KU LEUVEN

FACULTY OF PSYCHOLOGY AND
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RESEARCH UNIT CLINICAL PSYCHOLOGY

THE ROLE OF PARENTAL MENTALIZING IN EARLY PARENTHOOD: ASSOCIATIONS WITH PARENT AND CHILD PSYCHOLOGICAL FUNCTIONING

Doctoral thesis offered to obtain the degree of Doctor of Psychology

Liesbet Nijssens

Supervisor: Prof. dr. Patrick Luyten | Co-supervisors: Prof. dr. Linda C. Mayes, Prof. dr. Nicole Vliegen

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The role of parental mentalizing in early parenthood: Associations with parent and child psychological functioning

Doctoral dissertation submitted in partial satisfaction of the requirements for the degree of Doctor in Psychology by **Liesbet Nijssens**

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Parental mentalizing is an umbrella term that is used to refer to various research traditions that focus on the purported role of caregivers' capacity to envision their child as motivated by inner mental states. One of these research traditions, which originated in research on the role of attachment and reflective functioning, emphasizes the capacity for parental reflective functioning (PRF) in child development. PRF refers to the capacity of parents to understand their own and their child's behaviour in terms of underlying thoughts, feelings and desires. It is hypothesized to play an important role in the intergenerational transmission of attachment and other socio-emotional capacities, and to buffer the negative impact of early adversity. Yet, many questions remain unanswered regarding the role of PRF in psychological development. This PhD dissertation focuses on the role of PRF in infancy and early childhood specifically. It reports on a series of studies focusing on PRF and its associations with psychological functioning. The main objectives were (1) to enhance insights into the multidimensional nature and assessment of PRF, (2) to identify potential gender differences in PRF, and (3) to broaden our knowledge of the relationships between different dimensions of PRF and a wide array of developmental outcomes in both parents and their children.

Chapter 1 outlines the theoretical background and central research aims that guided our research. Chapter 2 and 3 report the findings of a prospective study investigating the mediating role of PRF in the relationship between parental attachment on the one hand, and parenting stress (Chapter 2) and child social-emotional development (Chapter 3) on the other, from infancy to toddlerhood (N = 106 children and their parents). Chapter 4 and 5 present a cross-sectional study (N = 83 pre-school children and their mothers) examining associations between the development of Theory of Mind (ToM) in children and PRF as assessed by the Parental Reflective Functioning Questionnaire (Chapter 4) and by the accuracy and certainty of mother's estimates of their child's ToM capacities (Chapter 5). In Chapter 6, associations among offline (i.e, assessed using the Parental Reflective Functioning Questionnaire) and online (i.e., Maternal Mind-Mindedness) assessments of parental mentalizing were investigated in a prospective study (N = 72 infants and their mothers). Chapter 7 presents a general discussion of the main findings, directions for future research, and implications for clinical practice.

De rol van ouderlijk mentaliseren in pril ouderschap: Verbanden met psychologisch functioneren in ouder en kind

Proefschrift aangeboden tot het verkrijgen van de graad van Doctor in de Psychologie door **Liesbet Nijssens**

Promotor: Prof. dr. Patrick Luyten

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Ouderlijk mentaliseren is een parapluterm voor verschillende conceptualisaties die verwijzen naar het vermogen van ouders om hun eigen gedrag en dat van hun kind te begrijpen in termen van onderliggende gedachten, gevoelens en verlangens. Een van die conceptualisaties, ouderlijk reflectief functioneren (ORF), vindt zijn oorsprong in het onderzoek naar reflectief functioneren en de intergenerationele overdracht van gehechtheid. ORF speelt een belangrijke rol in het bevorderen van sociaal-emotionele vaardigheden bij kinderen en buffert de impact van negatieve levenservaringen. Toch blijven veel vragen onbeantwoord met betrekking tot de rol van ORF in de psychologische ontwikkeling. Dit proefschrift focust op de rol van ORF gedurende de vroege kindertijd en beschrijft resultaten uit drie empirische studies. De belangrijkste doelstellingen zijn (1) kennis vergroten rond de multidimensionele aard en meting van ORF, (2) het onderzoeken van genderverschillen in ORF, (3) het onderzoeken van differentiële relaties tussen ORF dimensies en een brede waaier van uitkomsten bij ouder en kind.

Hoofdstuk 1 schetst de theoretische achtergrond en de centrale hypothesen waarop dit proefschrift is gebaseerd. Hoofdstukken 2 en 3 rapporteren de bevindingen uit een prospectieve studie bij baby's en peuters en hun ouders ($N = 106$), waarin de mediërende rol van ORF wordt onderzocht in de relatie tussen ouderlijke gehechtheid enerzijds en opvoedingsstress (Hoofdstuk 2) en sociaal-emotionele ontwikkeling van kinderen (Hoofdstuk 3) anderzijds. Hoofdstukken 4 en 5 presenteren een cross-sectionele studie ($N = 83$ moeder-kind dyades) waarin de samenhang wordt onderzocht tussen de Theory of Mind (ToM) ontwikkeling bij kleuters en ORF gemeten met de Parental Reflective Functioning Questionnaire (Hoofdstuk 4) en de nauwkeurigheid en zekerheid waarmee moeders de ToM capaciteiten van hun kind inschatten (Hoofdstuk 5) . In Hoofdstuk 6 worden verbanden tussen offline (gemeten met de Parental Reflective Functioning Questionnaire) en online (Maternal Mind-Mindedness) metingen van ouderlijk mentaliseren onderzocht in een prospectieve studie bij moeders en hun baby's ($N = 72$). Hoofdstuk 7 sluit dit proefschrift af met een algemene bespreking van de belangrijkste bevindingen, suggesties voor toekomstig onderzoek en implicaties voor de klinische praktijk.

