show more change than others). None of the random slope models showed an improved fit to the observed data.

Covariates

We analyzed whether the treatment outcomes were dependent on the type of training group (baby or toddler) and/or whether the treatment outcomes were dependent on the presence of an IMH-specialist. There were no other significant interaction effects for type of group, suggesting that the outcomes described above apply to the mothers in the baby and toddler group. With regard to the presence of the IMH-specialist versus psychologist in training, we also did not find significant interactions effects.

DISCUSSION

Mindful with your baby/toddler is a group-based training for mothers of babies and toddlers who experience parental stress and/or problems in the parent–child relationship. The training is focused on reducing parental stress and improving the mother–child relationship through practicing mindfulness meditation with and without the child present. The main aim of this study was to evaluate whether the training not only reduces maternal self-reported parenting stress, but also changes objectively measured maternal behavior during parent–child interactions and mother–child interaction quality, as compared to waitlist. We therefore observed changes in maternal sensitivity, acceptance, mind-mindedness, and dyadic synchrony, next to collecting mothers’ parenting stress reports. The results showed that mothers reported less parenting stress after the training (small effect size), were more accepting (medium effect size), and made less nonattuned references to the child’s mental states (large effect size). The children showed higher levels of responsiveness after the training (small to medium effect size). No improvements occurred on any of the outcome measures after waitlist, suggesting that the training underlies the observed outcomes.

First as expected, maternal stress decreased after the training, indicating that the training is effective in reducing mothers’ stress in parenting their young children. The effect size however was small. In two earlier studies, parenting stress did not yet reduce at posttest but only 8 weeks after the Mindful with your baby/toddler training (Potharst et al., 2017, 2018), suggesting that parenting stress reductions may continue
after the training has finished. In line with our hypotheses, mothers behaved more accepting toward their children (small to medium effect size), which means that they showed less rejecting behavior in reaction to the child’s initiatives and positive and negative feelings, and a more positive, warm, patient, and non-reactive attitude. Maternal sensitivity did not improve significantly indicating that this mindful parenting training seems to tap into the core aspects of acceptance more than the core aspects of sensitivity. Indeed, when mothers practice mindfulness they increase their capacity of “being present” with whatever comes up, whether it is pleasant or unpleasant (Kabat-Zinn, 2003). Examples of something unpleasant during a formal meditation could be pain or worries, and mothers practice not only with becoming aware of these experiences, but also to meet them non-judgmentally and with equanimity. Further, in the mindful parenting exercises, mothers learn to generalize what is learned in interaction with their children. So, they learn to meet difficulties with their child, like crying, and their own inner reactions to such difficulties, with patience and kindness. In the training, mothers receive psycho-education about the fight, flight, and freeze stress reactions. They practice with becoming aware of their own stress-related action tendencies, applying mindfulness when they notice a stress reaction, and then making a conscious choice in how they want to respond to their child. Rejecting behavior is an example of a fight reaction that is directly addressed in the training, which aligns with the post-intervention changes in accepting behavior.

Mothers’ ability to postpone judgment and reaction may underlie the decrease in nonattuned mind-related comments. Especially when children show behavior that is challenging or confusing to mothers, they may tend to express their distress in the form of judgments about the child (e.g., saying “you always want to have it your way” or “you just want attention”). Or they may look for explanations of behavior aimed at finding peace in the difficult situation, rather than at staying open to what the child may be going through at that moment (e.g., “You are tired, it is time for your nap” when actually the child is frustrated because he is not allowed to touch something in the room). This tendency may be associated with parental experiential avoidance, which is an inability to tolerate their own internal distress in difficult parenting situations (Tiwari et al., 2008). Parental experiential avoidance may cause intrusive behavior in parents that is aimed at reducing the child’s distress or behavior, and thereby reducing the parent’s distress. In the Mindful with your baby/toddler training, mothers practice awareness in situations that are stressful for them and learn to notice not only their thoughts and feelings in such a situation, but also their tendency to act and deal with these feelings. They are also invited to become aware of ‘not knowing’ why the child acts like he does or ‘not understanding’, and the distress that this may give, and to practice accepting this ‘not knowing’.
So possibly, the capacity to stay present in a non-judgmental way in the face of difficulty underlies both the improvement in acceptance and in nonattuned mind-related comments. On the other hand, the other dimension of mind-mindedness, appropriate mind-related comments, which did not improve in the current study, may be more related to encapsulate traditional notions of engagement, responsivity, and sensitivity (Meins, 2013; Zeegers et al., 2017). The question is whether there was no change in the extent to which mothers were inclined to interpret their child’s behaviors in terms of underlying mental states, or whether mothers did not verbalize these mind-related comments more often. In the watching meditation in which mothers practiced focusing their full attention to the child, they also practiced in reflecting on the experience of the child, but they were not invited to immediately verbalize these reflections. This is an important difference between mindful parenting training and a mentalization-based parenting program: the first focuses on awareness, while the latter focuses on the verbalizing emotions, intentions, and desires of the child (Sadler et al., 2006).

The mothers in the present study had proportions of nonattuned mind-related comments of 2–3% at waitlist and pretest, and 5% of the comments were classified as appropriately mind-related. In terms of frequencies, mothers made on average six appropriate mind-related comments and two to three nonattuned comments during a play session at the waitlist and pretest measurement. At posttest, mothers’ proportions of nonattuned comments decreased to 1% (frequency of 1 comment). Appropriate mind-related comments were still 5% (frequency of six comments). Unfortunately, there are no clinical or non-clinical norms of mind-mindedness available. We compared the mind-mindedness of the mothers in the present study with a non-clinical sample of Dutch mothers, who were living in the same urban area and had similar socioeconomic backgrounds (n = 116; Zeegers et al., 2018). In this study, proportions of nonattuned and appropriate mind-related comments at 12 months were 1% and 7%, respectively. These numbers indicate that at posttest, mothers’ mean levels of nonattuned mind-mindedness decreased to levels comparable in a non-clinical sample.

Turning to the results on dyadic synchrony, we found that children (both infants and toddlers) showed more vocalization after the mother vocalized, suggesting that they became more responsive to their mothers. These results may be explained better when considering the outcomes for mothers. That is, although non-significant, we found that mothers tended to show less responsiveness after the training (p = 0.087; small effect), possibly because they became less (over)reactive. We checked whether mothers talked less to their children from pre- to posttest. This was not the case. On average mothers made 127 comments both at pretest and posttest. Thus, it seemed that not mothers’ overall talk, but specifically their prompt reaction to the child’s vocalization decreased. These outcomes suggest that maternal reactivity decreased. Possibly, children showed
more responsiveness at posttest because they experienced more “space” to react upon their mothers. There were no changes in the co-occurrences of positive facial expressions and gazing.

We studied the effects of the training for all training groups together, regardless of the age of the children. Our rationale was that both the baby and toddler training aim to reduce parenting stress and improve the quality of the mother–child relationship using the same methods: mindfulness meditation, watching meditation, psycho-education, and inquiry. We therefore hypothesized that in both baby and toddler groups maternal mind-mindedness, sensitivity, acceptance, and turn-taking behavior and dyadic synchrony would increase. Furthermore, by investigating the outcomes of the baby and toddler groups together, we increased statistical power. In order to study whether the training effects were different for the baby and toddler groups, we added interaction effects (Group * Posttest) to the multilevel models. These interaction analyses did not show that effects were different for mother–baby and mother–toddler dyads. However, future studies should replicate the present study, including a larger sample, in order to study possible differences in baby versus toddler groups in more detail.

A large proportion of the current study sample (almost 70%) was diagnosed with mood or anxiety disorders. These disorders are risk factors for mother–child interaction problems (Nicol-Harper et al., 2007; Bernard et al., 2018). However, treating maternal depression does not necessarily improve mother–child interaction (Forman et al., 2007; Kersten-Alvarez et al., 2011). A meta-analysis on the effectiveness of mindfulness-based interventions in participants with mood or anxiety disorders showed large effect sizes of mindfulness interventions on symptoms of anxiety and depression (Hofmann et al., 2010). Earlier studies on the effectiveness of the Mindful Parenting training in general (Bögels et al., 2014; Meppelink et al., 2016) and the Mindful with your baby/toddler training (Potharst et al., 2017; Potharst et al., 2018) showed that even if a mindfulness training is focused on parenting, it also decreases parental internalizing psychopathology. The behavior changes observed in this study imply that Mindful with your baby/toddler may be a suitable intervention for mothers who suffer from internalizing psychopathology and also experience problems in interaction with their baby or toddler, as both mother and child may profit from a Mindful with your baby/toddler training.

Limitations

Some caution is warranted in interpreting the results. First of all, although the results of the waitlist period seem to suggest that the significant effects can be attributed to the training, conclusions about causality are limited by the lack of a
randomized control group. Second, the effects of the training may be less generalizable to the entire population of Dutch mothers with stress. Mothers were referred to this training by general practitioners, midwives, a mental health care providers, or mothers signed up for the training themselves. All mothers were aware that they experienced parenting stress and were willing to learn mindfulness in order to learn to cope with their stress differently. It is unclear whether the selection of the present study’s participants affected the treatment outcomes.

Third, the age of the children that were included in this study varied, ranging from 4 months to 3.5 years. This relatively broad age range could have influenced the scoring of the different mother–child observations, particularly the scoring of maternal acceptance and sensitivity. That is, certain parenting behaviors were shown during mother–toddler observations only. For instance, boundary-setting behavior occurred during the mother–toddler interactions but hardly occurred during the mother–infant interactions. This means that sensitive and accepting behavior could have a different appearance depending on the age of the child. The training may have had an effect on parenting behaviors that were more likely to appear in the mother–toddler interactions than in the infant–mother interactions. We aimed to make the coding as unbiased as possible by double coding the recordings and blinding the observers to the measurement condition (waitlist/pretest/posttest). However, the age differences between the children could have biased the coding of sensitivity and acceptance.

Research studying observational effects of mindful parenting interventions is yet scarce. This study was the first to examine post-intervention changes in observed maternal sensitivity, mind-mindedness, and parent–child synchrony. With regard to future research, it might be interesting to compare the observed effects of the Mindful with your baby/toddler training with other interventions, such as a mentalization-based parenting program, and compare the outcomes of these interventions. We also recommend measuring the long-term effects of the Mindful with your baby/toddler training on observed changes in behavior, since mindfulness skills may require time for consolidation, independent practice, or generalization to the context of the parent–child interaction.

Second, because of the limited sample size, we could not study the moderating or mediating effects of some variables. Analyses would have been seriously underpowered (Snijders & Bosker, 2012). This leaves a few questions unanswered. First of all, the present study did not take into account the influence of mother and child characteristics (e.g., temperament) that are known to – additively and interactively – contribute to parenting behavior (Achtergarde et al., 2015). Most important, while all mothers in this study suffered from elevated levels of stress, most mothers were also diagnosed with an anxiety disorder, depression, or PTSD. These (different) mental health problems
Evaluating Mindful with you baby/toddler could lead to differential effects of the training. Note, however, that Mindful with your baby/toddler has a transdiagnostic approach – the training is focused on changing repetitive, inflexible, distress-producing ways of thinking, perceiving, and behaving that are implicated in many disorders (e.g., anxiety, depression, posttraumatic stress, substance use, sleep disturbance, eating disorders, and chronic pain conditions; Greeson et al., 2014). We recommend that the present study is replicated in a larger sample of mother–child dyads in order to get a better understanding of whether and how mother and child characteristics influence the effects of the Mindful with your baby/toddler training.

Third, previous results suggest that a focus on the mental and emotional life of their child might give parents greater insight into the child’s behavior, thereby making it more comprehensible, meaningful, and predictable, and thus less likely to induce parenting stress (McMahon and Meins, 2012). This means that improvements in mindful parenting or mind-mindedness may moderate changes in maternal stress. To study these questions we recommend that the present study is replicated in a larger sample of mother–child dyads in order to get a better understanding of the working mechanisms of the Mindful with your baby/toddler training.

CONCLUSION

The present study evaluated whether the Mindful with your baby/toddler training led to observed changes in maternal behavior and mother–child interactions. Mothers were found to be more accepting and show less nonattuned mind-related comments after the training, whereas children showed higher levels of responsiveness. These observational outcomes suggest that the Mindful with your baby/toddler training resulted in more accepting behavior, better attunement to child’s mental world, and more ‘space’ for children to respond to their mothers during interactions. The Mindful with your baby/toddler training may be a suitable intervention for mothers who show a combination of parental stress, internalizing symptoms, problems in the parent–child interaction, and/or child regulation problems.
Remediating child attachment insecurity: evaluating the Basic Trust intervention in adoptive families

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M. J. Noom
N. Polderman
G. J. J. M. Stams

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ABSTRACT

Purpose. This study evaluated the video-feedback intervention Basic Trust in families with internationally adoptive children aged 2–12 years. The intervention aims to reduce child attachment insecurity and behavior problems by enhancing mothers’ and fathers’ sensitivity and mind-mindedness (parents’ capacity to hold in mind the mind of their child). Method. Fifty-three adoptive families participated in a pretest, posttest, and 6-month follow-up assessment. Questionnaires on parenting stress, child attachment insecurity, and behavior problems were administered. Parents’ sensitivity was assessed from free-play observations at home, and mind-mindedness was measured with a describe-your-child interview. Results. Parents reported less child behavior problems, insecure and disorganized attachment, and parenting stress at posttest and follow-up. Parents’ mind-mindedness increased from pre- to post-test but not from pretest to follow-up. Parents’ sensitivity showed an improvement at follow-up. Conclusions. Future studies should investigate whether the present study’s positive results can be replicated under conditions of strict experimental control.
INTRODUCTION

International adoption seems to be an intervention leading to long-term improvements for adopted children in all areas of development (van IJzendoorn & Juffer, 2006). The majority of internationally adopted children do not display severe or persistent medical, behavioral, or developmental problems (e.g., Bimmel, Juffer, van IJzendoorn, & Bakermans-Kranenburg, 2003). Still, a larger ratio of adopted children receives mental health counseling than do their nonadopted counterparts (Juffer & van IJzendoorn, 2005). The risk of developing mental health problems seems to stem from the fact that most internationally adopted children were exposed to severe environmental adversities before they were adopted (e.g., institutional rearing, poverty, social disorganization, abuse, malnutrition, poor pre- and postnatal care within the biological family; Colvert et al., 2008; van IJzendoorn & Juffer, 2006). Adopted children experienced the loss of at least one caregiver, and it is not uncommon that they went through multiple caregiver transitions in institutional care. Furthermore, the transition to a new culture and finding a connection with new caregivers constitute risks of successful adaptation (Havermans, Verheule, & Prinsen, 2016; Welsh, Viana, Petrill, & Mathias, 2007).

This list of unfavorable environmental conditions can especially be worrisome for the child’s developing attachment to their adoptive parents and other caregiving figures. Attachment, the newborn’s innate propensity to maintain proximity to an attachment figure in order to establish the experience of security, is hypothesized to affect children’s later social–emotional development (Bowlby, 1969/1982). Secure infants experience the primary caregiver as a secure base from which to explore the environment and as a haven of safety and a source of comfort (Ainsworth, Bell, & Stayton, 1974; Ainsworth, Blehar, Waters, & Wall, 1978; Benoit, 2004; Bowlby, 1969/1982). Attachment security thereby stimulates the development of healthy emotion regulation strategies in children as well as clear concepts of the self, others, and self–other relationships (Fonagy, Gergely, Jurist, & Target, 2002). In line with this reasoning, a large body of studies have demonstrated that attachment security during infancy predicts a wide variety of socioemotional outcomes during childhood and adolescence, such as social competence and empathy (e.g., Cohn, 1990; Groh et al., 2014; Kestenbaum, Farber, Ellen, & Sroufe, 1989; Thompson & Raikes, 2003). Conversely, the likelihood that children with insecure attachment develop internalizing and externalizing problems has proven to be respectively 2.9 and 2.4 times greater compared with their secure counterparts (Madigan, Brumariu, Villani, Atkinson, & Lyons-Ruth, 2016). Enhancing the child’s sense of security may thus reduce (the risk of later) mental health and adjustment difficulties.

A meta-analysis on attachment in biological and adopted children showed that adopted children are at a substantial risk of becoming insecurely attached to their
adoptive parents when they are adopted after the age of 12 months (i.e., after the sensitive phase of forming attachment relationships; van den Dries, Juffer, van Ijzendoorn, & Bakermans-Kranenburg, 2009). During the past decade, changes in global health, international adoption attitudes, and regulation policies have led to children being older during the adoptive placement—currently 80% of the internationally adopted children is placed after they turned 1 year old (Ministerie van Veiligheid en Justitie, 2017; Selman, 2012). This percentage suggests that the vast majority of adopted children is indeed at risk of developing attachment insecurity. Moreover, although the differences seem to be small, a large body of studies suggest that (internationally) adopted children show elevated levels of behavioral problems as compared to nonadopted peers, for instance, externalizing behavior problems and high rates of inattentive/overactive behavior (e.g., Bimmel et al., 2003; Hoksbergen, ter Laak, van Dijkum, Rijk, Rijk, & Stoutjesdijk, 2003; Kreppner, O’Connor, Rutter, & English and Romanian Adoptees Study Team, 2001; McGuiness & Pallansch, 2000).

Prevention of maladaptive developmental pathways may be realized when adopted children are able to build a secure attachment relationship with an adoptive parent (Kerr & Cossar, 2014). Changing children’s attachment representation from insecure to secure may require from parents that they maximize behaviors that cultivate a sense of trust in their caregiver’s availability and comforting support in times of distress, by trying to accurately understand and respond sensitively to the child’s needs (Ainsworth et al., 1974; Polderman, 1998, 2017; Stovall & Dozier, 2000; Verhage et al., 2016; Zeegers, Colonnese, Stams, & Meins, 2017).

Maximizing attachment-relevant caregiving behaviors poses challenges for all parents but possibly even more so for adoptive parents (Fishburn et al., 2017). Biological parents experience the development of their child from the very start (pregnancy), and their process of thinking about the child’s putative character starts to develop during pregnancy (Arnott & Meins, 2008). For parents of adopted children, the transition to parenthood often takes place in the context of complex losses that derive from infertility (Cudmore, 2005). Moreover, in the case of international adoption, parents typically come from different cultural backgrounds and know very little about their child’s pre-adoption caregiving history (Havermans et al., 2016. On the other hand, prior to the adoption (particularly in the case of late adoption), the adoptive child has developed cognitive models including expectations of the social world (Bowlby, 1969/1982), accompanied by certain behavioral patterns during social interaction. Not knowing the context from which a child’s patterns of behavior have developed seems to require a greater effort in caregivers’ mind-reading abilities and subsequently might affect whether caregivers are able to respond sensitively to their child’s cues (Fishburn et al., 2017; Zeegers et al., 2017).
For instance, when parents know that their daughter has been attacked by a dog in the past, it is easier for them to understand why their child cries and hides whenever a dog approaches and respond to this with understanding and comforting behavior. Disruptive or anxious behavior of insecurely attached adopted children may reflect, for a significant part, a history of (adverse) experiences unknown to the adoptive parents. This could cause more challenges for adoptive parents to understand the thoughts and feelings of their children.

Although there is little empirical evidence for the abovementioned notion, one study suggests that adoptive parents, compared to biological parents, are less likely to describe their children with reference to inner experiences and more likely to refer to behavior and physical aspects of their child (Fishburn et al., 2017). Moreover, another study showed that adoptive parents have shown to make fewer positive descriptions (e.g., “he is a very joyful boy”) and more negative descriptions (e.g., “he feels very tense about everything”; Harris-Waller, 2012) of their child. Thus, adoptive parents seem to have a higher tendency to think about their child’s behavior, rather than their thoughts and feelings, and are more likely to describe negative characteristics of their child.