OVERVIEW OF THE FIRST AUTHORSHIP OF THE REPORTED MANUSCRIPTS

Published or accepted journal articles, and/or articles submitted for or worthy of publication

- Chapter 2: Parental attachment dimensions and parenting stress: The mediating role of parental reflective functioning
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One's destination is never a place, but a new way of seeing things – Henry Miller

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In the realm of a parent's tender gaze,
A masterpiece of understanding plays.
It's the parent's capacity to mentalize,
Unveiling the depths where the child's world lies.

With patience and presence, parents attentively listen,
To the whispers of their child's inner vision.
They sense the thoughts, the feelings within,
Creating a secure base where love and knowledge begin.

With hearts wide open and minds attuned,
Parents grasp the emotions that are finely tuned.
Providing a safe haven when life seems to shatter,
Communicating the vital message: 'You matter'.

With love and understanding as their guide,
Children grow with confidence, side by side.
They learn to understand themselves and others,
Within true connections, the child explores and discovers.

In the realm of a parent's embrace,
I, Me, and We find their rightful place.
Parental mentalizing, a work of the mind and heart,
Fostering the foundation of a resilient life start.

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CHAPTER 1
Theoretical Background and Research Aims

Parental mentalizing is an umbrella term that is used to refer to various research traditions that focus on the purported role of the capacity of parents to envision their child as motivated by inner mental states (Camoirano, 2017; Medrea & Benga, 2021; Zeegers et al., 2017). One of these research traditions, which originated in research on the role of attachment and reflective functioning (RF), emphasizes the capacity for parental reflective functioning (PRF) in child development. PRF refers to the capacity of parents to envision their child in terms of internal mental states, to reflect upon their own and their child's internal mental experiences, and to understand the child's behaviour in the context of underlying mental states and intentions (Slade, 2005, 2023). This capacity of parents to keep the mental states of their children in mind is thought to play an important role in enabling parents to respond in consistent and sensitive ways to their children's physical and emotional needs, and is considered a key factor in the development of emotional expression and communication in the child (Turner et al., 2008).

This doctoral dissertation focuses on the capacity for parental mentalizing, and PRF in particular, to enhance and further refine the knowledge concerning the role of parental mentalizing in psychological development of parents and their children in both infancy and early childhood. The overall aim is to contribute to the extant literature on early parenthood and child development by focusing on parental mentalizing and associations with psychological functioning from a multidimensional perspective. The first aim is to enhance insights into the assessment of PRF and the construct validity of the Parental Reflective Functioning Questionnaire (PRFQ; Luyten et al., 2009; Luyten, Mayes, et al., 2017), a brief self-report measure of PRF. As current knowledge is largely based on a categorical or typological approach in investigating parental mentalizing, rather than a dimensional approach, this dissertation aims to contribute to a more comprehensive understanding of the multidimensionality of parental mentalizing. Specifically, it aims to provide insights in differential relationships among different operationalizations of parental mentalizing and how specific features of parental mentalizing are related to developmental outcomes in both parent and child. This may enable us to better understand the relationship between features of parental mentalizing and child development, which can aid in the clinical assessment of

parental mentalizing and the development of interventions to improve the parent-child relationship and to promote positive child developmental trajectories.

The second aim is to identify potential gender differences in parental PRF, as most studies are conducted in mothers but not in fathers. While mothers and fathers may have different parenting roles and responsibilities, both parents contribute to the parent-child relationship and child development (Camoirano, 2017; Charpentier Mora et al., 2023; Medrea & Benga, 2021; Zeegers et al., 2017). By investigating both parents, potential gender differences in PRF can be explored to gain a more complete understanding of how PRF of each parent may influence the parent-child relationship and child developmental outcomes. Again, this can help to design (differential) interventions that support both mothers and fathers in their parenting roles.

A final aim of this doctoral dissertation is to enhance the knowledge on the development of parental mentalizing and its determinants across parenthood by specifically focusing on parent and child psychological functioning. Although there is a growing body of research on the role of parental mentalizing in the intergenerational transmission of attachment security (Zeegers et al., 2017), less is known about the relationship between parental mentalizing and other developmental outcomes. To this end, associations among PRF dimensions and psychological functioning of both parents (i.e., parental attachment dimensions and parenting stress) and children (i.e., social-emotional development and Theory of Mind) will be investigated. Additionally, relationships between PRF dimensions and other conceptually related measures of parental mentalizing (i.e., maternal mind-mindedness) and parental sensitivity (i.e., emotional availability) will be examined. As such, this research project promises to broaden and deepen our knowledge with regard to potential adaptive and maladaptive developmental trajectories in children. Moreover, it is hoped that the findings of this research project will contribute to clinical practice by informing prevention and intervention initiatives in families at risk for psychopathology.

In this chapter, I will provide the theoretical background and aims of this doctoral dissertation. First, I discuss the assessment of parental mentalizing, followed by a summary of the literature on associations among parental mentalizing and psychological functioning. Next, I focus on the multidimensionality of parental mentalizing and summarize the research findings of studies using the PRFQ. I close this chapter with an outline of the different chapters in this doctoral dissertation, and how they each address key issues concerning the relationship between parental mentalizing and psychological functioning.

Assessment of Parental Mentalizing

The growing body of research on parental mentalizing and its determinants coincides with an increasing number of tools to assess parental mentalizing. To date, more than 15 operationalizations of parental mentalizing have been identified, ranging from more global to specific measures, with each of the measures tapping into somewhat different features of parental mentalizing—that is, affective (e.g., affective empathy and mentalized affectivity) versus cognitive (e.g., reasoning about mental states and perspective-taking), self-focused (e.g., the capacity to understand the self in terms of mental states) versus other-focused (e.g., the capacity to understand others in terms of mental states), or online (e.g., measured during an interaction with the child) versus offline (e.g., when reflecting about the child) (for a review, see Schiborr et al., 2013). In addition, these assessment tools can range from more time-consuming measures (i.e., interviews and observational data) to brief screening tools (i.e., questionnaires).

The first and a commonly used method to measure adult RF (in both parents and non-parents) is the Reflective Functioning Scale (RFS; Fonagy et al., 1998), which is typically scored on the ***Adult Attachment Interview*** (AAI; George et al., 1984), a semi-structured interview originally designed to assess adult attachment representations. Particularly responses to those questions that are meant to evoke a reflective stance, the so-called 'demand questions' (e.g., "Why do you think your parents behaved that way?"), allow for the assessment of someone's capacity to reflect upon own childhood relationships with his or her parents. RF in the AAI is primarily determined on the basis of an adult's (1) awareness of the nature of mental states, (2) explicit effort to tease out mental states underlying behaviour, (3) the recognition of the developmental aspects of mental states, and (4) the recognition of mental states in relation to the interviewer (see Fonagy et al., 1998, for a full description of this scale). The RFS consists of an 11-point scale ranging from -1 ("negative RF") to 9 ("exceptional RF"). High RF scores express an adult's capacity to see the experience of their parents as separate and distinct from their own and to describe and reflect on the emotions, intentions and mental states underlying their parent's behaviour. Reliability and validity of the RF scale have been well established (Fonagy et al., 1991; Slade et al., 2005; Taubner et al., 2013).

In order to measure PRF more specifically, Slade and colleagues adapted the AAI and the RFS to specifically assess the parent's reflective capacities in relation to their child, and named it the ***Parent Development Interview*** (PDI; Aber et al., 1985; Slade, Aber, et al.,

2004; Slade, Bernbach, et al., 2004; Slade et al., 2007). The PDI asks the parent to describe the ongoing, current, and evolving relationship with their child, and intends to examine the parents' representations of their children, of themselves as parents, and of their relationships with their children. Aside from the 11-point RFS, three levels of PRF are distinguished: low PRF indicates a parent is oblivious to the fact that the child has own feelings or thoughts, as well as of own parenting experiences. Moderate PRF is given when there is a parental recognition that the child has mental states, but no reflection on his own mental states or on the fact that mental states are connected to behaviour. High PRF reflects an appropriate understanding of mental states and how they are connected to parental as well as child behaviour (Slade, Bernbach, et al., 2004). Several studies have established the validity of the PDI (Aber et al., 1999; Slade et al., 1999; Sleed et al., 2020).

A third semi-structured ***Working Model of the Child Interview*** (WMCI; Benoit, Parker, et al., 1997; Zeanah et al., 1996) assesses whether parents are balanced, detached, or entangled in their internal working models of their child (Slade, 2005). Several studies have used the WMCI to score RF using the RFS (Fonagy et al., 1998), and several studies have established its reliability and validity (Benoit, Parker, et al., 1997; Benoit, Zeanah, et al., 1997; Slade et al., 2005).

Aside from representational measures such as interviews – which are considered offline measures of parental mentalizing – observational (i.e., online) measures have been developed to assess parental mentalizing 'in action'. The most well-known interactional measure of parental mentalizing is ***Maternal Mind-Mindedness*** (MMM) developed by Meins and colleagues (Meins & Fernyhough, 2010; Meins et al., 2003). For infants aged between 6 and 12 months, MMM is operationalized in terms of the mother's tendency to comment appropriately versus non-attuned on the infant's putative internal states during online interactions, i.e., a video-taped 20-minute free-play observation. A mother's mind-related comment is coded appropriate if she seems to read the infant's emotion or state of mind correctly, or non-attuned if the mother appears to misread the infant's internal states, using the Mind-Mindedness Coding Manual (Meins & Fernyhough, 2010). Asides from this online measure of MMM, an offline measurement variant has also been developed to measure representational MMM. Offline MMM is based on the proportion of mental state words of parents when describing their child during an interview, leading to a single and overall MMM score (Meins et al., 1998). Hence, contrary to online MMM, measures of offline MMM do not distinguish between adaptive and maladaptive parental mentalizing.