The study of Fishburn et al. (2017) suggests that these outcomes could be explained partially by the higher prevalence of behavioral difficulties in adoptive children compared to nonadopted children (Bimmel et al., 2003; Harris-Waller, Granger, & Gurney-Smith, 2016; Juffer & van IJzendoorn, 2005). That is, their study demonstrated that the more adoptive parents perceive their child’s behavior as difficult, the less they focused on describing their child’s inner experiences. However, children’s behavioral difficulties could not fully account for the differences in mind reading between adoptive and biological parents. These outcomes point to a complex interplay between a noncontinuous parent–child relationship, parents’ caregiving abilities, and the child’s behavior problems. Hence, although the vulnerability of an adopted child makes it even more important for parents to have the mental tendencies that enable them to show sensitive responses to their child, adoptive parents probably face more challenges in doing so.

**Attachment Interventions**

Existing attachment interventions typically focus on providing psychoeducation, behavioral guidance, and/or changing the parent’s own mental representation of attachment (Howe, 2006). The existing behaviorally based attachment interventions target multiple domains of parenting behaviors that promote the development of a predictable and stable caregiving environment (Bakermans-Kranenburg, Van IJzendoorn, & Juffer, 2003; Welsh et al., 2007). The most established predictor of attachment security is parental sensitivity, referring to parents’ understanding of their child’s signals and their appropriate and prompt responding to these signals.
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(Ainsworth et al., 1974; Verhage et al., 2016). So far, research indicates that attachment interventions that aim to improve parental sensitivity show more positive outcomes than attachment interventions that target multiple domains of parental functioning (Bakermans-Kranenburg et al., 2003). A comprehensive meta-analytic review including 70 studies and 88 interventions on parental sensitivity and infant attachment showed that interventions that focus exclusively on parental sensitivity are more successful in changing insensitive behavior and attachment insecurity, showing small to medium effect sizes (Bakermans-Kranenburg et al., 2003). Furthermore, this review highlighted that the most effective attachment interventions did not always include a large number of treatment sessions with the families and used video feedback to alter parenting behavior. So, there is some support for the potential success of short goal-directed attachment interventions that specifically target research-supported predictors of attachment.

However, the most recent meta-analytic reviews on effective elements in existing attachment interventions stem from 15 years ago (Bakermans-Kranenburg et al., 2003; Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2005). Since then, research on predictors of attachment has expanded enormously, and other parenting behaviors and features of the parent-child relationship have shown to explain variation in attachment (e.g., Beebe & Steele, 2013; Bernier, Matte-Gagné, Bélanger, & Whipple, 2014; Davis et al., 2017; Feldman, 2015; Meins, Fernyhough, Fradley, & Tuckey, 2001) and therefore might be important to incorporate in the programs of existing attachment interventions. One parenting feature that gained much attention in attachment research in the past two decades is parental mind-mindedness, referring to parents’ tendency to represent and hold in mind the child’s putative mental states: thoughts, feelings, preferences, desires, and so on (Meins, 1997, 2013). Mind-mindedness is operationalized in terms of the parent’s use of appropriate or nonattuned mental state language during infant–parent interactions and the parent’s use of mind-related speech when describing their toddler or child (Meins, 1997; Meins et al., 2001; Meins, Fernyhough, Russell, & Clark-Carter, 1998). Mind-mindedness has shown to predict substantial variation in secure infant–parent attachment over and above parental sensitivity (e.g., Meins et al., 2001; Meins et al., 2012; see Zeegers, et al., 2017 for an overview). Furthermore, mind-mindedness has shown to predict individual differences in children’s socioemotional development and behavior, for instance, theory of mind, social competence, behavior problems, and emotion regulation (e.g., Bernier, Carlson, & Whipple, 2010; Colonnese, Zeegers, Majdandzic, van Steensel, & Bögels, 2019; Gagné, Bernier, & McMahon, 2018; Meins et al., 2001; Meins et al., 2002; Meins, Centifanti, Fernyhough, & Fishburn, 2013; Zeegers et al., 2018).
Given these outcomes, it seems interesting to investigate whether adoptive parents’ mind-mindedness could be improved and whether a mind-mindedness-oriented intervention leads to positive outcomes in children’s behavioral and emotional development. More specifically, focusing on parents’ mind-mindedness may be important to curative interventions that aim to change children’s attachment representations from insecure to secure. That is, insecurely attached children are hypothesized to lack the experience of frequent and/or appropriate (nonverbal) affect mirroring, which in turn disrupts the child’s developing concept of the self as being valuable and effective in interacting with others (Bowlby, 1969/1982; Fonagy et al., 2002). By appropriately referring to the child’s internal states, parents may help their insecurely attached child to catch up with the experience of being reflected accurately and enable him or her to develop a clear and organized self-concept (Polderman, 2017). Further, parents’ mind-related speech stimulates the development of the child’s private speech which may in turn help the child to understand and tolerate arousal, rather than responding to arousal automatically (Fernyhough, 2008).

The Basic Trust Intervention

The Basic Trust intervention, on which we focus in the present study, aims to enhance the child’s sense of attachment security by improving parents’ sensitivity and mind-mindedness through the use of video feedback (Polderman, 1998, 2017). Although the Basic Trust intervention can also be applied in preventive settings, it is generally used as a component of curative intervention programs aimed at remediating attachment insecurity and disorganization in children (Polderman, 1998, 2017). Furthermore, in two-parent families (mother–father but also father–father and mother–mother), two separate child–caregiver attachment relationships are formed that are important to the child’s developmental health (Carone, Baiocco, Lingiardi, & Kern, 2019; Lamb, 2004; Lucassen et al., 2011). Therefore, mothers and fathers are asked to attend all sessions of the intervention.

The Basic Trust intervention on average consists of six to nine sessions. In the first session, parents visit the therapist alone to discuss the outcomes of the questionnaires and set therapy goals with the parents (Polderman, 2017). Parents also receive psychoeducation on insecure and disorganized attachment and on the mechanisms through which parents’ mind-mindedness and sensitive behavior stimulate the child’s sense of security. During the second, fourth, sixth, and eighth session, the therapist makes video recordings of parent–child interactions (e.g., playing together). During the third, fifth, seventh, and ninth session, parents visit the therapist alone to watch the video recordings. These sessions involve creating awareness and understanding of the child’s behavior and mind, as well as the parent’s own verbal and nonverbal
Chapter 8

responding to the child (Polderman, 2008, 2009). Parents and therapist first discuss how parents received and validated the child’s behavior and states nonverbally (e.g., seeking proximity, making eye contact, showing an attuned facial expression). After this, parents practice a stepwise method including a verbal response that they can use in each interaction with their child (Polderman, 2017). This method includes parents referring to their child’s behavior, thoughts, or feelings in a particular situation (Step 1) in an appropriate but affirmative way (i.e., without asking a question, e.g., “you grabbed a piece of the puzzle, you are wondering where to put it”). After this, parents make their own perspective clear to their child (Step 2; i.e., by mentioning their own thought or opinion, making a proposal, highlighting interpersonal contradictions, e.g., “I will help you look for a matching piece”). Parents, thus, learn to explicate their perspective on the child’s internal world as well as on their own. The verbalizing of the child’s and parent’s mental states is practiced in every video-feedback session. In order for parents to get used to verbalizing the child’s and their own perspective, they are stimulated to practice daily at home for 15 min.

The Basic Trust intervention has been examined previously in a pilot study including 20 adoptive families (Colonnesi et al., 2013). Decreases in children’s insecure attachments to their mothers and disorganized attachments to both their parents were found. Furthermore, mothers and fathers reported that their child’s conduct problems had decreased after the intervention. Colonnesi et al. (2013) did not find changes in parents’ sensitivity. Changes in parents’ mind-mindedness were not examined.

The Present Study

The aim of the present study was to perform a second, more comprehensive study on the effectiveness of the Basic Trust intervention in establishing a secure attachment relationship between internationally adopted children (aged 2–12 years) and their parents. We had expectations for eight different outcome measures: (1) parental mind-mindedness, (2) positive mind-related speech, (3) negative mind-related speech, (4) parental sensitivity, (5) child attachment insecurity, (6) child internalizing problems, (7) child externalizing problems, and (8) parenting stress. Since the intervention targets all primary caregivers, we expected that ratings of both mothers’ and fathers’ sensitivity as well as mind-mindedness would increase following the intervention. We also considered whether the emotional valence of parents’ mind-related speech changed, possibly as a result of changes in children’s behavior (problems). As mentioned above, adoptive parents may think about their child’s mind in a more negative way (Fishburn et al., 2017; Harris-Waller, 2012). Since parents may perceive motivational and behavioral changes in their child over the course of the intervention, the valence of mind-related comments
may change. We, therefore, expected parents to display less negative and more positive
descriptions of their child’s mind after the intervention.

With regard to changes in children’s attachment, we expected decreases in avoidant,
ambivalent, and disorganized attachment behaviors. We also expected the children’s
internalizing and externalizing problems to decrease, as a result of the improved parent–
child interactions and relationship. Because the training is assumed to enhance parents’
feelings of competence in managing the child’s emotions and behavior, we also expected
a decrease of general parenting stress.

**METHOD**

**Participants**

A total of 53 Dutch adoptive families, including mothers and fathers, agreed to
participate in this study. Figure 1 provides a flow diagram with the number of families
at each assessment. Children (45.3% boys) were aged between 3 and 11 years old
at pretest (M = 8.12 years, SD = 2.26). The mean age of placement in the adoptive
home was 2.41 years (SD = 1.79 years, range = 0–6 years), and the majority (68.9%)
of the children were placed after 12 months of age. At pretest, fathers had a mean
age of 44.43 years (SD = 4.54; range = 32–51 years) and mothers 43.22 years
(SD = 4.95; range = 29–53 years). On average, the socioeconomic status of the families was
middle-to-high. The mean educational level of parents was fairly high (Mfathers = 3.80,
SD = 0.81; Mmothers = 3.82, SD = 0.88, on a scale from 1 = primary education to 5 =
university degree).

**Intervention and Research Procedure**

The Basic Trust intervention is provided by Basic Trust, a Dutch national organization
of qualified psychologists specialized in offering treatment for children with complex
trauma or attachment problems. The psychologists follow an extensive 1- to 1.5-year
training program in order to gain expertise in working with the Basic Trust treatment
method, and they operate from their own treatment practice throughout different
counties in the Netherlands. In the present study, eight therapists participated. Parents
were typically referred to a Basic Trust therapist when their child had behavioral and/or
emotional problems, and there was a presumption of attachment insecurity. Treatment
started only when the Basic Trust therapist indicated that there was indeed a lack of
secure attachment.

The Basic Trust intervention consists of on average eight sessions. In the present
study, the average amount of sessions was 7 (range = 4–10 sessions). The intervention
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targets the involvement of all primary caregivers but can also be applied with secondary caregivers (e.g., school teachers). Involving both parents in the treatment process has shown to ameliorate the positive effects of parenting interventions in general and of attachment interventions specifically (e.g., Bakermans-Kranenburg et al., 2003; Lundahl, Tollefson, Risser, & Lovejoy, 2008). Both mothers and fathers took part in all sessions.

Figure 1. Flow diagram of the participants at each assessment
Note. For one of the families, the father did not participate in this study

The present study involved a one-group pretest–posttest design including a pretest prior to the intervention, a posttest directly after the intervention, and a 6-month follow-up measurement. During each measurement time, parents filled in questionnaires, and a describe-your-child interview was conducted to assess parents' mind-mindedness. Parents and children were videotaped for 10 minutes to assess parental sensitivity in a free-play interaction. Pretests were conducted at the treatment centers prior to the intake. Posttests and follow-up measurements were conducted at the family’s home.
because families appeared more willing to participate in the research if they did not have to travel to the treatment center for the purpose of the research only. The current study received permission from the ethical committee of the University of Amsterdam in February 2014 (Code: 2014-CDE-3395).

**Instruments**

**Mind-mindedness.** Mind-mindedness was assessed with the mind-mindedness interview (Meins et al., 1998). Parents were asked to describe their child, and answers were coded following the coding manual of Meins and Fernyhough (2015). Mind-mindedness is indexed by the proportion of mind-related attributes relative to the total amount of comments made by the parent. Mind-related descriptions were categorized by the type of internal state to which the parent referred: (a) mental descriptions (e.g., “she is a very curious girl”), (b) emotions (e.g., “he feels anxious in the presence of strangers”), (c) interests (e.g., she likes to read about historical events), and (d) the child’s preferences, needs, or desires (e.g., “he would like to have a little brother”). The emotional valence of each mind-related comment was classified as either positive, negative, or neutral based on the comments itself (see Demers, Bernier, Tarabulsy, & Provost, 2010). Finally, the other comments were not mind-related descriptions categorized in terms of behavioral (e.g., “he plays a lot of videogames”), physical (“she has green eyes”), and general descriptions.

Scores for both appropriateness and valence were computed as proportions of the total amount of comments parents made (Meins & Fernyhough, 2015). Trained coders (N= 4) independently rated the interviews, and 20% of the cases at each assessment (N = 56 in total) were randomly selected to calculate the interrater agreement among the coders. Interrater agreement on the proportion of mind-related comments per transcript was intraclass correlation (ICC) = .93, and for the coding of the valence of positive and negative comments, interrater agreement was ICC = .87 and ICC = .83 (Cicchetti, 1994).

**Parental sensitivity.** Parental sensitivity was measured with a 9-point sensitivity scale which was based on Ainsworth’s Original Sensitivity Scale (Ainsworth, 1969) and the Emotional Availability Scales (EAS-IV; Biringen, 2008). The EAS-IV are commonly used to assess parental sensitivity during free-play interactions between parents and children (Mesman & Emmen, 2013). The concept of parental sensitivity in the EAS-IV is broader than the original conception of Ainsworth, Bell, and Stayton’s (1974) sensitivity (which was constructed by observing infant–parent dyads). The EAS-IV highlight the positive, genuine, and creative communication between parent and child in addition to the appropriate responses. The addition of elements of the EAS-IV Scales was considered appropriate given the fact that we observed parent–child free-play interactions (and not natural home observations), and the EAS have previously been...
applied to assess sensitivity in parents of older children (Mesman & Emmen, 2013). The coding of the free-play interactions was performed by four independently trained observers who randomly coded recordings of the pre-, posttest, and follow-up. Twenty percent of the observations were coded twice to calculate interrater reliability. The reliability between the coders could be classified as excellent according to the guidelines of Cicchetti (1994), ICC = .86.

**Attachment insecurity.** The Attachment Insecurity Screening Inventory (AISI; Polderman & Kellaert-Knol, 2012; Spruit et al., 2018; Wissink et al., 2016) 2–5 years and 6–12 years were used to assess parents’ perspectives on the quality of the attachment relationship with their child aged between 2 and 5 years and 6 and 12 years. The questionnaire measures children’s insecure attachment behavior as reported by parents. Both versions of the questionnaire contain 20 6-point Likert-type items (never, sometimes, regularly, often, very often, and always) measuring total attachment insecurity by items belonging to three subscales: Avoidant, Ambivalent, and Disorganized Attachment Insecurity. A sum of these three subscales provides a total score for attachment insecurity.

Both questionnaires have been recently validated (Spruit et al., 2018; Wissink et al., 2016). Confirmatory factor analyses have demonstrated construct validity of the AISI, confirming the theoretically based factor solution, including the three subscales of attachment insecurity and one higher order total insecurity scale. It was furthermore reported that the AISI meets the demands of measurement invariance for the three-factor model across mothers and fathers (for the AISI 2–5 and 6–12) and across clinical and nonclinical groups (for the AISI 2–5). Further, for the AISI 2–5, convergent validity was supported by negative associations between the questionnaire scores and observed attachment security (Attachment Q–Sort (AQS); Waters & Deane, 1985). Negative associations were found between observed parental sensitivity (Maternal Behavior Q–Sort, MBQS; Pederson, Moran, & Bento, 1999) and the AISI insecurity scores, while positive associations were found between psychopathology (Strengths and Difficulties Questionnaire; Goodman, 2001) and the AISI insecurity scores.

Reliability coefficients have previously been reported to range from sufficient to good for both questionnaires (Spruit et al., 2018; Wissink et al., 2016). For the AISI 2–5, Cronbach’s $\alpha$ was sufficient for the subscale Ambivalent Attachment ($\alpha = .67$) and good for the subscales Avoidant Attachment ($\alpha = .80$) and for Disorganized Attachment ($\alpha = .79$). For the AISI 6–12, Cronbach’s $\alpha$ was sufficient for the subscale Ambivalent Attachment ($\alpha = .65$) and good for the subscales Avoidant Attachment ($\alpha = .80$) and Disorganized Attachment ($\alpha = .85$). In the present study, similar internal consistency reliabilities at pre- and post-test were found for the AISI 2–5, $\alpha = .77$ (avoidance),
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\[ \alpha = 0.64 \text{ (ambivalence), and } \alpha = 0.87 \text{ (disorganization), as well as for the AISI 6–12, } \alpha = 0.83 \text{ (avoidance), } \alpha = 0.70 \text{ (ambivalence), and } \alpha = 0.87 \text{ (disorganization).} \]

**Behavior and social–emotional problems.** Parents completed the Child Behavior Checklist 1.5–5 or 6–18 (CBCL; Achenbach & Rescorla, 2000, 2001), which are standardized questionnaires on emotional and behavioral problems of children aged 1.5–5 years or 6–18 years. Parents rate the child's behavior of the past 6 months using a 3-point scale (0 = not true, 1 = somewhat or sometimes true, 2 = very true or often true). The CBCL 1.5–5 and 6–18 yield 99 and 120 items, respectively, and reflect Diagnostic and Statistical Manual of Mental Disorders-IV (American Psychiatric Association, 2000)-oriented subscales. Both questionnaires yield sum scores on internalizing behaviors and externalizing behaviors. A T score of 65 or below is considered to fall within the normal range, 65–70 within the borderline clinical range, and above 70 indicates parents' clinically significant concerns.

**Parenting stress.** Parenting stress was assessed with the Dutch Questionnaire “Opvoedingsbelastingvragenlijst” (OBVL; Vermulst, Kroes, de Meyer, van Leeuwen, & Veerman, 2011). The OBVL is based on the Parenting Stress Index (Abidin, 1995), measuring parenting characteristics and the quality of the parent–child interactions. A total of 57 items measure five separate domains of parenting stress: (a) the caregiver–child relationship (10 items; the degree to which the caregiver experiences this relationship as problematic), (b) parenting competence (12 items; the degree to which the caregiver perceives to possess enough parenting skills), (c) depressive states (12 items; the degree to which a caregiver is content with him- or herself and life conditions), (d) role limitations (11 items; the degree to which a caregiver perceives the parental role as a containment on their own freedom), and (e) health complaints (12 items; the degree to which a caregiver feels physically unhealthy).

The questionnaire has shown high factor loadings and a satisfactory fit for the five subscales (Cronbach’s \( \alpha \) ranging from .74 to .84) and the total parenting stress scale (Cronbach’s \( \alpha = .89 \); Vermulst et al., 2011). In the present study, only the total scale was used, which showed an internal consistency reliability of \( \alpha = .91 \).