Because representational (e.g., RFS on the PDI and WMCI) and observational (e.g., MMM) measures of parental mentalizing are costly and time-consuming, the ***Parental Reflective Functioning Questionnaire*** (PRFQ; Luyten et al., 2009; Luyten, Mayes, et al., 2017) has been developed. The PRFQ is an 18-item self-report questionnaire scored on a 7-point Likert scale, and is therefore considered a quick screening tool to easily assess offline PRF. The PRFQ includes three subscales which are based on three key dimensions of parental mentalizing. The first dimension, *prementalizing modes* (PM), refers to a nonmentalizing stance that is characterized by the tendency of parents to make maladaptive and malevolent attributions about their child (e.g., "My child cries around strangers to embarrass me" or "My child sometimes get sick to keep me from doing what I want to do") and an inability to enter into the child's internal subjective world (e.g., "Often, my child's behavior is too confusing to bother figuring out" or "I find it hard to actively participate in make-believe play with my child"). PM is often characteristic of parents with (severe) impairments in PRF. The second dimension, *certainty of mental states* (CMS), refers to the parent's (in)ability to recognize that mental states are inherently opaque. Hence, there is either a denial of the opacity of mental states (e.g., "I always know why my child acts the way he or she does" or "I can completely read my child's mind") or mental states are felt to be completely opaque (e.g., "I never know what my child wants") or even totally absent (e.g., "My child is too young to feel or think anything"). Recognizing the opacity of mental states (e.g., "I can sometimes misunderstand the reactions of my child") is considered adaptive PRF, while being overly certain or uncertain is thought to be characteristic of distorted PRF. The third dimension, *interest and curiosity in the child's mental states* (IC), refers to the willingness of the parent to understand the child "from the inside out" (e.g., "I am often curious to find out how my child feels"). Maladaptive PRF is characterized by both excessive curiosity as well as a lack of genuine interest and curiosity in the child's mind (e.g., "I believe there is no point in trying to guess what my child feels"). Hence, adequate PRF is reflected by low PM and medium to high CMS and IC. Distorted PRF, on the other hand, is reflected by high PM and very low (i.e., scores 1 and 2) or very high (i.e., scores 6 and 7) CMS and IC. Since the original validation study in 2017 (Luyten, Mayes, et al., 2017), the reliability and validity of the PRFQ have been supported by several studies in different countries (i.e., Belgium, United Kingdom, Italy, Denmark, Portugal, Canada, Iran, Korea, and China), within clinical as well as non-clinical populations, and among parents of children of different ages ranging from pre-borns to children aged 12 years (De

Roo et al., 2019; Goudarzi et al., 2022; Lee et al., 2020; Moreira & Fonseca, 2022; Pajulo et al., 2015; Pajulo et al., 2018; Pazzagli et al., 2018; Vahidi et al., 2021; Wendelboe et al., 2022; Wendelboe et al., 2021; Ye et al., 2022). Recently, the three subscales have also been found to significantly correlate with the RFS on the PDI (Anis et al., 2020), but not with the RFS on the AAI or with MMM (Krink & Ramsauer, 2021).

Parental Mentalizing and Psychological Functioning

The increased interest in parental mentalizing is legitimate for several reasons. Overall, four important research traditions can be distinguished that each highlight the importance of parental mentalizing regarding (child) psychological functioning. A first cluster of studies has focused on the intergenerational transmission of attachment security and mentalizing. In this context, a number of studies have showed that secure attachment in the parent is associated with higher levels of parent RF and parental mentalizing compared to parents with insecure attachment (Arnott & Meins, 2007; Fonagy et al., 1991; Meins et al., 2012; Riva Crugnola et al., 2018; Slade et al., 2005). Subsequently, higher levels of parent RF and parental mentalizing have been associated with child attachment security, with results of a meta-analysis showing a pooled correlation of r = .30 based on 20 effect sizes (Zeegers et al., 2017). Impairments in parental mentalizing, by contrast, have been associated with disruptions in the mother-infant affective communication and, consecutively, insecure child attachment styles (Grienenberger et al., 2005; Sharp et al., 2006; Slade, 2005; Slade et al., 2005). Child attachment security, in turn, has been shown to be subsequently related to the child's mentalizing abilities (Fonagy et al., 1997; Fonagy et al., 1991).

In addition, a second cluster of studies also shows direct associations among parental and child mentalizing capacities (Ensink & Mayes, 2010). One of the main research traditions in this regard have been focusing on parental mentalizing and how it is related to the development of Theory of Mind (ToM), which is a frequently used operationalization of child RF that refers to the cognitive ability to impute mental states to others and to make predictions about an individual's behaviour (Premack & Woodruff, 1978). More specifically, child ToM has been associated with representational measures of PRF (Benbassat & Priel, 2012; Ensink et al., 2015; Rosso et al., 2015; Scopesi et al., 2015; Steele et al., 1999), parental ToM (Sabbagh & Seamans, 2008), as well as the parent's tendency to explicitly refer to internal mental states when speaking to their children, measured by

parental mental-state talk (Adrián et al., 2007; Doan & Wang, 2010; Dunn, Brown, & Beardsall, 1991; Dunn, Brown, Slomkowski, et al., 1991; Ensor et al., 2014; Peterson & Slaughter, 2003; Ruffman et al., 2002; Symons et al., 2006; Taumoepeau & Ruffman, 2006, 2008) or maternal mind-mindedness (de Rosnay et al., 2004; Hughes et al., 2018; Laranjo et al., 2010, 2014; Lundy, 2013; Meins et al., 2013; Meins et al., 1998; Meins et al., 2003; Meins et al., 2002).

A third cluster of studies is centered around the role of parental mentalizing with regard to a range of other developmental capacities beyond child attachment and mentalizing abilities (for a review, see Ensink & Mayes, 2010; Katznelson, 2014). Substantial evidence indicates that effective and accurate parental mentalizing has a protective function in the intergenerational transmission of trauma (Schechter et al., 2008; Schechter et al., 2005) and predicts adaptive socio-cognitive skills, an increased sense of self-efficacy, and self and affect regulation (Ensink & Mayes, 2010; Heron-Delaney et al., 2016; Rosenblum et al., 2008; Sharp et al., 2006; Slade et al., 2005). Further, higher levels of parental mentalizing are associated with lower levels of internalizing and externalizing problems in the child (Benbassat & Priel, 2012; Ensink et al., 2016; Ensink, Bégin, et al., 2017; Ensink, Leroux, et al., 2017; Ensink & Mayes, 2010; Esbjørn et al., 2013; Ordway et al., 2014; Salo et al., 2021; Smaling et al., 2016; Wong et al., 2017). By contrast, children of parents with lower mentalizing capacities are at greater risk for psychopathology and behavioural problems (Ensink & Mayes, 2010; Sharp & Fonagy, 2008).

A fourth group of studies investigates the effectiveness of psychological parenting interventions that specifically focus on improving parental mentalizing, and whether these interventions are associated with changes in parental mentalizing. Although both randomized trials and naturalistic studies support the positive effects of these parenting interventions on both children and parents (Byrne et al., 2020; Kalland et al., 2015; Lo & Wong, 2022; Milligan et al., 2021; Ordway et al., 2014; Sadler et al., 2013; Sleed et al., 2023; Suchman et al., 2011; Zayde et al., 2021), it remains to be determined whether these effects are primarily or specifically mediated through addressing parental mentalizing. A number of systematic reviews and meta-analyses provide preliminary evidence for increases in parental mentalizing (Barlow et al., 2021; Lavender et al., 2023; Lo & Wong, 2022; Sleed et al., 2023), whereas others report limited improvements in parental mentalizing (Byrne et al., 2020; Lo & Wong, 2022; Midgley et al., 2021).

Taken together, attachment security, effective mentalizing and psychological well-being seem to develop in the context of early secure attachment relationships, with parents being sensitive and attuned to the infant's needs and able to mentalize their own and their child's experiences (e.g., have high levels of PRF). Recent theoretical developments with regard to epistemic trust, that is, the capacity to perceive others as trustworthy sources of knowledge that is generalizable and relevant to the self (Fonagy et al., 2015), may help us to further understand these findings. Epistemic trust is considered to be a necessary precondition for an evolutionary inbuilt capacity for learning through interpersonal communication, and is associated with resilience and salutogenesis (the capacity to benefit from the positive influence of others; Antonovsky & Sagy, 1986). In order to develop epistemic trust, the child needs to be surrounded by a broader caregiving environment in which there is adequate attention to internal mental states. The quality of the parent-infant relationship, including emotional availability, adequate affect mirroring and parental mentalizing is thought to be crucial in this context. Sensitive and attuned parenting, characterized by marked affect mirroring and the use of ostensive cues (i.e., eye contact, motherese) promotes attachment security and the development of a sense of epistemic trust in the child, i.e., trust that the parent is a source of knowledge about the internal and external world (Fonagy et al., 2007; Fonagy & Luyten, 2018). This way, the child easily learns to recognize and label his or her own and other's mental states and experiences, leading to the development of mentalizing capacities more generally. On the contrary, non-reflective, insensitive and misattuned caregivers are prone to distorted affect mirroring. Their affect mirroring may be too accurate, non-contingent or absent, which increases the risk for disruptions in self-other boundaries, distorted secondary representations, or a fragmented and empty sense of self, respectively. These disruptions are likely to interfere with the development of mentalizing capacities (Fonagy et al., 2017; Fonagy et al., 2002; Fonagy et al., 2010) and to increase the odds that the child develops psychological and behavioural problems (Ensink & Mayes, 2010; Sharp & Fonagy, 2008).

In summary, parental mentalizing is thus thought to play an important role in the intergenerational transmission of attachment security (Katznelson, 2014; Slade, 2005; Slade et al., 2005; van Ijzendoorn, 1995) and RF in children (Ensink & Mayes, 2010), and subsequently, to foster adaptive socio-emotional development (Slade, 2005). As such, parental mentalizing is hypothesized to serve crucial intrapersonal and interpersonal

functions, and therefore considered an important research topic in examining psychological functioning in both parent and child.