**Statistical Analyses**

Multilevel analyses were performed to test the main hypotheses of the study using Statistical Package for the Social Sciences 22 (IBM, 2015) and the R 3.5.0 software environment to examine treatment effectiveness and factors that were important for predicting treatment effectiveness: gender of the parent, child age during placement, and number of treatment sessions. Multilevel analysis accounts for possible nesting of data, which means that data are organized at more than one level (e.g., individuals nested within certain contexts). In this study, measurement occasions (Level 1:
pretests, posttest, and follow-up’s) were nested within individual respondents (Level 2: mothers and fathers), and respondents were nested within families (Level 3). ICCs were calculated to indicate how much of the variability in a particular variable was associated with differences between mothers and fathers (Level 2) and families (Level 3; Tabachnick & Fidell, 2013). Intraclass correlations at the second level ranged from low (ICC = .06) for the model including mind-mindedness to substantial (ICC = .39) for the model including attachment parenting stress. Intraclass correlations on the third level ranged from low (ICC = .09) for the model including mind-mindedness to high (ICC = .64) for the model including externalizing behavior problems. Besides accounting for nested data, an advantage of multilevel modeling is that missing data can be handled and imputation is not needed (Kreft & de Leeuw, 1998). Thus, this approach allows for the use of all available data including the data of the families with a pretest only. Analyses were thus ran with 53 families that completed at least the pretest measures.

All variables were normally distributed. The proportion of mind-related comments and ratings of avoidant attachment had extreme scores (z-score > 3.29, Tabachnick & Fidell, 2013). The variables with outlying scores were winsorized, and analyses were performed twice, once with the raw scores and once with the winsorized variables. The results were similar, suggesting that the extreme scores did not have a disproportionally large influence on the outcomes. We, therefore, decided to report the results on the analyses including the raw data in this article.

**RESULTS**

Before running the main analyses, we checked whether the outcome variables were related to parent (educational level and age), child (age, age during placement, and gender), and therapist (gender, years of experience of working with the intervention) characteristics. Mothers with a higher educational level were classified as more sensitive during pretest, \( r(53) = .23, p = .011 \). Mothers’ educational level was, therefore, included as a covariate in the multilevel analyses on parental sensitivity. Child outcomes (behavior problems and attachment insecurity) were unrelated to child gender and age during placement, and the gender and experience of the therapists were unrelated to all outcome measures.

The means and standard deviations of the outcome variables on the three measurement occasions are presented in Table 1. Correlations between the outcome variables during pretest are presented in Table 2. Lastly, Table 3 shows the associations between mothers’ and fathers’ reports of attachment insecurity, behavior problems, and parenting stress as well as correlations between mothers’ and fathers’ mind-
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mindedness and sensitivity. Maternal and paternal reports of child internalizing and externalizing problems were highly correlated over all assessments (range $r$s from .52 to .78). Similar patterns were shown for parents’ reports on attachment insecurity, although reports on avoidant and ambivalent attachment behaviors were unrelated at the follow-up measurement. Mothers’ and fathers’ parenting stress scores were highly correlated at pretest, $r(53) = .60$ but were unrelated at both posttests. Couples’ sensitivity scores were associated at all measurement times (range $r$s from .40 to .60). Lastly, mothers’ and fathers’ levels of mind-mindedness were unrelated to each other at all assessment times.

Results of the multilevel analyses are presented in Table 4. This table displays the results of the overall intervention effects (mothers and fathers combined) on the parent and child outcome measures.

**Mind-mindedness.** Parents showed a significant increase (8%) in mind-related descriptions from pre- to post-test (medium-to-large effect size). From pretest to follow-up, the increase in mind-related descriptions was 5% but not significant.

**Positive mind-related speech.** Parents made significantly more positive mind-related descriptions at posttest (medium effect size) and follow-up (small effect size). From pre- to post-test, positive mind-related descriptions increased with 5% and from pre-test to follow-up with 4%.

**Negative mind-related speech.** Parents did not make less negative mind-related descriptions at both the posttest and follow-up.

**Sensitivity.** Parental sensitivity did not significantly increase from pre- to post-test but did from pretest to follow-up (medium effect size), showing a mean increase of 0.6 (on a scale from 1 to 9).

**Internalizing problems.** Parent reports on children's internalizing problems showed a significant decrease from pre- to posttest (small-to-medium effect size) and follow-up (medium effect size). Compared to pretest, the mean T score was 4.3 lower at posttest and 5.8 lower at follow-up.

**Externalizing problems.** Parent reports on children’s externalizing problems showed a significant decrease from pre- to post-test (medium effect size) and follow-up (medium effect size). Compared to pretest, the mean T score was 5.2 lower at posttest and 5.1 lower at follow-up.

**Insecure and disorganized attachment.** Parent reported a significant decrease in children’s avoidant attachment behavior from pre- to posttest (small-to-medium effect size) but not from pretest to follow-up. Ambivalent and disorganized attachment behaviors were reported to be lower at both posttest (small-to-medium effect sizes) and follow-up assessments (small effect sizes) compared to pretest.
<table>
<thead>
<tr>
<th>Outcome measure</th>
<th>Pretest</th>
<th>Posttest</th>
<th>6-month follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD) Mothers</td>
<td>M (SD) Fathers</td>
<td>M (SD) Mothers</td>
</tr>
<tr>
<td><strong>Parent</strong></td>
<td></td>
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<td></td>
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<tr>
<td>Mind-mindedness</td>
<td>28.62 (12.38)</td>
<td>25.12 (11.80)</td>
<td>36.31 (15.14)</td>
</tr>
<tr>
<td>Positive MRC*</td>
<td>11.04 (9.09)</td>
<td>10.26 (9.19)</td>
<td>16.14 (10.42)</td>
</tr>
<tr>
<td>Negative MRC*</td>
<td>9.36 (7.88)</td>
<td>7.67 (7.26)</td>
<td>9.81 (7.85)</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>5.90 (1.08)</td>
<td>5.88 (0.94)</td>
<td>6.20 (1.09)</td>
</tr>
<tr>
<td>Parenting stress</td>
<td>58.08 (10.10)</td>
<td>54.37 (8.74)</td>
<td>53.45 (9.93)</td>
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<tr>
<td><strong>Child</strong></td>
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<tr>
<td>Internalizing problems</td>
<td>62.51 (9.80)</td>
<td>59.00 (8.85)</td>
<td>58.18 (11.73)</td>
</tr>
<tr>
<td>Externalizing problems</td>
<td>59.13 (9.05)</td>
<td>56.80 (10.93)</td>
<td>53.13 (11.39)</td>
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<tr>
<td>Insecure attachment</td>
<td></td>
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<tr>
<td>Avoidant</td>
<td>19.75 (5.86)</td>
<td>22.20 (6.51)</td>
<td>17.62 (5.29)</td>
</tr>
<tr>
<td>Ambivalent</td>
<td>18.34 (5.17)</td>
<td>16.73 (4.40)</td>
<td>16.76 (5.27)</td>
</tr>
<tr>
<td>Disorganized</td>
<td>15.81 (6.06)</td>
<td>14.22 (4.94)</td>
<td>13.91 (5.23)</td>
</tr>
</tbody>
</table>

Note. MRC = mind-related comments.

* = mind-mindedness is reported in percentages of mind-related comments
### Table 2. Pearson's Correlation Between the Outcome Measures at Pretest

<table>
<thead>
<tr>
<th>Outcome measure</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
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<tbody>
<tr>
<td><strong>Parent</strong></td>
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<tr>
<td>1. Mind-mindedness</td>
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<td>2. Positive MRC</td>
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<td>3. Negative MRC</td>
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<tr>
<td>4. Sensitivity</td>
<td>-.05</td>
<td>-.12</td>
<td>.02</td>
<td></td>
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<td>5. Parental stress</td>
<td>.06</td>
<td>.06</td>
<td>.13</td>
<td>.07</td>
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<tr>
<td><strong>Child</strong></td>
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<tr>
<td>6. Internalizing problems</td>
<td>.08</td>
<td>-.03</td>
<td>.11</td>
<td>.08</td>
<td>.35***</td>
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<tr>
<td>7. Externalizing problems</td>
<td>.00</td>
<td>.11</td>
<td>.05</td>
<td>-.12</td>
<td>.41***</td>
<td>.49***</td>
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<tr>
<td>8. Avoidant attachment</td>
<td>-.05</td>
<td>-.00</td>
<td>.16</td>
<td>-.03</td>
<td>.30**</td>
<td>.17</td>
<td>.31**</td>
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<tr>
<td>9. Ambivalent attachment</td>
<td>.10</td>
<td>.07</td>
<td>.14</td>
<td>-.09</td>
<td>.13</td>
<td>.34***</td>
<td>.08</td>
<td>-.09</td>
<td></td>
</tr>
<tr>
<td>10. Disorganized attachment</td>
<td>.13</td>
<td>.30**</td>
<td>-.03</td>
<td>-.14</td>
<td>.17</td>
<td>.19</td>
<td>.51***</td>
<td>.09</td>
<td>.19*</td>
</tr>
</tbody>
</table>

Note. n = 104; MRC = mind-related comments
Table 3. Pearson’s R Correlations Between Maternal and Paternal Measures at Pretest, Posttest and Follow-Up

<table>
<thead>
<tr>
<th>Outcome measure</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r (n)</td>
<td>r (n)</td>
<td>r (n)</td>
</tr>
<tr>
<td><strong>Parent</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mind-mindedness</td>
<td>.18 (52)</td>
<td>.25 (42)</td>
<td>-.15 (43)</td>
</tr>
<tr>
<td>Positive MRC</td>
<td>.01 (52)</td>
<td>.09 (42)</td>
<td>-.03 (43)</td>
</tr>
<tr>
<td>Negative MRC</td>
<td>.16 (52)</td>
<td>-.05 (42)</td>
<td>-.20 (43)</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>.40 (52)**</td>
<td>.49 (42)**</td>
<td>.60 (43)**</td>
</tr>
<tr>
<td>Parental stress</td>
<td>.61 (52)**</td>
<td>.19 (43)</td>
<td>.20 (41)</td>
</tr>
<tr>
<td><strong>Child</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internalizing problems</td>
<td>.52 (52)**</td>
<td>.61 (44)**</td>
<td>.58 (44)**</td>
</tr>
<tr>
<td>Externalizing problems</td>
<td>.78 (52)***</td>
<td>.70 (44)**</td>
<td>.55 (44)**</td>
</tr>
<tr>
<td>Insecure attachment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Avoidant</td>
<td>.43 (52)**</td>
<td>.36 (43)*</td>
<td>.28 (41)</td>
</tr>
<tr>
<td>Ambivalent</td>
<td>.44 (52)**</td>
<td>.43 (43)**</td>
<td>.08 (41)</td>
</tr>
<tr>
<td>Disorganized</td>
<td>.58 (52)***</td>
<td>.38 (43)**</td>
<td>.55 (41)***</td>
</tr>
</tbody>
</table>

Note. MRC = mind-related comments; * p < .05, ** p < .01, *** p < .001.
Parenting stress. Parents reported a significant decrease in parenting stress from pre- to posttest (medium effect size) and from pretest to 6-month follow-up (small-to-medium effect size). Compared to pretest, the mean T score was 4.6 lower at posttest and 4.3 lower at follow-up.

Mothers and fathers. We added interaction effects to test whether the intervention effects were different for mothers and fathers. The results of these analyses are presented in Appendix I of the supplementary materials. Taken all assessments together, fathers reported less parenting stress, less avoidant and ambivalent attachment behaviors as well as less internalizing problems of their children. Mothers and fathers did not show differences in changes from pre- to post-test or pretest to follow-up.

Number of treatment sessions. We performed some additional analyses to check whether child treatment effects were dependent on children’s gender and age during placement and number of treatment sessions. Taken all measurement occasions together, children with higher levels of externalizing problems and avoidant and disorganized attachment had a higher number of treatment sessions. The number of treatment sessions was also related to parenting stress; families in which parents reported higher levels of stress over all assessments received more treatment sessions. The interaction effect between internalizing problems and number of treatment sessions was significant. This means that when children showed less decline in internalizing problems from pre- to posttest, the number of treatment sessions was larger.

**DISCUSSION**

The present study examined whether the Basic Trust intervention led to an increase in parents’ mind-mindedness and sensitivity and to a decrease in attachment insecurity, disorganization, and behavior problems in a sample of 53 families with internationally adopted children. Overall, parents’ mind-mindedness increased from pre- to posttest but not from pretest to 6-month follow-up, whereas parents’ sensitivity showed improvement only at the follow-up. Children’s attachment insecurity and disorganization and behavior problems decreased from pretest to both posttest and follow-up. Parenting stress decreased from pre-test to posttest, and this effect sustained at the 6-month follow-up. Taken all measurement times together, fathers reported less parenting stress and lower rates of internalizing problems and attachment insecurity. Intervention effects, however, were not different for mothers and fathers. Thus, although fathers generally reported less stress and child emotional problems, they reported a similar decrease in problems compared to mothers.
<table>
<thead>
<tr>
<th>Outcome measure</th>
<th>Posttest</th>
<th></th>
<th></th>
<th>Six-month follow-Up</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B (SE)</td>
<td>F</td>
<td>Cohen's d</td>
<td>B (SE)</td>
<td>F</td>
<td>Cohen's d</td>
</tr>
<tr>
<td>Parent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mind-mindedness</td>
<td>0.08 (0.03)</td>
<td>10.75**</td>
<td>0.58</td>
<td>0.05 (0.03)</td>
<td>3.28</td>
<td></td>
</tr>
<tr>
<td>Positive mind-related comments</td>
<td>0.05 (0.02)</td>
<td>7.34**</td>
<td>0.50</td>
<td>0.04 (0.02)</td>
<td>4.89*</td>
<td>0.39</td>
</tr>
<tr>
<td>Negative mind-related comments</td>
<td>0.01 (0.01)</td>
<td>0.20</td>
<td>-0.00 (0.01)</td>
<td>0.05</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.16 (0.14)</td>
<td>1.37</td>
<td></td>
<td>0.60 (0.14)</td>
<td>13.76***</td>
<td>0.53</td>
</tr>
<tr>
<td>Parenting Stress</td>
<td>-4.69 (1.04)</td>
<td>20.38***</td>
<td>-0.51</td>
<td>-3.99 (1.08)</td>
<td>13.75**</td>
<td>-0.43</td>
</tr>
<tr>
<td>Child</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internalizing problems</td>
<td>-3.99 (1.20)</td>
<td>11.03**</td>
<td>-0.38</td>
<td>-5.51 (1.19)</td>
<td>21.34***</td>
<td>-0.53</td>
</tr>
<tr>
<td>Externalizing problems</td>
<td>-5.55 (1.12)</td>
<td>24.50***</td>
<td>-0.53</td>
<td>-5.29 (1.11)</td>
<td>22.54***</td>
<td>-0.50</td>
</tr>
<tr>
<td>Insecure attachment</td>
<td>-2.05 (0.78)</td>
<td>6.99**</td>
<td>-0.35</td>
<td>-1.47 (0.80)</td>
<td>3.35</td>
<td>-0.29</td>
</tr>
<tr>
<td>Avoidant</td>
<td>-1.57 (0.62)</td>
<td>6.35*</td>
<td>-0.33</td>
<td>-1.38 (0.64)</td>
<td>4.60*</td>
<td>-0.31</td>
</tr>
<tr>
<td>Ambivalent</td>
<td>-1.69 (0.54)</td>
<td>9.82**</td>
<td>-0.33</td>
<td>-1.58 (0.56)</td>
<td>8.07**</td>
<td></td>
</tr>
</tbody>
</table>

Note. B = the unstandardized parameter coefficient of the post-test and follow-up relative to the pre-test, SE = standard error of parameter estimate, Cohen's d = the standardized beta coefficient, * = p < .05, ** = p < .01, *** = p < .001

* Cohen's d effect sizes: 0.20 is considered small, 0.50 medium, 0.80 large (Cohen, 1992).
First of all, behavior indicative of an ambivalent, avoidant, or disorganized attachment style diminished directly after the intervention, and children showed less internalizing and externalizing problems after the intervention. These effects sustained at the 6-month follow-up, with an exception of behavior indicative of an avoidant attachment style. In a prior study on the Basic Trust intervention, posttest measures were conducted 6 months after the intervention had ended. Children’s levels of avoidant and ambivalent attachment (to mothers only) were lower, but these decreases were not significant (Colonnesi et al., 2013). Children’s levels of disorganized attachment to both parents, however, were significantly reduced after 6 months (medium-to-large effect sizes).

It was argued that enhancing parents’ mind-related speech is especially helpful in improving children’s organization of their affects (Colonnesi et al., 2013; Sharp & Fonagy, 2008). The present study showed a slightly different picture: Both mothers and fathers reported less attachment insecurity at posttest and follow-up on the three subscales of the AISI, with small-to-medium effect sizes. At the follow-up assessment, the decrease in disorganized attachment behaviors remained strongest for this sample (d = 0.31).

The present study did not replicate the medium-to-large effect sizes for disorganized attachment of the previous study of Colonnesi and colleagues. The differences in outcomes could be due to sampling differences. However, methodological concerns may also underlie this outcome. In the study of Colonnesi et al., an observational measure of attachment security and organization was used (AQS; Waters & Deane, 1985), whereas the AISI, a questionnaire on children’s insecure and disorganized attachment behavior, was used in the present study. Wissink et al. (2016) reported only weak correlations between the parent-reported AISI scores and observed attachment security on the AQS. The AQS could have been more sensitive in detecting changes in disorganized attachment behavior. On the other hand, differences in the outcomes on attachment security (ambivalent and avoidant attachment) could also have been due to the small sample size of the previous study, which implies less statistical power to detect smaller pre- to post-test differences. The use of a multilevel approach to analyze the data contributed to maximizing the power in the present study. The multilevel approach also proved to be important in this study since we found associations between paternal and maternal reports of attachment and behavior problems as well as associations between mothers’ and fathers’ sensitivity at all measurement occasions. Taken the results from this and the previous study together, there seems to be some support that the Basic Trust intervention changes disorganized attachment behaviors.

An innovative aspect of the Basic Trust intervention is the explicit focus on parents’ use of mind-mindedness. Parents showed more mind-related speech after the intervention, suggesting that their level of mind-mindedness increased as a result of the treatment. Before the intervention, 28% of parents’ descriptions were related
to mental aspects of the child. After the intervention, the percentage of mind-related descriptions was 36. Because the intervention is focused explicitly on retrieving and verbalizing appropriate explanations for the child’s behavior, rather than dismissing the behavior as being difficult or exhausting, parents may have been inclined to verbalize more mental characteristics during the describe-your-child interview. We hypothesized that parents would show more positive and less negative mind-related descriptions after the intervention (Fishburn et al., 2017; Harris-Waller, 2012). The percentage of negative mind-related comments at pretest was surprisingly low (9%) considering that all parents expressed major concerns about their child during intake sessions. At posttest, positive mind-related descriptions showed an increase of 5%, whereas percentages of negative comments were the same as at pretest. The intervention may thus have led to parents producing more positive, but not necessarily less negative, comments on their child’s mind.

At the follow-up assessment, the proportion of mind-related speech was still 5% higher than at pretest, but the difference was no longer significant. For some parents, it may be difficult to maintain a mind-minded stance when the child encounters new difficulties, particularly when the families face other stressors (e.g., work-related stress, medical or mental health problems of the parent, having multiple children with emotional or behavioral difficulties; van Aar, Leijten, Orobio de Castro, & Overbeek, 2016). Booster sessions may be helpful to prevent a fade-out effect, although there is little research to support the effectiveness of maintenance treatment in parenting interventions (e.g., Eyberg, Boggs, & Jaccard, 2014; Eyberg, Edwards, Boggs, & Foote, 1998; van Aar et al., 2016). During the follow-up assessments, we observed that some parents continued to actively use the Basic Trust method at home (i.e., verbalizing their child’s and their own thoughts and feelings), whereas other parents did not. This discrepancy in parents’ behavior might have been present already during the intervention period and could explain why the effect on parental mind-mindedness shows a slight fade-out 6 months post intervention. Future studies should therefore take into account a measure of treatment fidelity and motivation.