The Multidimensional Nature of Parental Mentalizing and Associations Among PRFQ Dimensions and Developmental Outcomes

Over the past decades, it has become clear that parental mentalizing is best considered a multifaceted construct (Luyten, Nijssens, et al., 2017; Meins et al., 2012). Moreover, recent developments emphasize the importance of looking at specific aspects or dimensions of parental mentalizing when examining associations with psychological functioning, as there may be differential associations between the different dimensions of parental mentalizing and various outcomes in both parents and their children (Luyten, Mayes, et al., 2017; Luyten, Nijssens, et al., 2017; Meins et al., 2012; Smaling et al., 2016). The PRFQ has become the most used measure of PRF as a multidimensional concept (Luyten, Mayes, et al., 2017; Luyten, Nijssens, et al., 2017). As the PRFQ is included in each of the studies reported in this doctoral dissertation, and its validity is an important focus of these studies, a brief overview of the extant research with this measure is provided here. This body of research provides the background for the research conducted in this doctoral dissertation.

Research utilizing the PRFQ can be divided in five groups of studies, each providing valuable insights into the intricate relationship between PRF dimensions and psychological functioning in both parents and children. A first group of studies focuses on associations among PRF and arousal regulation capacities in parents. For example, higher PM (but not IC or CMS) has been associated with decreases in maternal sensitivity in an emotionally stressful mother-infant interaction (Krink et al., 2018), whereas IC and CMS have been associated with the neural processing of infant affective cues, such as infant cries and faces, respectively (Rutherford et al., 2017). Similarly, IC as well as PM have been related to maternal persistence in a simulated baby paradigm. More specifically, depending on child age, higher IC is related to increased tolerance of infant distress (Rutherford et al., 2013), whereas higher PM is associated with a decrease in the mother's ability to tolerate distress (Rutherford et al., 2015). Interestingly, in these studies, PRF dimensions are only related to tolerance of infant distress and not general distress, suggesting that PRF may reflect specific persistence behaviours in parenting contexts and not persistence capacities per se

(Rutherford et al., 2015; Rutherford et al., 2013). However, other studies show that maternal self-reported difficulties with (more general) emotion regulation are related to higher levels of PM and lower levels of IC and CMS (Moreira & Fonseca, 2022; Schultheis et al., 2019), and that maternal executive function (i.e., working memory and set-shifting capacities) is related to higher IC (Rutherford et al., 2018). Likewise, parenting stress has been found to be related to higher PM (De Roo et al., 2019; Steele et al., 2020; Ye et al., 2022) and lower CMS (Lee et al., 2020; Steele et al., 2020; Ye et al., 2022).

Second, PRF dimensions have also been found to be associated with specific parenting styles. More specifically, PM is positively associated with psychologically controlling (Dieleman et al., 2020), authoritarian and permissive parenting styles (Moreira & Fonseca, 2022), and negatively with parental warmth (Ye et al., 2022) and authoritative parenting (Moreira & Fonseca, 2022). CMS and IC, on the other hand, are negatively associated with authoritarian parenting and positively with parental warmth, authoritative parenting, and cognitive empathy (Lee et al., 2020; Moreira & Fonseca, 2022; Ye et al., 2022). In addition, IC is also positively associated with affective empathy (Lee et al., 2020). Congruent with these findings, PRF dimensions also show significant associations with parental emotional availability. Particularly, PM is negatively related to self-reported parent (i.e., non-intrusiveness and non-hostility), dyadic (i.e., mutual attunement and affect quality) (Luyten, Mayes, et al., 2017; Salo et al., 2021), and child (i.e., involvement) emotional availability (Luyten, Mayes, et al., 2017). The findings for CMS and IC are more differentiated, with CMS being positively related to parent emotional availability (Luyten, Mayes, et al., 2017), while IC is found to be positively associated with emotional availability of the dyad (Salo et al., 2021) and the child (Luyten, Mayes, et al., 2017), but slightly negative with parent emotional availability (Luyten, Mayes, et al., 2017).

Third, PRF dimensions – especially PM – have been found to be related with multiple aspects of parenting experiences. For instance, higher PM is associated with less marital (Salo et al., 2021) and parenting (De Roo et al., 2019; Rostad & Whitaker, 2016; Steele et al., 2020) satisfaction, lower ratings of family functioning (Cooke et al., 2017; Ye et al., 2022), and higher levels of parenting distress (Steele et al., 2020). In addition, higher levels of PM are associated with less perceived support (De Roo et al., 2019; Rostad & Whitaker, 2016), coping (De Roo et al., 2019), competence (Gordo et al., 2020) and efficacy (Cooke et al., 2017; De Roo et al., 2019; Steele et al., 2020), as well as with less perceived quality of certain aspects of the parent-child relationship (i.e., involvement for and

communication with the child, limit setting, and allowance of autonomy) (Rostad & Whitaker, 2016). On the contrary, CMS and IC have both been found to be positively associated with perceived competence (Gordo et al., 2020), efficacy (Cooke et al., 2017; De Roo et al., 2019; Steele et al., 2020), involvement for and communication with the child (Rostad & Whitaker, 2016), support (De Roo et al., 2019; Rostad & Whitaker, 2016), parenting satisfaction (De Roo et al., 2019; Rostad & Whitaker, 2016; Steele et al., 2020), and family functioning (Cooke et al., 2017; Ye et al., 2022). Additionally, IC is positively associated with perceived paternal coping (De Roo et al., 2019) and marital satisfaction (Salo et al., 2021), while CMS is associated with the perceived capacity for limit setting in the parent-child relationship (Rostad & Whitaker, 2016).