Interestingly, parents’ sensitivity was not enhanced directly after the intervention but did increase at the 6-month follow-up. This result indicates that parents show a change in their mind-mindedness before they show a change in parental sensitivity. Modification of maladaptive cognition is thought to be the process by which therapy is effective (Beck, 1970; DeRubeis, Tang, & Beck, 2001). The operationalization of mind-mindedness, as opposed to the operationalization of sensitivity, unites the mental or cognitive tendency of parents to form theories on their child’s mind (i.e., mentalizing) and parents’ behavioral tendency to translate these theories into words (Meins, 2013). The outcome that improvement in mind-mindedness preceded improvement in sensitivity
Evaluating Basic Trust

suggests that the intervention first changes parents’ cognitions and perceptions of the child, after which changes in their behavior took place (i.e., sensitive responding). Prior to the intervention, one of the participating fathers held the belief that his son “is constantly seeking out a conflictual confrontation during dinner.” After the intervention, the father believed that his son “was angry because he was feeling rejected by my frequent commenting on his eating behavior.” In this example, the father initially gave an explanation of the child’s behavior. After the intervention, he was able to turn to the child’s motivation underlying the behavior. It may be that after the process of cognitive change, parents can (behaviorally) engage in more sensitive interactions with their child (e.g., responding to the anger with compassion instead of frustration). The outcomes may also be explained by the main focus of the Basic Trust intervention, which is the instruction on the content of parents’ verbal response. Verbalizing mental states was very new to most parents and required explicit attention and effort from the parents. Directly after the training, parents may, therefore, have been focused primarily on the verbal responses to their child and to a lesser extent on their nonverbal behavioral reactions.

The effect sizes on parent outcomes were medium, whereas the effect sizes for the child outcomes could be considered small to medium (Cohen, 1992). These results are in line with the effects of the Video-Feedback Intervention to Promote Positive Parenting and Sensitive Discipline (VIPP-SD), a widely used preventive attachment intervention (Juffer, Bakermans-Kranenburg, & van IJzendoorn, 2008). The VIPP-SD was designed for parents of children aged 0–6 years and has similar aims and methods as the Basic Trust intervention (i.e., promoting sensitive caregiving by means of video feedback; see Juffer, Struis, Werner, & Bakermans-Kranenburg, 2017 for an overview of the intervention elements). A recent meta-analysis on the effectiveness of the VIPP-SD included 12 randomized controlled trials (Juffer, Bakermans-Kranenburg, & van IJzendoorn, 2017). The meta-analysis showed that overall parents’ sensitivity increased after the intervention (pooled effect size of $d = 0.47$). Children’s behavior problems decreased ($d = 0.26; k = 7$). Only four studies investigated the intervention’s effect on attachment security, which pooled together showed an effect size of $d = 0.36$. The present study’s results are in line with the effects of the VIPP-SD, suggesting that short sensitivity-focused video-feedback interventions may be useful in preventing but also decreasing attachment problems.

It would be interesting to study whether an explicit focus on enhancing parents’ mind-related speech raises the effectiveness of attachment interventions. In other words, is it necessary to explicitly instruct parents to verbalize the child’s inner state? To examine this, it may be useful to compare the Basic Trust intervention to a similar intervention which puts less emphasis on promoting parents’ use of mental state
language (e.g., VIPP-SD). Microtrials may also be useful tools to study what specific factors of a short intervention bring about the change in children's sense of security (Klasnja et al., 2015).

The present study had limitations that should be addressed in future studies on the effectiveness of the Basic Trust intervention. First of all, conclusions about causality and placebo effects are limited by the lack of a (randomized) control group. Second, the sample size of the study was small, with 44 families completing the posttest assessment. Third, we used parent-report questionnaires to assess changes in child outcomes, and therefore, we cannot be sure that the effects were reflecting actual changes in behaviors of children and were not, for instance, demand effects. Moreover, we used the representational measure of mind-mindedness. It is recommended that the mind-mindedness of caregivers of older children (who are able to speak) is assessed with the mind-mindedness interview and not with the online observational measure of mind-mindedness (Meins & Fernyhough, 2015). That is, when children are able to speak, parents’ mind-related speech may be influenced greatly by what children say to their parents during interactions (Meins & Fernyhough, 2015). However, the representational operationalization of mind-mindedness may not have entirely captured the change in the core focus of the Basic Trust training, which is to verbalize children’s behavior, thoughts, and feelings during actual parent–child interactions. One study showed that the observational and representational (interview) measure of mind-mindedness are moderately correlated ($r = .40$; Meins et al., 2003), while another study reported no correlation between the observational and representational measure of mind-mindedness (Illingworth, MacLean, & Wiggs, 2016). The increase in mind-related speech during the interview implies that parents were more inclined to think about their children’s mind states than before the training. However, whether the intervention also led to changes in the interactional mind-related speech remains to be investigated. Lastly, a questionnaire on insecure attachment behaviors (AISI) was used with reliability coefficients ranging from sufficient to good. These reliability statistics may have been insufficient for the use of the questionnaire for individual diagnoses.

Altogether, these limitations imply that we should be careful about drawing strong causal conclusions from this study. A next step should be to (randomly) assign participants to a control group to study if the effects can be ascribed to the intervention with more certainty. Also, the Basic Trust intervention focuses primarily on changing parental behavior, which in turn may result in changes in children’s attachment security. We recommend that future studies investigate a model in which changes in caregiver behavior are modeled as a predictor of change in child attachment security, using a larger sample size. Lastly, future research should address whether the Basic Trust intervention is equally effective in biological and foster care families, as well as families
with lower socioeconomic backgrounds, as the current sample primarily consisted of families from middle-to-high socioeconomic status.

CONCLUSION

The present study replicated the positive results of a previous study on the effectiveness of the Basic Trust intervention in a sample of families with internationally adopted children (Colonnese et al., 2013). The results imply that the intervention reduces child attachment insecurity and disorganization as well as child behavior and emotional problems. Further, the outcomes suggest that the intervention enhances adoptive parents’ mind-mindedness and, in the longer term, sensitive caregiving behavior. Future studies should examine whether the results of the present study can be replicated under conditions of strict experimental control and in other types of families with children at risk of insecure attachment (e.g., foster or biological families).
General discussion
Chapter 9

GENERAL DISCUSSION

Mentalizing, or theory of mind, is a widely studied human capacity in the literature on adult mental health and child development (Baron-Cohen, Leslie, & Frith, 1985; Fonagy & Luyten, 2015; Freeman, 2016; Marty, 1991; Premack & Woodruff, 1978; Wimmer & Perner, 1983). Since two decades, mentalizing became embedded in theories that explain infant-parent attachment security as well as socioemotional functioning, and parenting researchers developed ways to assess parents’ mentalizing capacity (e.g., Meins, 1997; Meins et al., 2001; Slade, 2005). This dissertation aimed to examine whether parents’ mentalizing capacity predicts attachment security by summarizing the mentalizing-attachment literature of the past two decades. Second, this dissertation aimed to extend existing research on parental mentalization by investigating whether both mothers’ and fathers’ mind-mindedness uniquely predicts socioemotional functioning of children, and whether parents’ mind-mindedness is adaptable through intervention. Section 1 (Chapters 2 and 3) included two meta-analytic studies on the associations between parents’ and children’s mentalizing and child-parent attachment security. Section 2 (Chapters 4 and 5) addressed fundamental questions on whether mind-mindedness of mothers and fathers predicts infants’ regulated emotional responding, as well as preschoolers’ behavior problems and social competence later in childhood. Section 3 (Chapters 6, 7, and 8) included an evaluation of two interventions that aim to change parents’ “online” moment-to-moment representations of their child’s mind. Below, I discuss the present dissertation’s contribution to the research on parental mentalization for each individual section along with implications for future fundamental and intervention research.

Section 1 Summarizing research on parent and child mentalization

Section 1 includes two meta-analyses in which we investigated (a) the pooled association between parental mentalizing and infant-parent attachment security and (b) the pooled associations between child-parent attachment security and children’s mentalizing abilities. First of all, Chapter 2 includes a meta-analytic study that aimed to examine to what extent parental mentalization predicts infant-parent attachment security, accounting for an already established predictor of attachment, namely parental sensitivity. We therefore tested whether parents’ mentalizing capacity (i.e., mind-mindedness, parental reflective functioning, and insightfulness) uniquely predicts variation in attachment, over and above parental sensitivity. The pooled correlations presented moderate but robust associations between parental mentalization and attachment security as well as parental sensitivity. Although the overall effect of mentalization on attachment security decreased after controlling for the effect of
General discussion

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.

The outcomes of Chapter 2 are important for at least two reasons. First, the outcomes provide stronger evidence for the implementation of mentalization-based treatment approaches in attachment interventions, of which the Basic Trust intervention (evaluated in Chapter 8) is an example. Still attachment interventions are carried out worldwide that, supposedly based in traditional attachment theory (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969/1982), entail coercive strategies that operate with limited support and potentially do harm to children (e.g., holding therapy, rebirthing; Lilienfield, 2007; Mercer, 2019). It is therefore important that we not only examine possible adverse effects from such interventions (Mercer, 2017; 2019), but also perform research that can inform parents and mental health organizations on established predictors of attachment security. Furthermore, a previous meta-analysis indicated that those interventions that focus on evidence-based predictors of attachment security were most successful in promoting positive parent and child outcomes (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003).

Second, the results of Chapter 2 are relevant because they highlight that there are at least two parental features that, besides being related to each other, are of unique importance to the development of secure attachment relationships. Multiple other parenting or parent-child relationship features have been theorized and/or examined as a predictor of attachment security, such as parental embodied mentalization (Shai & Belsky, 2011a; Shai & Meins, 2018), autonomy granting behavior (Bernier et al., 2014), reciprocal parenting (Feldman, 2015), limit setting (Juffer, Bakermans-Kranenburg, & van IJzendoorn, 2019), entropy (Davis et al., 2017), protective parenting (Bakermans-Kranenburg, & van IJzendoorn, 2017), and repair of mismatches (Beebe & Steele, 2013). However, it is yet unclear how all these parenting aspects relate to each other and whether they predict unique variance in attachment security, over and above parental sensitivity and mentalizing. Particularly since Chapter 2 also showed that most variance in attachment security (i.e., 88%) remains unexplained, it might be important to move to studies that investigate large and more complex models, including multiple direct predictors and/or mediators of attachment.

In the future, we could extend the research in Chapter 2 by adding other parenting or parent-child relationship features to models that map infant-parent attachment (e.g., limit setting, repair of mismatches, autonomy support, protective parenting; see Bernier et al., 2014 for a good example). Such complex model testing is only possible with relatively large samples, and appropriate statistical techniques (Kline, 2011). This criterion has been met by few attachment studies (Bernier et al., 2014; see appendix
Although performing observational assessments of attachment and parenting behavior is very time-consuming, the attachment field would benefit greatly from studies with a sample size that exceeds 200 parent-child dyads, which use structural equation modelling allowing the investigation of the extent to which each of the predictors uniquely accounts for variance in attachment, above and beyond the role of other predictors (Preacher & Hayes, 2008). Ultimately, this type of research enables scientists to develop an evidence-based overview of the precise parenting abilities and behaviors that are important to children’s attachment security, aiding a sound translation of fundamental research to clinical practice.

Chapter 3 followed up on the previous chapter by considering whether there are direct pooled associations between child-parent attachment and two hallmarks of children’s mentalizing abilities: false-belief understanding and emotion understanding. Although a body of literature exists in which attachment is examined as a predictor of early mentalizing abilities of preschoolers, doubts have been raised about whether the attachment-mentalization relation is significant and direct. The results of the second meta-analysis suggest that children’s attachment security related more strongly to emotion understanding (moderate association) than to false-belief understanding (small association).

Perhaps the most important outcomes of Chapter 3 are that (a) controlling for language ability, the association between false-belief understanding and attachment was substantially reduced and (b) representational measures of attachment (story telling tasks) show larger associations with children’s understanding of emotions and beliefs than behavioral measures of attachment in childhood. Since representational measures of attachment explicitly require perspective-taking abilities, the observed association may be due to representational attachment measures and false belief tasks drawing on the same ability to understand others’ mental states, rather than indicating a genuine association between attachment security and false-belief understanding. Chapter 3’s results therefore only provide marginal support for the hypothesis that early secure attachment predicts children’s understanding of others’ belief states.

Indeed, the outcomes provide reason to study whether the opposite direction of effect holds—are children who are good at reading their own and other people’s minds better able to form secure attachments in the preschool years? In order to disentangle possible bi-directionality of the attachment-mentalizing association, we need studies that observe child-parent attachment at several time-points and during longer stretches of time. Also, in hindsight, it would have been very informative if we had also included studies on parental mentalization as a predictor of children’s false-belief and emotion understanding in Chapter 3. Since two previous meta-analyses already showed that the parent’s’ mentalizing capacity associates with children’s false belief understanding...
General discussion

(Devine & Hughes, 2016; Tompkins, 2018), and since we learned from the Chapter 2 that parents’ mentalizing predicts attachment security, it could be possible that the attachment-false belief association would have further decreased with parental mentalizing included in the model.

In summary, Figure 1 shows an overview of the hypothesized associations between parent and child mentalization derived from the meta-analytic results in Section 1 and from three previous meta-analyses (Devine & Hughes, 2016; Tompkins, 2018; Verhage et al., 2016). The meta-analytic data indicates that children seem to acquire mentalizing in the context of the child-parent attachment relationship, fostered by their parents’ mentalizing capacity. In turn, children’s mentalizing abilities might enable them to form secure attachment representations during preschool, suggesting that the two systems are closely related and mutually influence each other over time (Gergely & Unoka, 2008). To conclude, Figure 1 shows a remaining gap in our knowledge, that is, could mentalizing of parents be one of the mechanisms underlying the intergenerational transmission of attachment? (van IJzendoorn & Bakermans-Kranenburg, 2019). The association between adult attachment and parents’ tendency to mentalize about their child has been addressed in few studies (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, since this could shed further light on the mechanisms underlying transmission of attachment from parent to child.

Section 2 mothers’ and fathers’ mind-mindedness

In Section 2 (Chapters 4 and 5) we investigated whether the effects of mentalizing of two attachment figures extends to socioemotional functioning of infants and preschoolers. More specifically, we investigated the (bidirectional) relations between mothers’ and fathers’ mind-mindedness and physiological emotion regulation in infancy as well as behavior problems and social competence in childhood. In Chapter 4, we tested multiple hypotheses on the associations between both parents’ early mind-mindedness and infants’ physiological emotion regulation across the first year of life, as indicated by levels of heart rate variability (HRV) during rest and a stressful situation (Appelhans & Luecken, 2006). When mothers displayed high levels of appropriate and low levels of nonattuned mind-related comments about their 4-month-olds’ minds, infants had higher HRV levels during rest at 12 months, over and above infants’ resting HRV levels at 4 months. Hence, the analyses showed convincing support for the hypothesis that that parents’ mind-mindedness predicts more flexibility of infants’ autonomic nervous system to deal with arousal in general. The same effects were found for paternal mind-mindedness, but only at 12 months.
Figure 1. Hypothesized pathways from parent to child mentalization, supported by meta-analytic data
Red lines: Chapter 2; blue lines: Chapter 3; black lines: Devine & Hughes, 2016; Tompkins, 2018; Verhage et al., 2016
The results on the prediction of infants’ HRV decline (i.e., active emotion regulation; Shahrestani et al., 2014) during the stressful stranger situation were less straightforward. We observed a larger HRV decline in infants during the stranger task at 12 months when mothers made more frequent appropriate mind-related comments at 4 months, and fathers made more nonattuned comments at 12 months. This means there was some support for the hypothesis that mind-mindedness links to active emotion regulation during a stressful stranger situation. A recent meta-analysis of Groh and Narayan (2019) showed that attachment security in children is unrelated to infant heart rate during the separation phase of the strange situation procedure, suggesting that the strange situation causes a physiological stress reaction in all infants (securely and insecurely attached). Considering this meta-analytic evidence, infants’ HRV reactivity (decline) during Chapter 4’s stranger approach task might not have been a strong indicator of infant emotion regulation capacity and the parent-infant relationship quality.

Another interesting outcome of Chapter 4 was that infants’ HRV levels at 4 months did not predict parents’ mind-mindedness at 12 months, over and above earlier levels of mind-mindedness at 4 months. In line with this finding, previous research has shown that mind-mindedness is not associated with children’s temperament (Meins et al., 2011) and general cognitive ability (e.g., Meins et al. 2001), which, altogether, suggests that individual characteristics of infants do not determine parents’ later frequent and appropriate mentalizing during infancy.

Chapter 5 presents research on the stability, continuity, and concordance in mothers’ and fathers’ mind-mindedness from 4 to 30 months, as well as the joint effects of both parents’ early mind-mindedness on children’s later social competence and behavior problems (4.5 years). The study indicated that both parents’ mind-mindedness is rather stable from 4 to 30 months, although the amount of mind-related speech decreases as the child grows older. During infancy mothers’ and fathers’ mind-mindedness becomes more alike, but concordance disappears during toddlerhood. Only when both parents were low in mind-mindedness, children showed more externalizing problems at 4.5 years, suggesting that parents show joint effects on their children’s externalizing problems. In addition, mothers’ and fathers’ use of nonattuned mind-related comments predicted children’s low social competence and more externalizing, but not internalizing behavior at 4.5 years.

In summary, Chapters 4 and 5 indicate that parents’ mind-mindedness is stable across infancy and predicts better capacity to deal with physiological arousal in infants as well as less maladaptive behaviors directed toward the environment in preschoolers. The outcomes of Chapters 4 and 5 align with the propositions made in earlier studies that mind-mindedness is a trait-like quality of parents (e.g., Meins et al., 2003) and a predictor of adaptive socioemotional functioning in children (e.g., Meins et al., 2011).
Nevertheless, the notion that parents’ mentalizing is a stable trait that determines child development paints a too simplistic picture. We considered the role of two parents in this dissertation since, from an evolutionary view, fathers are thought to be more prone to challenge their children, encourage risk taking than mothers, and they more often participate in or initiate playful interactions with their children, whereas mothers are inclined to have a more caring and nurturing parenting role (Möller, Majdandžić, de Vente, & Bögels, 2013). Multiple results from the studies in Chapters 4 and 5 confirm the unique role of maternal and paternal caregiving.

First, we found that despite couples’ concordance in appropriate mind-related speech at 12 months, mothers’ and fathers’ mind-mindedness independently predicted infant emotion regulation, although the first appearance of these effects showed a different timing (Chapter 4). Second, fathers’, not mothers’, mind-mindedness at 12 months predicted better emotion regulation at 12 months via caregiving behavior (Chapter 4). Third, we found continuity in parents’ mind-mindedness from 4 months to 2.5 years, and concordance in couples’ mind-mindedness at 12 months (Chapter 5). Fourth, it was the combination of two parents being low in mind-mindedness that predicted children’s externalizing problems at 4.5 years. Altogether, these outcomes highlight that a) mothers and fathers have a unique influence on their child’s socioemotional functioning, b) parents may affect their children’s development through different mechanisms and at different age points. (also see Miller et al., 2019), and, c) parents could compensate each other’s lack of mind-mindedness in buffering against externalizing behavior problems.

There may be multiple reasons for the unique paternal and maternal effects that we found in Chapters 4 and 5. For instance, 4-month-old infants have fewer motor and communication abilities that allow them to deliberately use parents to regulate their emotional states (Sroufe, 1997). The development of young infants may therefore be particularly influenced by the extent to which caregivers adequately read subtle cues of their infant and provide a caring response to these cues. On the other hand, the positive effect of parents who are challenging, though in an attuned and appropriate manner, may become more apparent at a later age, when infants begin to experience more efficacy in adapting their own and others’ behaviors (Majdandžić et al., 2016).

Another reason for the different onset and trajectory of maternal and paternal effects might be that Dutch female employees are entitled to at least 3 to 4 months maternity leave, whereas male employees are entitled to up to 2 days of paid paternity leave after their partners have given birth (in 2018). Almost all mothers in Chapter 5’s study reported to have spent full-time with their newborns during the first 3 months, whereas most fathers reported to have worked full-time (or 4 days) from birth. Getting an appropriate understanding of the newborn’s signals may require time to develop, which fathers in the present sample have had less than mothers. Moreover, nursing
mothers participate in parent-child interactions that are critical in soothing arousal during the first months. Differences in the nature and quantity of infant–mother and infant–father interactions during the newborn’s first months may thus also explain the different first appearance of the maternal effects.

Interestingly, Chapter 5’s results showed joint effects of mothers’ and fathers’ mind-mindedness on preschoolers’ behavioral functioning: Only when two parents were low in appropriate mind-mindedness, children showed an increased rate of behavioral difficulties. These results suggest that parents may compensate each other’s lack of frequent mind-reading. It is important to note that we found this result only for appropriate mind-mindedness, and not for the nonattuned index. That is, a lack of verbalizing the child’s mental states could possibly be repaired by another parent’s frequent commenting on the child’s mind, while nonattuned comments provide a strong indication that the parent has problems with accurately representing the infant’s mind and treating him or her as a sentient individual (Meins, 2013). When one parent is high in nonattuned mind-mindedness, this could therefore not be compensated by another parent being low in nonattuned mind-mindedness. The joint effects of parents’ lack of appropriate mind-mindedness thus demonstrate a crucial difference between the use of parents’ appropriate and nonattuned mind-mindedness, which might have implications for the socioemotional development of the child.

The outcome that the combination of two parents being low in mind-mindedness predicted externalizing behavior is relevant for another reason. In a previous study maternal mind-mindedness at 8 months predicted less behaviorally difficulties in low, but not high socioeconomic status (SES) families (N = 177; Meins et al., 2003). In line with the study of Meins et al., Chapter 5 showed that in a population of middle-to-high SES families, children are at risk for developing behavioral difficulties only when both their mother and father are low in mind-mindedness. In other words, in families with more socioeconomic stressors, a mother’s frequent mentalizing about her child is a protective factor against the development of behavioral difficulties, whereas in families with more optimal socioeconomic circumstances, low mentalizing of both parents poses a risk factor for the development of externalizing problems.

Altogether, Section 2’s results on both the stability and concordance in mind-mindedness as well as the independent and joint effects of mothers’ and fathers’ mind-mindedness suggest that there is much to say for including the entire family system and its dynamics when predicting children’s socioemotional trajectories (Bögels & Phares, 2008; Lucassen et al., 2011; Monteiro, Verissimio, Vaughn, Santos, & Bost, 2008), as well as including broader family factors (e.g., socioeconomic stressors, life events). An important avenue for future fundamental research on parents’ mentalizing is to further investigate the bidirectional effects between parents’ mentalizing and children’s
behavior. Although Chapter 4 did not show infant-to-parent effects on parents’ mind-mindedness, we found concordance in couples’ mind-mindedness at 12 months (but not 4 months), suggesting that mind-mindedness is affected by family dynamics (Chapter 5). Mind-mindedness in later childhood has shown to associate with parental stress, which is both an antecedent and consequence of child behavioral difficulties (McMahon & Meins, 2012; Neece et al., 2012). Furthermore, there is evidence from neuroscience studies in adults that stress or arousal immediately impedes people’s ability to reflect consciously on the minds of others (reflective or controlled mentalizing; Luyten & Fonagy, 2015). This means that moment-to-moment stressors that occur during daily parenting situations (e.g., a child that starts to cry because he does not get his way) may cause sudden, short-term decreases in parents’ mentalizing.

In order to understand the immediate (causal) effects of difficult infant or child behavior on parents’ mentalizing stance, future studies should focus on conducting experimental research. For instance, using an infant simulator at home, it would be possible to test whether excessive crying of an infant (simulator) causes immediate effects on parents’ mind-mindedness and caregiving behavior (Voorhuis, Out, van der Veen, Bhandari, van IJzendoorn, & Bakermans-Kranenburg, 2013). On a similar note, in later childhood, it is possible to manipulate children’s behaviors, for instance, by instructing children to obstruct a parent-child puzzle task without informing the parent. Such experiments could not only clarify possible child-to-parent effects, but also provide an opportunity to learn about the specific characteristics of parents who are able to maintain a mentalizing stance during stressful parenting situations (particularly when such experiments are conducted in a heterogeneous group of parents; Luyten & Fonagy, 2015). Moreover, recently, interview measures and questionnaires on parental mentalizing became available that could be administered online (Fishburn et al., 2017; Luyten, Mayes, Nijssens, & Fonagy, 2017). These less time-consuming measures of mentalizing make it feasible to start using microgenetic designs (Siegler & Crowley, 1991) to get a better understanding of the mechanisms underlying the relation between parental mentalizing and children’s behavioral/socioemotional functioning.

Section 3 Adapting parents’ mentalizing

In Section 3 (Chapters 6, 7, and 8), we investigated whether parental mind-mindedness increased after two interventions that explicitly aim to enhance and change parents’ representations of their child’s mind: Mindful with your baby/toddler and Basic Trust. First, the Mindful with your baby/toddler training is a group-based mindful parenting training for mothers of infants and toddlers who experience parental stress and/or problems in the parent-child relationship. Chapter 6 presents initial results on the self-reported effects of the “Mindful with your toddler” intervention,
since the effectiveness of the toddler version had not been explored previously. Overall, mothers (N = 22) reported no significant differences between waitlist and pretest. From pre- to posttest, mothers reported improvements in child psychopathology, maternal mindfulness and self-compassion (medium effect sizes). These effects were stable or further improved at a 2- and 8-month follow-up (medium/large effect sizes). Improvement in child dysregulation, maternal internalizing psychopathology, parenting stress, sense of parental incompetence, non-judgmental acceptance of parental functioning, and nonjudging of inner experience was only seen at 2- and 8-month follow-up (medium/large effect sizes). No changes in maternal externalizing psychopathology, overreactivity, compassion for the child, and partner relationship were reported. These results provided initial support that the mindful parenting group training is also successful in improving mental health in mother-toddler dyads, next to mother-infant dyads (Potharst et al., 2017).

In Chapter 7 we examined whether the mindful with your baby/toddler training not only reduces maternal self-reported parenting stress, but also changes objectively-measured maternal behavior during parent-child interactions and mother-child interaction quality, as compared to wait list (N = 53 mother-child dyads). The results showed no significant changes in maternal behavior or stress between waitlist and pretest. Mothers reported less parenting stress after the training (small effect size), were more accepting (medium effect size), and made fewer nonattuned references to the child’s mental states (large effect size). The children showed higher levels of responsiveness after the training (small to medium effect size). No significant changes occurred in appropriate mind-related comments, maternal responsiveness (vocal turn-taking), and dyadic coordination of gaze and facial expressions. The outcomes suggest that the Mindful with your baby/toddler training affects not only maternal stress, but also maternal behavior, particularly (over)reactive parenting behaviors, which resulted in more acceptance, better attunement to child’s mental world, and more “space” for children to respond to their mothers during interactions.

Second, The Basic Trust method, presented in Chapter 8, is an example of an attachment-based intervention method that is focused on explicitly improving children’s mentalizing abilities through teaching parents to frequently and consistently make the child aware of their own and others’ mental states (i.e., by frequently using mental state language when interacting with their child; Polderman, 1998; 2017). We studied post-intervention changes in child attachment insecurity, behavior problems, parental mind-mindedness, sensitivity and parenting stress in 53 families with internationally adopted children who were insecurely attached to their adoptive parents. Children’s insecure attachment, internalizing and externalizing behaviors, as well as mothers’ and fathers’ stress decreased from pre-test to posttest and these effects were sustained at
the six-month follow-up. Both parents’ sensitivity showed an improvement at follow-up, but not at posttest, whereas both parents’ mind-mindedness showed an improvement at posttest, but a slight fade-out effect at follow-up.

The results of Chapters 7 and 8 suggest that mentalizing of parents is adaptable and interventions aimed at enhancing parents’ mentalizing result in positive effects on children’s behavior. Chapter 7 showed that after the Mindful with your baby/toddler training mothers were not more inclined to refer to their child’s mind during interactions, but they did show fewer misinterpretations of the child’s moment-to-moment mental states. Chapter 8 shows that after the Basic Trust intervention, mothers and fathers used more mind-related references to describe their child, suggesting that parents’ mentalizing tendency had increased, or at least, the tendency to comment on their child’s mind. The two interventions therefore seem to bring about changes in distinct aspects of parents’ mentalizing stance. Although we evaluated the interventions within two very different populations (e.g., different age, different reasons for referral), it might be interesting to consider the two different approaches to get a better understanding of the results.

It is the main focus of the Basic Trust intervention to stimulate parents’ thinking about their child’s behavior in relation to their mental states, as well as commenting on the child’s mental states (with the help of video feedback; Polderman, 2017). This intervention approach might result in direct effects on the frequency of parents’ mind-related speech. In the Mindful with your baby/toddler training, different than in the Basic Trust intervention, parents are not invited to immediately verbalize reflections on their child’s mind or respond to them (Potharst et al., 2017), which may explain why mind-related speech did not increase at posttest, nor did sensitive responsiveness (which associates with appropriate mind-related comments; Meins, 2013). On the other hand, the focus on being aware of and accepting one’s own and others’ moment-to-moment state of mind may have led mothers to become better attuned to the infant’s thoughts and feelings, demonstrating fewer nonattuned comments (misinterpretations of the child’s mind) as well as less rejecting behavior. So it seems that the two interventions bring about changes in different aspects of mentalizing (reading the mind more accurately versus reading more frequently), highlighting the multidimensional character of parental mind-mindedness and mentalization in general (Meins, 2013; Luyten & Fonagy, 2012). Changing parents’ mentalizing stance could, therefore, be reached through several routes.

Although Chapter 8 suggests that the Basic Trust intervention is successful in adapting parents’ mind-mindedness, the intervention did not prove to be successful in establishing long-term effects in parents’ mind-mindedness. This raises the question whether short parenting interventions are able to bring about a long-term adaptation
in parents’ mentalizing. Especially since an individual’s mentalizing capacity is thought
to develop from the experiences of close personal relationships (Fonagy et al., 2002),
behaviorally focused methods (i.e. the stepwise method of interacting that parents
are taught to use) might not be sufficient to establish long-term changes in parents’
mentalizing. There is convincing evidence from neuroscience studies that good
(balanced) mentalizing of adults is not only dependent on stress and arousal, but also
the use of attachment strategies in response to arousal (Luyten & Fonagy, 2015). Thus,
it might be important to incorporate intervention modules that a) track and intervene in
internal and external stressors with an individual and/or family, and b) discuss parents’
own history of attachment and how this affects their response to stress. In order to
reach this goal it seems important to pay attention to therapeutic alliance. Forming a
therapeutic alliance in which the therapist encourages self-focused mentalizing may
help parents in regulating their own challenging emotional states, which could possibly
lead to more long-term improvements in parents’ mentalization within the parent-child
relationship (e.g., Suchman DeCoste, Castiglioni, Legow, & Mayes, 2008).

In sum, Section 3 presents preliminary evidence that Mindful with your baby/toddler
and Basic Trust, both interventions that target parents’ online representations of their
child’s mind, are successful in increasing parents’ mind-mindedness and to some extent,
their sensitive behavior. The positive changes in parent and child outcomes provide
reasons to further study the effectiveness as well as the working mechanisms of both
interventions. Specifically, in order to refine our understanding of mentalization-based
parenting programs, we should gain more insight into the type of interventions that
bring about changes in the different aspects of mentalizing (Luyten & Fonagy, 2015).

**Strengths and Limitations**

The present dissertation united meta-analytic and prospective study designs
including low- and high-risk participants to answer questions about the relations
between parents’ mentalizing and children’s socioemotional development. In most
studies, both mothers and fathers were included, and we tested their unique and/or joint
effects on child outcomes. We also considered multiple methods to assess children’s
functioning, that is, we employed physiological measures, parent-child observations
at home and in a laboratory setting, interviews, and parent reports on questionnaires.
Finally, we examined multiple domains of children’s socioemotional functioning
(attachment security, mentalizing, emotion regulation, internalizing/externalizing
behaviors, social competence).

Nevertheless, the research presented in this dissertation has limitations. First,
understanding adaptive and maladaptive pathways in child development is a tremendous
puzzle. How parents represent their children’s mind seems an important indicator of the
quality of proximal processes within the child’s family system (Bronfenbrenner, 1994), but is far from an exclusive predictor of children’s socioemotional development. As mentioned earlier, it is likely that family environment and children’s behavioral problems connect via the effect of environmental factors on the parent. For example, low SES is correlated with higher rates of psychopathology and heightened levels of stress and in adults (Fryers, Melzer, & Jenkins, 2003; Lorant et al., 2003), and parental depression and stress are known to associate with children’s behavioral problems (e.g., Crnic, Gaze, & Hoffman, 2005; Yates, Obradovic, & Egeland, 2010). We did not include measures of all ecological systems that may influence children’s development (i.e., meso-, exo-macrosystem; Bronfenbrenner, 1994). On a similar note, we did not include measures that index biological and/or genetic vulnerability, precluding us from making hypotheses on the differential susceptibility of children to parents’ (lack of) mentalizing (Belsky, 2005).

Second, the non-experimental and correlational design of the fundamental studies precludes causal inference on the effects of parental mind-mindedness on infant and child development. Furthermore, we only studied the bidirectionality of effects in Chapter 4. The outcomes of Chapter 3 remind us that the outcomes of this dissertation could equally be explained as child-to-parent effects as parent-to-child effects. Third, with regard to the intervention studies, conclusions about causality and placebo effects are limited by the lack of a randomized control design. Furthermore, much has yet to be studied when it comes to supporting the claim that the interventions in Chapters 6 to 8 work the way they are theorized to work. We were not able to adequately study whether a post-intervention change in mind-mindedness was underlying a change in child attachment insecurity or behavior problems. Next to studying mechanisms of change, future studies should also consider whether mentalization is a moderator of treatment success. Do mentalizing parents respond better to treatment? If this is the case, it would also be interesting to investigate whether the mind-mindedness interview could provide a useful tool in screening for extreme cases of problems with mentalizing (i.e., when parents only describe the child’s behavior and physical appearance or when they only comment on negative aspects of the child’s mind and behavior), enabling clinicians to adapt their treatment approach accordingly.

Fourth, the samples in the empirical studies included mostly families with middle to high socioeconomic backgrounds, and also the majority of the samples in the meta-analytic studies involved middle-to-high class families from Western societies. Particularly since research has shown that the extent to which a lack of mind-mindedness is a family risk factor for child behavioral difficulties depends on socioeconomic status (Meins et al., 2013, 2018), we should be careful with generalizing the results to families with lower SES. Fifth, in Chapters 5, 6, 7 and 8, we used, next to observational measures
of parenting, parent report on child outcomes, most importantly reports on social competence, attachment insecurity, and behavior problems. Especially because this dissertation examines how parents represent their child’s mind, the reports of child outcome could have been biased by the parent’s mentalizing capacity. For instance, parents who tend to primarily see problematic behavior of their children, without trying to understand the meaning of this behavior (i.e., showing a lack of mentalizing), may also be the parents who report more behavioral problems. This means that the associations found could expose the parents’ representation of their child’s development, rather than the child’s actual development. Using multiple informants, other than the parents, and using objective observations of child psychopathology and socio-emotional functioning, may be important particularly in research on parental mentalization.

Last, although this dissertation aimed to shed further light on how parental mentalizing relates to attachment and children’s social-emotional development, both child outcomes were investigated in separate studies. So, the pathway from parents’ mentalizing to infant attachment security and later children’s healthy social-emotional functioning remains to be studied further.

Conclusion
The combination of meta-analytic and empirical (fundamental) studies as well as intervention studies performed under clinically representative conditions provides evidence for the notion that the parent’s capacity to mentalize is an essential characteristic of parents that sets in motion a positive developmental pathway of children, starting with (a) fostering regulated emotional responding and a secure attachment relationship during infancy, (b) providing interactions in which children are able to learn about their own and others’ minds, which in turn (c) aids the development of more (socially) adaptive behaviors and less maladaptive behaviors. The results of this dissertation also point to the complexity of predicting child development—if we want to paint the right picture, it seems important to take into account the entire family system when examining children’s socioemotional functioning and consider the stressors that each family faces. The results indicate that the parent’s capacity to mentalize seems adaptable, but the results also raise the question on whether short parenting interventions are able to bring about changes in the parent’s mentalizing stance that last on the longer term. We should therefore learn more about the antecedents of parental mentalizing and the long-term effects of mentalization based parenting interventions.
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Supplementary Materials
APPENDIX A

Flow Chart of Search Results

[Flow chart diagram]

- Database search (k =)
  - PsycINFO: 3548 results
  - Medline: 901 results
  - RIC: 623 results
  - Embase: 89 results
  - Cochrane Library: 97 results
  - Web of Science: 2391 results
  - Google Scholar: 830 results
  - Reference lists: 87
  - Suggested by experts: 21

- Records after duplicates removed (n = 3982)

- Records screened (n = 4605)

- Records excluded (n = 4352)

- Excluded:
  - Exclusion criteria: assessment procedures: 74
  - samples too old: 35
  - foreign language: 2
  - clinical samples: 24
  - Papers not retrieved: 5
  - Non-response from author on request for information/effect size could not be calculated: 3

- Full-text articles assessed for eligibility (n = 253)

- Number of studies (n), number of independent samples (s)
  - Mentalization-attachment (n = 17, s = 13)
  - Sensitivity-attachment (n = 75, s = 51)
  - Mentalization-sensitivity (n = 18, s = 14)
## APPENDIX B1