A fourth group of studies shows that PRF dimensions are associated with psychological functioning and adjustment of the parent. With regard to parental attachment, strong associations are found among PM and attachment avoidance as well as anxiety (Burkhart et al., 2017; Luyten, Mayes, et al., 2017; Moreira & Fonseca, 2022; Pazzagli et al., 2018; San Cristobal et al., 2017), except in one study (Rostad & Whitaker, 2016). For IC and CMS, the results are less clear. IC is positively associated with attachment security (Pazzagli et al., 2018), and negatively with attachment avoidance (but not anxiety) (Moreira & Fonseca, 2022; Rostad & Whitaker, 2016). However, these associations are only modest and are not replicated in other studies (Burkhart et al., 2017; Luyten, Mayes, et al., 2017; San Cristobal et al., 2017). Associations among CMS and parental attachment dimensions are mostly non-significant, except in one study that shows that CMS is negatively associated with attachment avoidance (Rostad & Whitaker, 2016). With regard to parental psychopathology, strong positive associations are found among PM and depressive symptoms (Krink et al., 2018; Moreira & Fonseca, 2022; Nobre-Trindade et al., 2021) as well as anxiety symptoms (Moreira & Fonseca, 2022). CMS, on the other hand, is negatively related to depressive symptoms (Lee et al., 2020; Moreira & Fonseca, 2022; Nobre-Trindade et al., 2021) and anxiety symptoms (Lee et al., 2020; Moreira & Fonseca, 2022), while IC is negatively related to depressive symptoms only (Moreira & Fonseca, 2022). In addition, mothers with clinically significant levels of anxious and/or depressive symptomatology show higher levels of PM and lower levels of CMS compared to mothers with normal symptomatology levels (Nobre-Trindade et al., 2021). However, another study shows that the odss of developing a postpartum depression is not directly related to PRF dimensions. Yet, within individuals with clinical levels of psychological distress and/or

personality disorder, high levels of PM significantly increase the odds of having a postpartum depression, whereas high levels of CMS significantly decrease these odds (Wendelboe et al., 2021). Likewise, results from another study indicate that parents with a high level of borderline personality disorder features report higher levels of PM and CMS, while no significant differences are found with regard to levels of IC (Steele et al., 2020). Combined PRF dimensions have been found to be negatively related to parental alexithymia (Ahrnberg et al., 2020). Finally, a positive direct association is found between IC and alcohol use disorder in male combat veterans, while CMS is found to moderate the relationship between posttraumatic stress symptoms and alcohol use disorder (Feingold & Zerach, 2021).

Finally, PRF dimensions have also been associated with child psychological functioning. For instance, the combination of high levels of PM and CMS with low levels of IC have been found to predict infant anxious-resistant attachment (Luyten, Mayes, et al., 2017). Further, PM is positively associated with parent-reported difficulties in child social-emotional adjustment (Gordo et al., 2020; Goudarzi et al., 2022; Salo et al., 2021) and emotion regulation (Álvarez et al., 2022; Goudarzi et al., 2022), as well as with child internalizing and externalizing problems, and an elevated perceived need for child treatment (Carlone & Milan, 2020). Congruently, PM is positively related to child social-emotional problems (Malcorps, Vliegen, Fonagy, et al., 2022) and perceptions of parenting a difficult child and having a difficult parent-child relationship (Steele et al., 2020). Further, PM is negatively related to general child ToM understanding and the specific ToM dimensions ‘visual perspective taking’, ‘emotion recognition’ and ‘belief-desire reasoning’ (Malcorps, Vliegen, Nijssens, et al., 2022). CMS, on the contrary, is associated with higher reported child social-emotional adjustment (Gordo et al., 2020; Goudarzi et al., 2022) and emotion regulation (Álvarez et al., 2022), and with lower reports of child internalizing and externalizing problems, perceived need for child treatment (Carlone & Milan, 2020), and perceptions of parenting a difficult child and having a difficult parent-child relationship (Steele et al., 2020). In addition, CMS is found to moderate the relationship between emotion reactivity and emotion regulation, with children in distress showing more adaptive (i.e., mother-oriented) coping strategies when mothers have low to mean levels of CMS (which is considered high PRF) and more aggressive coping strategies when mothers have high to mean levels of CMS (which is considered low PRF) (Borelli et al., 2021). In addition, CMS has been found to be negatively related to false-belief understanding

(Malcorps, Vliegen, Nijssens, et al., 2022). IC is only positively associated with child social-emotional adjustment (Gordo et al., 2020; Goudarzi et al., 2022; Salo et al., 2021) and emotion regulation capacities (Álvarez et al., 2022; Goudarzi et al., 2022). Furthermore, one study shows that fathers of children with ADHD have lower IC and higher PM compared to fathers of non-clinical children (Mazzeschi et al., 2019). Interestingly however, the abovementioned findings are in contrast with some other studies investigating the role of PRF with regard to child psychological functioning. Childhood obesity, for example, is found to be positively associated with CMS (Pazzagli et al., 2019). Another study reports that internalizing and externalizing problems are positively related to PRF (total score) (Khan & Renk, 2019) and yet another study shows that parental relationship dissatisfaction, and not PRF dimensions, predicts child behavioural problems (Salo et al., 2022). More research is therefore needed to identify the unique and differential relations between PRF dimensions and aspects of child psychological functioning.