Overview of the Included Studies on Parental Mentalization and Attachment

<table>
<thead>
<tr>
<th>Year</th>
<th>Parent gender</th>
<th>Age parents</th>
<th>Age ment</th>
<th>Age att</th>
<th>Country</th>
<th>Type ment</th>
<th>App/N-A MM</th>
<th>SSP/AQS</th>
<th>N*</th>
<th>#ES</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demers et al. 2010a</td>
<td>M</td>
<td>28.7/18.5</td>
<td>18</td>
<td>12</td>
<td>Canada</td>
<td>MM obs</td>
<td>App</td>
<td>SSP</td>
<td>29/69</td>
<td>2</td>
<td>.37/.17</td>
</tr>
<tr>
<td>Fonagy et al. 2016</td>
<td>M</td>
<td>34.2</td>
<td>10</td>
<td>12</td>
<td>UK</td>
<td>PRFQ</td>
<td>-</td>
<td>SSP(4)</td>
<td>136</td>
<td>1</td>
<td>.18</td>
</tr>
<tr>
<td>Grienenberger et al. 2005</td>
<td>M</td>
<td>31</td>
<td>10</td>
<td>14</td>
<td>USA</td>
<td>PRFQ</td>
<td>-</td>
<td>SSP(4)</td>
<td>40</td>
<td>1</td>
<td>.40</td>
</tr>
<tr>
<td>Koren-Karie et al. 2002</td>
<td>M</td>
<td>31.6</td>
<td>13.3</td>
<td>13.3</td>
<td>Israel</td>
<td>IA</td>
<td>-</td>
<td>SSP(4)</td>
<td>129</td>
<td>1</td>
<td>.44</td>
</tr>
<tr>
<td>Lordanj et al. 2014</td>
<td>M</td>
<td>30.5</td>
<td>12</td>
<td>15</td>
<td>Canada</td>
<td>MM obs</td>
<td>App</td>
<td>AQS</td>
<td>59</td>
<td>1</td>
<td>.10</td>
</tr>
<tr>
<td>Lundy 2003</td>
<td>M/F</td>
<td>26.8/29.9</td>
<td>6</td>
<td>13.3</td>
<td>USA</td>
<td>MM obs</td>
<td>App</td>
<td>AQS</td>
<td>24/24</td>
<td>2</td>
<td>.37/.29</td>
</tr>
<tr>
<td>Meins et al. 2001</td>
<td>M</td>
<td>28</td>
<td>6.3</td>
<td>12.25</td>
<td>UK</td>
<td>MM obs</td>
<td>App</td>
<td>SSP</td>
<td>65</td>
<td>1</td>
<td>.48</td>
</tr>
<tr>
<td>Meins et al. 2002</td>
<td>M</td>
<td>28</td>
<td>6.3</td>
<td>12.25</td>
<td>UK</td>
<td>MM obs</td>
<td>N-A</td>
<td>SSP(4)</td>
<td>57</td>
<td>1</td>
<td>.54</td>
</tr>
<tr>
<td>Meins et al. 2012</td>
<td>M</td>
<td>28.1</td>
<td>8.5</td>
<td>15.5</td>
<td>UK</td>
<td>MM obs</td>
<td>App/N-A</td>
<td>SSP</td>
<td>204</td>
<td>2</td>
<td>.20/.45</td>
</tr>
<tr>
<td>Ontai &amp; Virmani 2010</td>
<td>M</td>
<td>-</td>
<td>11.3</td>
<td>11.3</td>
<td>USA</td>
<td>MMI</td>
<td>-</td>
<td>AQS</td>
<td>35</td>
<td>1</td>
<td>-.09</td>
</tr>
<tr>
<td>Ramsauer et al. 2014</td>
<td>M</td>
<td>35.5</td>
<td>7.4</td>
<td>15</td>
<td>Germany</td>
<td>IA</td>
<td>-</td>
<td>SSP(3)</td>
<td>20</td>
<td>1</td>
<td>.21</td>
</tr>
<tr>
<td>Stacks et al. 2014</td>
<td>M</td>
<td>30</td>
<td>16</td>
<td>16</td>
<td>USA</td>
<td>PRFQ</td>
<td>-</td>
<td>SSP(4)</td>
<td>83</td>
<td>1</td>
<td>.30</td>
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<tr>
<td>Taubner et al. 2014</td>
<td>M</td>
<td>29.5</td>
<td>10</td>
<td>13</td>
<td>Germany</td>
<td>MM obs</td>
<td>App</td>
<td>SSP</td>
<td>24</td>
<td>1</td>
<td>.21</td>
</tr>
</tbody>
</table>

Note. M = mothers, F = fathers, Age parents = parents’ age during first assessment; Age ment = infants’ average age in months during assessment parental mentalization; Age att = infants’ average age in months during attachment assessment; Country = country in which the participants lived; Type ment = type of mentalization assessment; MM obs = mind-mindedness observational assessment; MMI = mind-mindedness interview; IA = insightfulness assessment; PRF = Parental reflective functioning; App MM = appropriate mind-mindedness, N-A MM = non-attuned mind-mindedness; SSP = strange situation procedure; AQS = Attachment Q-sort; N = number of participants in study; #ES = number of effect sizes coded from study; r = Pearson’s r correlation coefficient.

a The N reported in the tables may deviate from the N reported in article texts because in some cases authors were contacted for additional information.
b Study in which the same sample was analyzed as in the study mentioned above.
## APPENDIX B2

### Overview of the Included Studies on Sensitivity and Attachment

<table>
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<td>18.5</td>
<td>Chile</td>
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<td>Age sens</td>
<td>Age att</td>
<td>Country</td>
<td>SSP/AQS</td>
<td>Sensitivity instrument</td>
<td>N⁰</td>
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<td>r</td>
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<td>3.6</td>
<td>12</td>
<td>USA</td>
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<td>Ainsworth</td>
<td>62/62</td>
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<td>-.03/.15</td>
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<tr>
<td>Xue et al.</td>
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<td>M</td>
<td>30.91</td>
<td>10/21</td>
<td>13/27</td>
<td>Canada</td>
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<td>MBQS</td>
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<tr>
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<td>1/16</td>
<td>16</td>
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<td>SSP(4)</td>
<td>Ainsworth</td>
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Note: M = mothers, F = fathers; Age parents = parents’ age during first assessment; Age sens = infants’ average age in months during assessment sensitivity; Age att = infants’ average age in months during attachment assessment; Country = country in which participants lived; SSP = strange situation procedure; AQS = Attachment Q Sort; Ainsworth = Ainsworth Scales, MBQS = Maternal Behavior Q-Set, EAS = Emotional Availability Scales; N = number of participants; #ES = number of effect sizes coded from study; r = Pearson’s r correlation coefficient.
a The N reported in the tables may deviate from the N reported in article texts because in some cases authors were contacted for additional information.
b Study in which the same sample was analyzed as in the study mentioned above
C Unpublished studies
## APPENDIX B3

Overview of the Included Studies on Parental Mentalization and Sensitivity

<table>
<thead>
<tr>
<th>Reference</th>
<th>Year</th>
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<th>Age parents</th>
<th>Age mental</th>
<th>Age sens</th>
<th>Country</th>
<th>Type ment</th>
<th>App/N-A MM</th>
<th>Sensitivity instrument</th>
<th>Sensitivity instrument</th>
<th>N²</th>
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<td>18.4/28.7</td>
<td>18</td>
<td>18</td>
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<td>MM obs</td>
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<td>USA</td>
<td>MM obs</td>
<td>App/N-A</td>
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<td>28</td>
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<td>6.25</td>
<td>UK</td>
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<td>App</td>
<td>Ainsworth</td>
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<td>M</td>
<td>28</td>
<td>6.25</td>
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<td>UK</td>
<td>MM obs</td>
<td>N-A</td>
<td>Ainsworth</td>
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<td>28</td>
<td>48.25</td>
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<td>UK</td>
<td>MMI</td>
<td>Interview</td>
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<td>8.5</td>
<td>UK</td>
<td>MM obs</td>
<td>App/N-A</td>
<td>Ainsworth</td>
<td>203</td>
<td>2</td>
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<td>24</td>
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<td>PRFQ</td>
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<td>Germany</td>
<td>IA</td>
<td>-</td>
<td>Ainsworth</td>
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<td>Rosenblum et al.</td>
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<td>29.3</td>
<td>7</td>
<td>7</td>
<td>USA</td>
<td>MM obs / PRF</td>
<td>App</td>
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### Overview of the Included Studies on Parental Mentalization and Sensitivity (continued)

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<th>Age parents</th>
<th>Age ment</th>
<th>Age sens</th>
<th>Country</th>
<th>Type ment</th>
<th>App/N-A MM</th>
<th>Sensitivity instrument</th>
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Note. M = mothers; Age parents = parents’ age during first assessment; Age ment = infants’ average age in months during assessment mentalization; Age att = infants’ average age in months during sensitivity assessment; Country = country in which participants lived; Type ment = type of mentalization assessment; MM obs = mind-mindedness observational assessment; MMI = mind-mindedness interview; IA = Insightfulness assessment; App MM = appropriate mind-mindedness, N-A MM = non-attuned mind-mindedness; N = number of participants in study, #ES = number of effect sizes coded from study; r = Pearson’s r correlation coefficient

a The N reported in the tables may deviate from the N reported in article texts because in some cases authors were contacted for additional information.
b Study in which the same sample was analyzed as in the study mentioned above
c Unpublished study
**APPENDIX C**

**Overview of Quantitative and Categorical Variables Coded for Each Primary Study Including Response Categories**

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<th>Study characteristics</th>
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<td>Publication year</td>
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<tr>
<td>Sample size</td>
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<tr>
<td>Effect size controlled or not</td>
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<th>Sample characteristics</th>
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<td>Country in which the families lived</td>
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<tr>
<td>Gender of the parent</td>
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<tr>
<td>Mothers / Fathers</td>
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<tr>
<td>Percentages of males (children)</td>
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<tr>
<td>Age of the parent</td>
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<tr>
<td>Age of the child during the MM/sensitivity/attachment assessment</td>
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<tr>
<td>Socioeconomic status of the family</td>
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<td>Low / Middle / High</td>
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<td>Instrument attachment</td>
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<tr>
<td>Strange Situation Procedure / Attachment Q-Sort</td>
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<tr>
<td>Location</td>
</tr>
<tr>
<td>Lab / Home</td>
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<tr>
<td>Type of classification (only when SSP was conducted)</td>
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<td>Three-way classification (ABC) / Four-way classification (ABCD)</td>
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<th>Characteristics of the mentalization assessment</th>
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<td>Construct</td>
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<td>Mind-mindedness / Parental Reflective Functioning / Insightfulness</td>
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<td>Dimension of mind-mindedness (only when free-play observation was assessed)</td>
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<tr>
<td>Appropriate mind-related comments / Non-attuned mind-related comments</td>
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<tr>
<td>Location assessment</td>
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<tr>
<td>Lab / Home</td>
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<td>Location assessment</td>
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<tr>
<td>Lab / Home</td>
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<td>Duration of the assessment</td>
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<td>Removal or addition of items/scales</td>
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### APPENDIX D1

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

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<th></th>
<th>#k</th>
<th>#ES</th>
<th>Zr (SE)</th>
<th>β</th>
<th>(SE)</th>
<th>F (df1, df2)</th>
<th>p-value</th>
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<td><strong>Study characteristics</strong></td>
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<td>Publication year (c)</td>
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<td>mothers</td>
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<td>17</td>
<td>.31 (.05)**</td>
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<td>fathers</td>
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<td>-.03 (.17)</td>
<td>F(1, 18) = 0.41</td>
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### Parental Mentalization and Attachment: Estimated Results (Fisher’s Z, Regression Coefficients, Omnibus-test) for Continuous and Categorical Moderator Variables (continued)

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<th>Zr (SE)</th>
<th>β1 (SE)</th>
<th>F (df1, df2)</th>
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<th>Zr (SE)</th>
<th>β1 (SE)</th>
<th>F (df1, df2)</th>
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<tr>
<td>home</td>
<td>4</td>
<td>5</td>
<td>.24 (.09)</td>
<td>-.11 (10)</td>
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<table>
<thead>
<tr>
<th>MM Index</th>
<th>#k</th>
<th>#ES</th>
<th>Zr (SE)</th>
<th>β1 (SE)</th>
<th>F (df1, df2)</th>
<th>p-value</th>
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</thead>
<tbody>
<tr>
<td>appropriate</td>
<td>7</td>
<td>10</td>
<td>.26 (.09)**</td>
<td></td>
<td>F(1, 12) = 8.60*</td>
<td>.013*</td>
</tr>
<tr>
<td>non-attuned</td>
<td>3</td>
<td>4</td>
<td>.49 (.07)**</td>
<td></td>
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</tbody>
</table>

Note. #k = number of studies; #ES =number of effect sizes; Zr=Fisher’s Z correlation; SE=standard error; β1 = estimated regression coefficient; (c) = continuous variables; MM = mind-mindedness; IA = insightfulness assessment; PRF = parental reflective functioning; * p < .05; ** p < .01; *** p < .001.

a Omnibus test of all regression coefficients in the model.
b The effects of the variables study design and attachment classification system were not tested due to lack of variation within this variable.
c One study was conducted in a continent other than North-America or Europe (Koren-Karie et al., 2002). This study was left out of this moderator analysis.
## APPENDIX D2

### Parental Mentalization and Sensitivity: Estimated Results (Fisher’s Z, Regression Coefficients, Omnibus-test) for Continuous and Categorical Moderator Variables

<table>
<thead>
<tr>
<th></th>
<th>#k</th>
<th>#ES</th>
<th>Zr (SE)</th>
<th>β̂ (SE)</th>
<th>F (df1, df2)</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Publication year (c)</td>
<td>14</td>
<td>24</td>
<td>.01 (.01)</td>
<td></td>
<td>F(1, 22) = 0.28</td>
<td>.603</td>
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<tr>
<td>Age of the parent (c)</td>
<td>14</td>
<td>24</td>
<td>.02 (.01)</td>
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<td>F(1, 22) = 3.48</td>
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<tr>
<td>Percentage boys (c)</td>
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<td>-.00 (.01)</td>
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<td>F(1, 18) = 0.46</td>
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<tr>
<td>Age child mentalization assessment (c)</td>
<td>14</td>
<td>24</td>
<td>-.01 (.004)</td>
<td></td>
<td>F(1, 22) = 6.62</td>
<td>.017*</td>
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<tr>
<td>Age child sensitivity assessment (c)</td>
<td>14</td>
<td>24</td>
<td>.29 (.06)***</td>
<td>-.01 (.004)</td>
<td>F(1, 22) = 4.47</td>
<td>.046*</td>
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<tr>
<td>Continent (c)</td>
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<td></td>
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<tr>
<td>Europe</td>
<td>6</td>
<td>11</td>
<td>.22 (.05)***</td>
<td>-.07 (.08)</td>
<td>F(1, 21) = 0.81</td>
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<td>North-America</td>
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<td>F(1, 22) = 0.88</td>
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<tr>
<td>low</td>
<td>6</td>
<td>12</td>
<td>.28 (.07)***</td>
<td>.07 (.07)</td>
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<td>middle-high</td>
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<td>MM</td>
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<td>.24 (.04)***</td>
<td></td>
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<td>IA/PRF</td>
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<td>.27 (.07)***</td>
<td>.03 (.08)</td>
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<td>Location</td>
<td></td>
<td></td>
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<tr>
<td>lab</td>
<td>8</td>
<td>15</td>
<td>.27 (.05)***</td>
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<td>F(1, 20) = 0.26</td>
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<td>7</td>
<td>.23 (.07)**</td>
<td>-.04 (.08)</td>
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<td>MM Index</td>
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<tr>
<td>appropriate</td>
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<td>10</td>
<td>.30 (.05)***</td>
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<td>F(1, 13) = 4.43</td>
<td>.055</td>
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<td>5</td>
<td>.13 (.07)</td>
<td>-.17 (.08)</td>
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Parental Mentalization and Sensitivity: Estimated Results (Fisher’s Z, Regression Coefficients, Omnibus-test) for Continuous and Categorical Moderator Variables (continued)

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<tr>
<th>Sensitivity assessment</th>
<th>#k</th>
<th>#ES</th>
<th>Zr (SE)</th>
<th>β₁ (SE)</th>
<th>F (df₁, df₂)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lab</td>
<td>9</td>
<td>16</td>
<td>.26 (.04)***</td>
<td>-.01 (.09)</td>
<td>F(1, 20) = 0.03</td>
<td>.876</td>
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<tr>
<td>Home</td>
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<td>6</td>
<td>.25 (.08)***</td>
<td>-.001 (.002)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration (c)</td>
<td>12</td>
<td>20</td>
<td></td>
<td></td>
<td>F(1, 18) = 0.22</td>
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<tr>
<td>Instrument</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F(1, 22) = 0.00</td>
<td>.998</td>
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<td>Ainsworth scales</td>
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<td>8</td>
<td>.25 (.06)***</td>
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<tr>
<td>Other</td>
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<td>16</td>
<td>.25 (.04)***</td>
<td>.00 (.08)</td>
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<td></td>
</tr>
</tbody>
</table>

Note. #k = number of studies; #ES = number of effect sizes; Zr = Fisher’s Z correlation; SE = standard error; β₁ = estimated regression coefficient; (c) = continuous variables; MM = mind-mindedness; IA = insightfulness assessment; PRF = parental reflective functioning; * p < .05; ** p < .01; *** p < .001.

a Omnibus test of all regression coefficients in the model
b The effects of the variables study design were not tested due to lack of variation within these variables
c One study was conducted in a continent other than North-America or Europe (Koren-Karie et al., 2002). This study was left out of this moderator analysis
d The location was unknown for one study (with 2 effect sizes)
APPENDIX E CHAPTER 3

Flow Chart of Search Results

Database search
PsycINFO 1,227 results
Medline 557 results
ERIC 382 results
Embase 97 results
Cochrane Library 43 results
Web of Science 854 results
Google Scholar 620 results
Reference lists: 15
Suggested by experts: 6
Total: 3801

Records after duplicates (n = 1178) removed

Records screened (n = 2623)

Records excluded after screening (n = 2419)

Excluded (171):
Exclusion criteria:
- assessment procedures/different construct: 141
  - samples too young/old: 22
  - clinical/non-biological samples: 8

Full-text articles assessed for eligibility (n = 204)

Studies included (n = 33*):
Attachment - EU (n = 18, with 15 unique samples)
Attachment - FBU (n = 18 with 17 unique samples)
3 studies investigated attachment in relation to both EU and FBU
## APPENDIX F1 CHAPTER 3

Characteristics of the Included Studies on Attachment and Emotion Understanding

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>N</th>
<th>Child age attachment (months)</th>
<th>Attachment assessment</th>
<th>Child age EU (months)</th>
<th>EU task</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altamura (U)</td>
<td>2010</td>
<td>58</td>
<td>49</td>
<td>ASCT</td>
<td>49</td>
<td>Emotion labelling and understanding (Denham, 1986)</td>
<td>.45</td>
</tr>
<tr>
<td>Greig &amp; Howe*</td>
<td>2001</td>
<td>45</td>
<td>40</td>
<td>ASCT</td>
<td>40</td>
<td>Emotion labelling and understanding (Denham, 1986)</td>
<td>.52</td>
</tr>
<tr>
<td>Kidwell et al.</td>
<td>2010</td>
<td>54</td>
<td>54</td>
<td>PAA</td>
<td>54</td>
<td>Emotion labelling and understanding (positive and negative; Saarni, 1999)</td>
<td>.46</td>
</tr>
<tr>
<td>Laible &amp; Thompson</td>
<td>1998</td>
<td>40</td>
<td>50</td>
<td>AQS - mother</td>
<td>50</td>
<td>Emotion labelling and understanding (Denham, 1986 + naturalistic interview)</td>
<td>.39</td>
</tr>
<tr>
<td>Laible et al.*</td>
<td>2004</td>
<td>51</td>
<td>49</td>
<td>AQS - mother</td>
<td>49</td>
<td>Emotion labelling and understanding (Denham, 1986)</td>
<td>.50</td>
</tr>
<tr>
<td>Laible et al.*</td>
<td>2011</td>
<td>50</td>
<td>51</td>
<td>AQS - mother</td>
<td>51</td>
<td>Emotion labelling and understanding (Denham, 1986)</td>
<td>.00</td>
</tr>
<tr>
<td>McQuaid et al.*</td>
<td>2008</td>
<td>33</td>
<td>57</td>
<td>PAA</td>
<td>57</td>
<td>Emotion understanding; scenario played by actors</td>
<td>.34</td>
</tr>
<tr>
<td>[Blinded for review]</td>
<td>160</td>
<td>15; 44; 51</td>
<td>SSP; PAA; ASCT; SAT</td>
<td>51; 61</td>
<td>Emotion labelling and understanding (Denham, 1986) + Test of Emotion Comprehension (Pons, Harris, &amp; de Rosnay, 2004)</td>
<td>.07; -.02; .24; .19; .33; .23; .11; -.04</td>
<td></td>
</tr>
<tr>
<td>Ontai et al</td>
<td>2002</td>
<td>50</td>
<td>41</td>
<td>AQS - mother</td>
<td>41</td>
<td>Emotion labelling and understanding (Denham, 1986)</td>
<td>.12</td>
</tr>
<tr>
<td>Psychogiou et al.*</td>
<td>2018</td>
<td>105; 81</td>
<td>68</td>
<td>Manchester Child Attachment Story task</td>
<td>68</td>
<td>Test of Emotion Comprehension (Pons &amp; Harris, 2000)</td>
<td>.30; .32</td>
</tr>
<tr>
<td>Author</td>
<td>Year</td>
<td>N</td>
<td>Child age attachment (months)</td>
<td>Attachment assessment</td>
<td>Child age EU (months)</td>
<td>EU task</td>
<td>r</td>
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<td>-----------------------------</td>
<td>-----------------------</td>
<td>----------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>-----</td>
</tr>
<tr>
<td>Raikes &amp; Thompson</td>
<td>2006; 2008</td>
<td>42</td>
<td>28</td>
<td>AQS - observer</td>
<td>42</td>
<td>Emotion labelling and understanding (Denham, 1986)</td>
<td>.44</td>
</tr>
<tr>
<td>Repacholi &amp; Trapolini</td>
<td>2004</td>
<td>48</td>
<td>54</td>
<td>SAT</td>
<td>54</td>
<td>Causes of Emotion interview (Dunn &amp; Hughes, 1998)</td>
<td>.30</td>
</tr>
<tr>
<td>Steele et al.</td>
<td>1999; 2002; 2008</td>
<td>60;63</td>
<td>12;18</td>
<td>SSP</td>
<td>71</td>
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<td>Vaughn et al.</td>
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<td>39</td>
<td>45</td>
<td>ASCT</td>
<td>45</td>
<td>Emotion labelling and understanding (adapted version; Denham, 1998)</td>
<td>.46</td>
</tr>
<tr>
<td>Waters et al</td>
<td>2010</td>
<td>72</td>
<td>54</td>
<td>AQS - mother</td>
<td>54</td>
<td>Negative emotion understanding (Denham, 1986)</td>
<td>.10</td>
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</table>

Note. ASCT = Attachment Story Completion Task; AQS = Attachment Q-Sort; SAT = Separation Anxiety Test; SSP = Strange Situation Procedure; PAA = Preschool Assessment of Attachment.

*Additional information provided by authors: Controle voor taal: raikes en thompson (r = .29)

*Effect size calculated on the basis of insecure/secure group differences
### APPENDIX F2 CHAPTER 3

**Characteristics of the Included Studies on Attachment and False Belief Understanding**

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<tr>
<th>Author</th>
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<th>N</th>
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<th>Child age FB task (months)</th>
<th>FB task</th>
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<td>Arranz et al.</td>
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<tr>
<td>De Rosnay &amp; Harris</td>
<td>2002</td>
<td>51</td>
<td>60.9</td>
<td>SAT</td>
<td>60.9</td>
<td>Desire-belief reasoning</td>
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</tr>
<tr>
<td>Fonagy et al.</td>
<td>1997</td>
<td>77</td>
<td>58</td>
<td>SAT</td>
<td>58</td>
<td>Desire-belief reasoning</td>
<td>.37</td>
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<tr>
<td>Greig &amp; Howe</td>
<td>2001</td>
<td>45</td>
<td>40</td>
<td>ASCT</td>
<td>40</td>
<td>Unexpected identity/content</td>
<td>.09</td>
</tr>
<tr>
<td>Laranjo et al.</td>
<td>2010/2014</td>
<td>59</td>
<td>15.6</td>
<td>AQS - observer</td>
<td>48.9</td>
<td>Unexpected identity</td>
<td>-.13</td>
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<tr>
<td>Marchetti et al.*</td>
<td>2014</td>
<td>30</td>
<td>76.4</td>
<td>SAT</td>
<td>76.4</td>
<td>Unexpected transfer</td>
<td>.19</td>
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<tr>
<td>McElwain &amp; Volling</td>
<td>2004</td>
<td>32</td>
<td>12</td>
<td>SSP</td>
<td>51</td>
<td>Unexpected transfer</td>
<td>.30 / .50</td>
</tr>
<tr>
<td>Meins et al.</td>
<td>1998</td>
<td>30</td>
<td>12</td>
<td>SSP</td>
<td>49 /61.5</td>
<td>Unexpected transfer; Desire-belief reasoning</td>
<td>.51 / .23</td>
</tr>
<tr>
<td>Meins et al. *</td>
<td>2002</td>
<td>52</td>
<td>12</td>
<td>SSP</td>
<td>45 / 48</td>
<td>Unexpected transfer; Unexpected identity/content</td>
<td>.26; -.19</td>
</tr>
<tr>
<td>[Blinded for review]</td>
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<td>160</td>
<td>15;44;51</td>
<td>SSP; PAA; ASCT; SAT</td>
<td>51; 61</td>
<td>Unexpected transfer; Unexpected identity/content</td>
<td>.01; .02; .08; .06; .09; .16</td>
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<td>Moore &amp; Symons</td>
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<td>48</td>
<td>AQS</td>
<td>42</td>
<td>Unexpected transfer; Unexpected identity/content</td>
<td>.32</td>
</tr>
<tr>
<td>Ontai &amp; Thompson *</td>
<td>2008</td>
<td>78</td>
<td>54</td>
<td>AQS</td>
<td>54</td>
<td>Unexpected transfer; Desire-belief reasoning</td>
<td>-.02; .04</td>
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<tr>
<td>Oppenheim et al.*</td>
<td>2005</td>
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<td>12</td>
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<td>48</td>
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<td>.00</td>
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### Characteristics of the Included Studies on Attachment and False Belief Understanding (continued)

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>N</th>
<th>Child age attachment (months)</th>
<th>Attachment</th>
<th>Child age FB task (months)</th>
<th>FB task</th>
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<td>19</td>
<td>AQS</td>
<td>51</td>
<td>Unexpected transfer; unexpected identity/content</td>
<td>-.21; .00</td>
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<tr>
<td>Repacholi &amp; Trapolini</td>
<td>2004</td>
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<td>54</td>
<td>SAT</td>
<td>54</td>
<td>Unexpected identity</td>
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<tr>
<td>Symons &amp; Clark</td>
<td>2000</td>
<td>46</td>
<td>25 / 70</td>
<td>AQS</td>
<td>70</td>
<td>Unexpected transfer; unexpected identity/content</td>
<td>.02; .06 / .23; .30</td>
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<tr>
<td>Villachan-Lyra et al</td>
<td>2015</td>
<td>20 / 20</td>
<td>36 / 48</td>
<td>ASCT</td>
<td>36 / 48</td>
<td>Unexpected transfer; unexpected identity/content</td>
<td>.42; .43 / .44; .45</td>
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</table>

Note. ASCT = Attachment Story Completion Task; AQS = Attachment Q-Sort; SAT = Separation Anxiety Test; SSP = Strange Situation Procedure; PAA = Preschool Assessment of Attachment.

*Additional information provided by authors

*effect size calculated on the basis of insecure/secure group differences
### APPENDIX C CHAPTER 3

Overview of Quantitative and Categorical Variables Coded for Each Primary Study Including Response Categories

<table>
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</tr>
<tr>
<td>Sample size</td>
</tr>
<tr>
<td>Effect size controlled or not</td>
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</table>

<table>
<thead>
<tr>
<th>Sample characteristics</th>
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<tbody>
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<td>Country in which the families lived</td>
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<tr>
<td>North-America / Europe / Other</td>
</tr>
<tr>
<td>Percentage boys</td>
</tr>
<tr>
<td>Age of the parent</td>
</tr>
<tr>
<td>Age of the child during the mentalization/attachment assessment</td>
</tr>
<tr>
<td>Socioeconomic status of the family</td>
</tr>
<tr>
<td>Low-middle / middle-high</td>
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</table>

<table>
<thead>
<tr>
<th>Characteristics of the attachment assessment</th>
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</thead>
<tbody>
<tr>
<td>Instrument attachment</td>
</tr>
<tr>
<td>Stange Situation Procedure / Attachment Q-Sort / Separation Anxiety Test / Attachment Completion Task</td>
</tr>
<tr>
<td>Location</td>
</tr>
<tr>
<td>Lab / Home</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics of the FB/EU assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of FB task</td>
</tr>
<tr>
<td>Unexpected transfer / Unexpected identity / Desire – Belief reasoning</td>
</tr>
<tr>
<td>Type of EU task</td>
</tr>
<tr>
<td>Denham’s emotion understanding task / other</td>
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<td>Location FB/EU task</td>
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<td>Lab / Home</td>
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</table>
APPENDIX I CHAPTER 8

Main Effects of Parent Gender (with Father as a Reference Category) and Interaction Effects with Posttest and Follow-up

<table>
<thead>
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<th></th>
<th>B (SE)</th>
<th>F</th>
<th>Cohen's d</th>
<th></th>
<th>B (SE)</th>
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<th>Cohen's d</th>
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<td>0.16</td>
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<td>-0.09</td>
<td>Father</td>
<td>-3.60 (1.38)</td>
<td>6.77**</td>
<td>-0.35</td>
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<td>-3.60 (1.38)</td>
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<td>2.24 (0.89)</td>
<td>6.29**</td>
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<td>Father</td>
<td>2.24 (0.89)</td>
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<td>-1.68 (0.79)</td>
<td>4.52*</td>
<td>-0.35</td>
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<tr>
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<td>1.63 (0.88)</td>
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</tr>
<tr>
<td>Father * follow-up</td>
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<td>0.32</td>
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<td>1.88 (0.95)</td>
<td>2.97*</td>
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Main Effects of Parent Gender (with Father as a Reference Category) and Interaction Effects with Posttest and Follow-up (continued)

<table>
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<th>Parenting Stress</th>
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<th>Cohen’s d</th>
<th>Disorganized attachment</th>
<th>B (SE)</th>
<th>F</th>
<th>Cohen’s d</th>
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<td>Father</td>
<td>-1.52 (0.77)</td>
<td>4.43*</td>
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<tr>
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<td>2.20 (1.47)</td>
<td>2.23</td>
<td>0.24</td>
<td>Father * posttest</td>
<td>0.20 (0.77)</td>
<td>0.07</td>
<td>0.04</td>
</tr>
<tr>
<td>Father * follow-up</td>
<td>1.93 (1.53)</td>
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<td>Father * follow-up</td>
<td>0.18 (0.83)</td>
<td>0.05</td>
<td>0.03</td>
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</tbody>
</table>

Note. MRC = mind-related comments, B = the unstandardized parameter coefficient of the posttest and follow-up relative to the pretest, SE = standard error of parameter estimate. † = p < .1, * = p < .05, ** = p < .01, *** = p < .001. The label Father presents main effects of fathers compared to mother, taken all measurement times together. The label Father x posttest indicates whether the pre- to posttest changes were different for fathers compared to mothers, the label Father x follow-up indicates whether effects were the pretest to follow-up changes were different for fathers compared to mothers.
SUMMARY

Mentalizing, the capacity to interpret behaviors of the self and others in terms of mental states, is a hugely influential construct for understanding individual differences in development across the life span. Since two decades, mentalizing became embedded in theories that explain infant-parent attachment security as well as socioemotional functioning, and parenting researchers developed ways to assess parents’ mentalizing capacity. This dissertation aimed to review the existing mentalizing-attachment literature of the past two decades. Second, this dissertation aimed to extend existing research on parental mentalization by investigating whether both mothers’ and fathers’ mind-mindedness uniquely predicts children’s socioemotional functioning of, and whether parents’ mind-mindedness is adaptable through intervention. Section 1 (Chapters 2 and 3) included two meta-analytic studies on the associations between parents’ and children’s mentalizing and child-parent attachment security. Section 2 (Chapters 4 and 5) addressed fundamental questions on whether mind-mindedness of mothers and fathers predicts infants’ regulated emotional responding, as well as preschoolers’ behavior problems and social competence later in childhood. Section 3 (Chapters 6, 7, and 8) included an evaluation of two interventions that aim to change parents’ “online” moment-to-moment representations of their child’s mind.

Since research on the association between people’s mentalizing and attachment relationships expanded hugely the past two decades, the aim of Section 1 was to synthesize the research on the associations among the parent’s and child’s mentalizing capacity and child-parent attachment security. In Chapter 2 we investigated whether parents’ mentalizing capacity (i.e., mind-mindedness, parental reflective functioning, and insightfulness) uniquely predicts variation in attachment, over and above parental sensitivity. The pooled correlations presented moderate but robust associations between parental mentalization and attachment security, as well as parental sensitivity. 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. The results imply that parental mentalization explains unique variation in attachment, and should be incorporated into existing models that map the predictors of infant-parent attachment.

In Chapter 3 we investigated whether there are direct pooled associations between attachment and two hallmarks of children’s mentalizing abilities: false-belief understanding and emotion understanding. Although a body of studies exists in which attachment is examined as a predictor of early mentalizing abilities of preschoolers, doubts have been raised about whether the attachment-mentalization relation is...
Summary

significant and direct. The results of Chapter 3 showed that the pooled correlation between attachment and emotion understanding was significantly larger than the pooled correlation between attachment and false belief understanding, suggesting that attachment relates more strongly to processes involved in understanding other people's emotions. Children's language ability mediated the association between attachment and false belief understanding, but not the association between attachment and emotion understanding. Lastly, the attachment assessment approach was a significant moderator of the attachment-mentalizing association—studies using representational measures of attachment reported significant associations between attachment and false belief or emotion understanding, whereas studies using behavioral measures of attachment did not. Given that only representational attachment tasks were associated with mentalizing tasks, the observed attachment-mentalizing association may be due to representational attachment measures and mentalizing tasks drawing on the same ability to understand others' internal states, rather than indicating a genuine link between attachment security and children's mentalizing capacity. The outcomes provide reason to further study the opposite direction of cause and effect—are children who are good at reading their own and other people's minds better able to form secure attachments during the preschool years?

In Section 2 (Chapters 4 and 5) we investigated the (bidirectional) relations between mothers' and fathers' mind-mindedness and physiological emotion regulation in infancy, as well as behavior problems and social competence in early childhood. In Chapter 4, we tested multiple hypotheses on the associations between both parents' early mind-mindedness and infants' physiological emotion regulation across the first year of life, as indicated by levels of heart-rate variability (HRV) during rest and a stressful situation. When mothers displayed high levels of appropriate and low levels of nonattuned mind-related comments about their 4-month-olds' minds, infants had higher HRV levels during rest at 12 months, over and above infants' resting HRV levels at 4 months. The same effects were found for paternal mind-mindedness, but only at 12 months. We observed a larger HRV decline (i.e., active emotion regulation) in infants during the stranger task at 12 months when mothers made more frequent appropriate mind-related comments at 4 months, and fathers made more nonattuned comments at 12 months. Infants' HRV levels at 4 months did not predict mind-mindedness at 12 months. The results indicate that mothers' and fathers' appropriate and non-attuned mind-related speech uniquely impacts the development of infants' physiological emotion regulation.

Chapter 5 presents research on the stability, continuity, and concordance in mothers' and fathers' mind-mindedness from 4 to 30 months, as well as the joint effects of parents' early mind-mindedness on children's later social competence and behavior problems (4.5 years). The study showed that both parents' appropriate mind-related
comments and fathers’ nonattuned mind-related comments were stable from 4 to 30 months, although the amount of parents’ mind-related speech decreased over time. During infancy mothers’ and fathers’ mind-mindedness became more alike, but concordance disappeared during toddlerhood. Only when both parents were low in appropriate mind-related speech, children showed more externalizing problems at 4.5 years, implying that mothers and fathers could compensate for each other’s lack of mind-mindedness. In addition, mothers’ and fathers’ use of nonattuned mind-related comments predicted children’s low social competence and more externalizing, but not internalizing, behavior at 4.5 years. The results imply that the effects of parents’ mind-mindedness during infancy and toddlerhood may extend to preschoolers’ social and behavioral development.

In Section 3 (Chapters 6, 7, and 8), we investigated whether parental mind-mindedness increased after two interventions that explicitly aim to enhance and change parents’ representations of their child’s mind: “Mindful with your baby/toddler” and “Basic Trust”. In Chapters 6 and 7, we evaluated changes in parenting behavior after the Mindful with your baby/toddler training, a group-based mindful parenting training for mothers of infants and toddlers who experience parental stress and/or problems in the parent-child relationship. Chapter 6 presents initial results on the self-reported effects of the “Mindful with your toddler” intervention, since the effectiveness of the toddler version had not been explored previously. Overall, mothers (N = 22) reported no significant differences between waitlist and pretest. From pre- to posttest, mothers reported improvements in child psychopathology, maternal mindfulness and self-compassion (medium effect sizes). These effects were stable or further improved at a 2- and 8-month follow-up (medium/large effect sizes). Improvement in child dysregulation, maternal internalizing psychopathology, parenting stress, sense of parental incompetence, non-judgmental acceptance of parental functioning, and nonjudging of inner experience was only seen at 2- and 8-month follow-up (medium/large effect sizes). No changes in maternal externalizing psychopathology, overreactivity, compassion for the child, and partner relationship were reported. These results provided initial support that the mindful parenting group training is also successful in improving mental health in mother-toddler dyads.

In Chapter 7 we examined whether the mindful with your baby/toddler training not only reduces maternal self-reported parenting stress, but also changes objectively-measured maternal behavior during parent-child interactions and mother-child interaction quality, as compared to waitlist (N = 53 mother-child dyads). The results showed no significant changes in maternal behavior or stress between waitlist and pretest. Mothers reported less parenting stress after the training (small effect size), were more accepting (medium effect size), and made fewer nonattuned references
to the child’s mental states (large effect size). The children showed higher levels of responsiveness after the training (small to medium effect size). No significant changes occurred in appropriate mind-related comments, maternal responsiveness (vocal turn-taking), and dyadic coordination of gaze and facial expressions. The outcomes suggest that the Mindful with your baby/toddler training affects not only maternal stress, but also maternal behavior, particularly (over)reactive parenting behaviors, which resulted in more acceptance, better attunement to child’s mental world, and more “space” for children to respond to their mothers during interactions.

The Basic Trust method, presented in Chapter 8, is an example of an attachment-based intervention method that is focused on explicitly improving children’s mentalizing abilities through teaching parents to frequently and consistently make the child aware of their own and others’ mental states (i.e., by frequently using mental state language when interacting with their child). We studied post-intervention changes in children’s attachment insecurity and behavior problems, as well as parents’ mind-mindedness, sensitivity and parenting stress in 53 families with internationally adopted children who were insecurely attached to their adoptive parents. Children showed less insecure attachment behaviors (small effect sizes, internalizing and externalizing behaviors (medium effect size). Mothers’ and fathers’ stress decreased from pre-test to posttest and these effects were sustained at the six-month follow-up (medium effect sizes). Both parents’ sensitivity showed improvement at follow-up (medium effect size), but not at posttest, whereas both parents’ mind-mindedness showed an improvement at posttest (medium effect size), but not at the follow-up assessment.

Altogether, the outcomes presented in the separate chapters provide support for the idea that parents’ mentalizing about their child is an essential characteristic that sets in motion a positive developmental pathway of children by: (a) fostering secure attachment and better emotion regulation capacity during infancy, (b) providing interactions in which children are able to learn about their own and others’ minds, and (c) aids the development of more (socially) adaptive behaviors and less maladaptive behaviors. The outcomes of this dissertation also indicate that predicting child development is complex. It seems necessary to take into account the entire family system and the stressors they face when investigating children’s socioemotional functioning. Since aspects of the parent’s capacity to mentalize seem adaptable, we should learn more about which aspects of mentalizing in the parent-child relationship are essential for positive developmental changes in children to occur.
Mentaliseren is een veel besproken en onderzochte capaciteit in de literatuur over de mentale gezondheid van volwassenen en de sociale ontwikkeling van kinderen. Sinds twee decennia is mentaliseren opgenomen in theorieën die de veilige gehechtheid van kinderen verklaren. Ook hebben gedragswetenschappers verschillende manieren ontwikkeld om het mentaliserend vermogen van ouders goed te kunnen meten. Het eerste doel van dit proefschrift was om de bestaande literatuur over mentaliseren en kind-ouder gehechtheid samen te vatten. Daarnaast beoogde dit proefschrift om de bestaande literatuur uit te breiden door te onderzoeken of (a) het mentaliserend vermogen van zowel moeders als vaders een unieke voorspeller is van het sociaal-emotioneel functioneren van kinderen, en (b) of behandeling gericht op het verbeteren van het mentaliseren van ouders leidt tot positieve veranderingen in gedrag en mentale gezondheid van ouders en kinderen. Sectie 1 (hoofdstukken 2 en 3) bevat twee meta-analyses over mentaliseren van ouders en kinderen in relatie tot een veilige kind-ouder gehechtheid. In sectie 2 (hoofdstukken 4 en 5) onderzochten we of mentaliseren (d.w.z. mind-mindedness; Meins, 1997) van moeders en vaders de fysiologische stressreactie van baby’s voorspelt, alsook de gedragsproblemen en sociale competenties van kleuters. In sectie 3 (hoofdstukken 6, 7, en 8) evalueerden we twee interventies die tot doel hebben het mentaliseren van ouders te veranderen.

In hoofdstuk 2 onderzochten we of het mentaliserend vermogen van ouders (d.w.z. mind-mindedness, reflective functioning, en insightfulness) unieke variantie in baby-ouder gehechtheid verklaart, naast de variantie die door sensitiviteit van ouders wordt verklaard. Om deze vraag te onderzoeken, voegden we de resultaten van alle studies naar de associatie tussen mentaliseren en sensitiviteit van ouders, en baby-ouder gehechtheid samen. Daarna onderzochten we of, alle studies samengenomen, de associatie tussen mentaliseren en gehechtheid nog steeds significant was. De resultaten lieten een middelgroot verband zien tussen mentaliseren van ouders en veilige baby-ouder gehechtheid, alsook tussen ouderlijk mentaliseren en sensitiviteit. Hoewel de effectgrootte van de mentaliseren-gehechtheid relatie afnam na controle voor het effect van sensitiviteit van ouders (en vice versa), bleven de directe effecten van beide voorspellers substantieel. We namen ook een klein indirect effect van mentaliseren op gehechtheid via sensitiviteit waar. De resultaten suggereren dat het mentaliserend vermogen van ouders een unieke indicator is van een veilige baby-ouder gehechtheidsrelatie, en dat mentaliseren van ouders moet worden opgenomen in bestaande modellen die de voorspellers van veilige baby-ouder gehechtheid in kaart brengen.
In Hoofdstuk 3 onderzochten we of veilige gehechtheid gerelateerd is aan twee 'markers' van mentaliseren bij kinderen: het begrijpen van onjuiste overtuigingen in anderen (false-belief begrip, vaak aangeduid als theory of mind) en het begrijpen van emoties in anderen. Hoewel er een flink aantal studies is gedaan naar veilige gehechtheid als voorspeller van het mentaliserend vermogen van kinderen, was er twijfel of de gehechtheid-mentaliseren relatie significant en direct is. De resultaten van Hoofdstuk 3 lieten zien dat de associatie tussen gehechtheid en begrip van emoties, $r = .31$, groter is dan die tussen gehechtheid en false-belief begrip, $r = .19$. Taalvaardigheid van kinderen bleek de associatie tussen gehechtheid en false-belief begrip te mediëren: Kinderen met een veilige gehechtheid hebben vaker een betere taalvaardigheid en scoren daardoor mogelijk beter op false-belief taken. Verder bleek de operationalisatie van gehechtheid een modererend effect te hebben op de associatie tussen gehechtheid en mentaliseren. We vonden namelijk dat studies die gehechtheid classificeerden aan de hand van een beoordeling van gedrag van kinderen (bijv. the strange situation procedure) geen significante samenhang lieten zien tussen gehechtheid en mentaliseren (zowel begrip van emoties als false belief begrip). Aan de andere kant vonden we dat studies die gehechtheid classificeerden aan de hand van een beoordeling van gehechtheidsrepresentaties (bijv. de Attachment Story Completion Task) wel een samenhang lieten zien tussen gehechtheid en mentaliseren van kinderen. Representatietaken meten gehechtheid aan de hand van verhaaltjes met plaatjes of poppen over situaties die gehechtheidsgedrag activeren. In representatietaken wordt aan kinderen gevraagd te vertellen wat zij zouden doen in een dergelijke situatie en dat vereist van kinderen dat ze het perspectief van anderen kunnen nemen. Omdat de operationalisatie van gehechtheid een significante moderator was, is het mogelijk dat de link tussen gehechtheid en mentaliseren van kinderen dus voortkomt uit methodologische kwesties, en niet uit een daadwerkelijke relatie tussen vroege gehechtheid en later mentaliseren van kinderen. De resultaten werpen daarmee ook de vraag op of er bi-directionele effecten zijn tussen gehechtheid en mentaliseren—zijn kleuters die goed kunnen mentaliseren beter in staat veilige gehechtheidsrepresentaties te ontwikkelen? Dit idee vereist echter vervolgonderzoek, omdat direct empirisch bewijs hiervoor tot nu toe ontbreekt.

Omdat het de premisse van de gehechtheidstheorie is dat veilige gehechtheid de sociale en emotionele ontwikkeling van kinderen bevordert, onderzochten we in Sectie 2 of de effecten van mentaliseren van ouders zich uitstrekken tot het sociaal-emotioneel functioneren van jonge kinderen (van baby tot kleuter). Het specifieke doel van Sectie 2 (Hoofdstukken 4 en 5) was om te onderzoeken of het mentaliseren van moeders en vaders de werking van het autonome zenuwstelsel in 12-maanden-oude baby’s voorspelt (d.w.z. fysiologische emotie-regulatie), alsook gedragsproblemen en
sociale competenties in de kleutertijd. Mentaliseren werd in deze studies gemeten door de mind-mindedness van moeders en vaders in kaart te brengen. Mind-mindedness gaat over de neiging van ouders om de mentale toestanden (gevoelens, gedachten, voorkeuren) van hun kind te herkennen en op gepaste manier te verwoorden tijdens interacties, en kent twee indexen. Appropriate mind-mindedness geeft weer hoe vaak een ouder op gepaste wijze over de mentale toestanden van het kind praat (bijv. “Jij vindt dit een heel leuk boekje” wanneer een kind tekenen van enthousiasme laat zien tijdens het lezen). Nonattuned mind-mindedness geeft weer hoe vaak de ouder niet goed afgestemde opmerkingen over de mentale toestand van het kind maakt (bijv. ‘Jij bent moe’, wanneer de baby zich verzet tegen oppakken door de ouder en geen signalen van moeheid laat zien).

In Hoofdstuk 4, hebben we meerdere hypothesen getoetst over de associaties tussen de mind-mindedness van beide ouders en fysiologische emotieregulatie gedurende het eerste levensjaar, gemeten door de levels van hartslagvariatie (HSV) gedurende rust en een stressvolle ontmoeting met een vreemde man (opgepakt worden). We vonden dat moeders die blijk gaven van een hoge mate van mind-mindedness (hoog in appropriate mind-gerelateerde opmerkingen en laag in nonattuned mind-gerelateerde opmerkingen), vaker een baby hadden met een hogere HSV tijdens rust, en daarmee een ‘betere’ emotieregulatie-capaciteit. Dit bleek zowel op 4 als 12 maanden. Voor vaders trad het effect ook op, maar dan alleen op 12 maanden. Deze effecten werden gevonden ongeacht de eerdere HSV levels van baby’s op 4 maanden. We vonden een grotere afname in de HSV van baby’s tijdens de ‘vreemde man’ taak op 12 maanden wanneer moeders meer mind-minded waren op 4 maanden en vaders op 12 maanden. De HSV levels van baby’s op 4 maanden waren geen voorspeller van mind-mindedness op 12 maanden. De resultaten impliceren dat de mate van mind-mindedness van zowel vaders als moeders een belangrijke indicator is van de ontwikkeling van fysiologische emotie-regulatie in baby’s gedurende het eerste levensjaar.

In Hoofdstuk 5 onderzochten we de stabiliteit, continuïteit, en overeenstemming in de mind-mindedness van moeders en vaders gedurende de baby- en peutertijd. Ook onderzochten we de effecten van mind-mindedness op de latere gedragsproblemen en sociale competentie van kleuters (4,5 jaar). Appropriate mind-gerelateerde opmerkingen van beide ouders en nonattuned mind-gerelateerde van vaders liet stabilité zien van 4 tot 30 maanden, hoewel het aantal mind-gerelateerde opmerkingen afnam over de tijd. Gedurende het eerste levensjaar van het kind, ontstond een correlatie tussen de mind-mindedness van moeders en vaders, maar die correlatie verdween weer gedurende de peutertijd. Alleen wanneer beide ouders weinig over de gevoelens en gedachten van de baby praatten, lieten kinderen op 4,5 jaar meer externaliserende gedragsproblemen zien. Dit impliceert dat moeders en vaders een ‘gebrek’ aan
mentaliseren van hun partner mogelijk kunnen compenseren. Belangrijk is hierbij te vermelden dat de studie een steekproef met gemiddeld hoogopgeleide ouders betrof met gemiddeld weinig psychische problemen. Mogelijk is dit effect anders in hoogrisico populaties (bijv. gezinnen met een ouder met psychopathologie of veel socio-economische stressoren). Ten slotte zagen we dat moeders en vaders die moeite hadden met het juist interpreteren van hun baby’s mentale toestanden (hoog in non-attuned mind-mindedness), op latere leeftijd vaker een kleuter hadden met minder goede sociale competenties en meer opstandig en dwars gedrag.

In Sectie 3 (Hoofdstukken 6, 7, en 8) onderzochten we of ouders meer mind-minded werden na twee interventies die erop gericht zijn te veranderen hoe (vaak) ouders de mentale toestanden van hun kind representeren: Mindful met je baby/peuter en Basic Trust. In hoofdstukken 6 en 7 evalueerden we veranderingen in ouderlijk gedrag na de Mindful met je baby/peuter training, een mindfulness groep training voor moeders van baby’s en peuters die stress en/of problemen in de ouder-kind relatie ervaren. Hoofdstuk 6 presenteert een pilot studie naar de zelf-gerapporteerde effecten van de Mindful met je peuter interventie, omdat de effectiviteit van de peuter-training nog niet eerder was onderzocht. Moeders (N = 22) rapporteerden geen significante verschillen tussen de wachtlijst-meting en voormeting. Na de behandeling rapporteerden moeders verbeteringen in psychopathologie (kind), mindful opvoeden, en zelf-compassie (gemiddeld effect). Deze effecten bleven bestaan of verbeterden tijdens de 2- en 8-maanden follow-up (gemiddeld tot groot effect). Verbetering in regulatie van kinderen, internaliserende problematiek van moeders, opvoedstress, gevoel van ouderlijke incompetentie, acceptatie van ouderlijk functioneren, en niet-oordelende houding over innerlijke ervaringen werden alleen gevonden op de 2- en 8-maanden follow-up (gemiddeld tot groot effect). We vonden geen veranderingen in externaliserende psychopathologie van moeders, overreactiviteit, compassie voor het kind, en partner relaties. Deze resultaten geven een eerste indicatie dat de mindfulness groepstraining ook succesvol is in het verbeteren van de geestelijke gezondheid van moeder-peuter paren.

In Hoofdstuk 7 onderzochten we of de mindful met je baby/peuter training niet alleen stress van moeders vermindert, maar ook leidt tot veranderingen in geobserveerd opvoedgedrag van moeders tijdens interacties met hun kind. In totaal werden 53 moeder-kind paren gezien tijdens een wachtlijst-meting (8 weken voor de training), voormeting en nameting (direct na de training). De resultaten lieten geen veranderingen zien in stress of gedrag van moeders in de periode van wachtlijstmeting tot aan de start van de training. Moeders rapporteerden na de training minder stress (klein effect), ze lieten meer acceptatie zien (gemiddeld effect), en maakten minder nonattuned opmerkingen over de gevoelens en gedachten van hun kind (groot effect).
De kinderen lieten meer responsiviteit zien na de training (klein tot gemiddeld effect). Geen veranderingen werden waargenomen in moeders’ appropriate mind-gerelateerde opmerkingen, moederlijke responsiviteit, en de ouder-kind synchronie (d.w.z. synchronie in kijkrichting en gezichtsuitdrukking). De uitkomsten suggereren dat de Mindful met je baby/peuter training niet alleen stress van moeders beïnvloedt, maar ook gedrag van moeders, in het bijzonder (over-)reactief opvoedgedrag. Dit resulteert in meer acceptatie, betere afstemming op de mentale wereld van het kind, en meer ‘ruimte’ voor kinderen om te reageren op hun moeders tijdens interacties.

De Basic Trust methode, beschreven in Hoofdstuk 8, is een voorbeeld van een gehechtheidsinterventie die erop gericht is mentaliserend vermogen van ouders expliciet te verbeteren door ouders te leren om frequent de gedachten en gevoelens van het kind te verwoorden. We onderzochten de effecten van de training op verschillende gebieden: onveilig gehechtheidsgedrag (kind) dwars en opstandig gedrag (kind), het mentaliserend vermogen (mind-mindedness; ouder), sensitiviteit (ouder), en opvoedstress. In totaal deden 53 internationaal geadopteerde kinderen met gehechtheidsproblemen en hun moeders en vaders mee aan een voormeting, nameting en zes-maanden follow-up meting. Ouders rapporteerden na de behandeling dat hun kinderen minder onveilig gehechtheidsgedrag lieten zien (klein effect), alsook minder internaliserende en externaliserende gedragsproblemen (gemiddeld effect). Opvoedstress van moeders en vaders nam af van de voormeting naar de nameting (gemiddeld effect). Deze afname was nog steeds aanwezig zes maanden na de behandeling. Sensitiviteit van zowel vaders als moeders liet een verbetering zien zes maanden na de behandeling, maar niet direct na de behandeling. Mind-mindedness van ouders liet direct na de behandeling een verbetering zien, maar deze verbetering was niet meer zichtbaar zes maanden na de behandeling.

Over het geheel genomen, ondersteunen de studies in dit proefschrift het idee dat mentaliseren van ouders een essentieel kenmerk van ouders is dat een positief ontwikkelingstraject van kinderen in gang zet door (a) een veilige gehechtheid en betere emotie-regulatie capaciteit tijdens de babytijd te voeden, (b) interacties te bieden waarin kinderen de mogelijkheid krijgen om over hun eigen en andermans gedachten en gevoelens te leren, en (c) de ontwikkeling van (sociaal) flexibel en adaptief gedrag en minder maladaptief gedrag bevordert. De uitkomsten van de eerste twee secties laten tevens zien dat het voorspellen van kind-ontwikkeling zeer complex is. Het ziet er naar uit dat het noodzakelijk is om in onderzoek naar de sociaal-emotionele ontwikkeling van kinderen het gehele gezinssysteem in acht te nemen alsook de (socio-economische) stressoren. Sectie 3 impliceert dat mentaliseren (mind-mindedness) van ouders een veranderbare eigenschap is, hoewel de resultaten van dit proefschrift de vraag opwerpen of kortdurende gezinsinterventies langdurende effecten in het mentaliseren...
van ouders te weeg kunnen brengen. Om hier meer zicht op te krijgen zullen we meer moeten leren over de antecedenten van mentaliseren, alsook over de lange-termijn effecten van mentaliseren-bevorderende gezinsinterventies.
PUBLICATIONS AND CONTRIBUTION OF AUTHORS


MZ and CC designed the study. MZ conducted literature searches, coded the studies, and conducted the statistical analysis. CC coded studies for the interrater reliability. MZ wrote the manuscript. All authors contributed to and have approved the final manuscript.


MZ, EM, and CC designed the study. MZ conducted literature searches, coded the studies, and conducted the statistical analysis. CC coded studies for the interrater reliability. MZ wrote the manuscript. All authors contributed to and have approved the final manuscript.


SM designed the original prospective study on the antecedents of social anxiety in children. MZ and WdV designed the study on mind-mindedness and infant cardiac activity. WdV, MN, MM, and CC collected data. MZ, MM, and CC coded parent-child observations. WdV and “MN processed physiology data. MZ performed the statistical analyses. MZ wrote the manuscript. All authors contributed to and have approved the final manuscript.

SM designed the original prospective study on the antecedents of social anxiety in children. CC, MZ, and MM collected data. MZ and CC coded parent-child observations. CC performed the statistical analyses. CC wrote the manuscript. All authors contributed to and have approved the final manuscript.


EP and SB contributed to the design of the study. EP developed the training. EP and MZ did the statistical analyses. EP supervised data collection. EP and MZ wrote the manuscript. SB contributed to and has approved the final manuscript.


MZ, EP, IV, EA, SB, and CC contributed to the design of the study. MZ did the statistical analyses. EP developed the trainings. EP and IV were the mindfulness trainers. MZ, IV, MG, and CC contributed to data collection. MZ, CC, and EP supervised data collection. MZ and EP wrote the manuscript. All authors contributed to and have approved the final manuscript.


CC, NP, and GS designed the study. MZ and CC contributed to data collection. MZ, CC, and GS supervised data collection. MZ and CC coded parent-child interactions. MZ wrote the manuscript. All authors contributed to and have approved the final manuscript.
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ABOUT THE AUTHOR

Moniek Zeegers (1988) was born and grew up in Utrecht, the Netherlands. She currently lives in Amsterdam with Geert and their son Oscar (2018). Moniek received a Bachelor degree in Criminology at the VU University in Amsterdam (2011). During her studies Moniek volunteered at a forensic psychiatric center for two years. The conversations with the psychiatric patients made her aware of the fundamental importance of secure child-parent attachment relationships. She therefore proceeded to study Pedagogical Sciences at the University of Amsterdam (short Bachelor track; 2012). Moniek received a clinical Master degree in Pedagogical Sciences (Cum laude; 2014) and Research Master degree in Child Development and Education (Cum laude; 2015), at the Research Institute for Child Development and Education (RICDE), University of Amsterdam. In 2015, Moniek worked for six months at the mental health care institute Bosman GGZ, before she started her PhD track at the RICDE. In 2016 she visited the lab of Professor Elizabeth Meins at the University of York. In 2017 and 2018 she worked at Basic Trust, trauma and attachment center, counseling parents of children with attachment-related problems. Moniek currently works as a postdoctoral researcher at the RICDE where she studies whether dysfunctional parenting alters methylation of stress system genes throughout infancy.
The fact that we try to make sense of our own and others’ behavior in terms of thoughts and feelings is unique to us as humans. This capacity is termed mentalizing, or theory of mind, and has proven to be a hugely influential construct for understanding individual differences in development across the life span. Over the last two decades, mentalizing has become embedded in theories that attempt to explain child-parent attachment security as well as children’s socioemotional functioning. This dissertation aimed to a) review the existing literature on parents’ and children’s mentalizing in relation to child-parent attachment security, b) extend the existing research on parents’ mentalization by investigating whether mothers’ and fathers’ mentalizing (i.e., mind-mindedness) predicts variation in children’s emotion regulation and behavioral functioning, and c) investigate whether parents’ mentalizing is changeable through intervention.