Taken together, the above findings provide substantial evidence for PRF being a multidimensional construct, with each of the dimensions tapping into different features of parental and child psychological functioning. In addition, some studies indicate small gender differences with regard to the average level of PRF between mothers and fathers, with mothers typically scoring slightly higher on IC and lower on PM compared to fathers (Cooke et al., 2017; Gordo et al., 2020; Pajulo et al., 2018; Pazzagli et al., 2018). With regard to associations with psychological functioning, the pattern of results is quite similar for mothers and fathers, although some of the results were slightly different between mothers and fathers (Cooke et al., 2017; De Roo et al., 2019; Gordo et al., 2020; Salo et al., 2021). However, the majority of studies is still conducted in mothers only, and there is a need for more research in fathers to further clarify the gender-specific role of PRF.

Outline of the Doctoral Dissertation

The main research aims of this doctoral dissertation are to enhance the knowledge with regard to (1) the multidimensional assessment of PRF, (2) gender differences in parental PRF, and (3) the development of PRF and its determinants across parenthood by investigating (a) associations among PRF and psychological functioning in both parent and child, and (b) associations among and with different operationalizations of parental mentalizing. As such, this research project aims to broaden and deepen the knowledge base with regard to potential adaptive and maladaptive developmental trajectories in children.

These objectives are addressed in five different studies (Chapters 2-6), using data from three community samples. The proposed studies vary in (a) design (i.e., cross-sectional and prospective), (b) study sample (i.e., homogeneous and heterogeneous), and (c) measurement method of parental mentalizing (i.e., offline and online).

The ***Parent-Child Study*** (Chapters 2 and 3) is a two-wave, prospective study from infancy to toddlerhood, comprising 106 first-time parents and their biological child aged between 8 and 13 months (follow-up assessment was completed 1 year later). Questionnaire data are gathered in both mothers and fathers to investigate the role of PRF in the relationship between parental attachment and psychological functioning in both parent (i.e., parenting stress; Chapter 2) and child (i.e., social-emotional development; Chapter 3). This study adopts a multi-informant (both mother and father data) and multi-wave (both infancy and toddlerhood) approach in a community sample that is homogeneous with regard to child age and risk status.

The ***Theory of Mind Study*** (Chapters 4 and 5) is a multi-method, cross-sectional study in a sample of 83 mothers and their child aged between three and six years old investigating the relationship between parent and child RF in a community sample that is heterogeneous with regard to child age, socioeconomic and risk status. Child RF is operationalized as the child's capacity for ToM understanding. Maternal mentalizing capacities are assessed with the PRFQ (Chapter 4) and the accuracy and certainty of mother's estimates of their child's ToM capacities, which is considered a quasi-online measure of parental mentalizing (Chapter 5).

The ***Maternal Mind-Mindedness Study*** (Chapter 6) is a multi-method, prospective study in a sample of 72 mothers and their child aged between 0 and 36 months. In this study, associations among different operationalizations of parental mentalizing are investigated. More specifically, this study examines the interplay between offline PRF, as assessed with the PRFQ, and online parental mentalizing, as assessed by maternal mind-mindedness coded based on mother-child free-play interactions. Additionally, this study investigates the relationships between these offline and online measures of parental mentalizing and self-reported emotional availability as an index of maternal sensitivity. Similar to the ToM study, the study sample is heterogeneous with regard to child age, socioeconomic and risk status, and adopts a multi-method approach (offline and online measures of parental mentalizing).

This doctoral dissertation is closed with a general summary and discussion of the research findings reported in the different chapters of this dissertation, which will also

address the limitations of the reported studies as well as possible directions for future research and clinical practice (Chapter 7).

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CHAPTER 2

Parental Attachment Dimensions and Parenting Stress: The Mediating Role of Parental Reflective Functioning[1]

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Abstract

Research suggests that parental reflective functioning—the parent's capacity to envision the mind of his/her child—may play an important role in the intergenerational transmission of attachment and reflective functioning. Studies also suggest the importance of this capacity for the transition to parenthood, and particularly parents' capacity to deal with parenting stress. This study focused on the potential mediating role of PRF dimensions in the relationship between parental attachment dimensions (attachment anxiety and avoidance) and parenting stress, using data from a 1-year longitudinal study in biological first-time parents (*N*=106). Structural Equation Modeling showed that parents' use of prementalizing modes of reflecting upon their child (PM) fully mediated the relationship between attachment anxiety and three parenting stress dimensions (marital relationship, role restriction, and social isolation) across a 1-year interval, while attachment avoidance was indirectly related to these parenting stress dimensions through PM. Further, PM partially mediated the relationship between parental attachment anxiety and avoidance and a fourth dimension of parenting stress, lack of trust in parental competence. In addition, multi-group analyses revealed some interesting gender differences. Implications of these findings for the conceptualization of the relationship between parental attachment, PRF, and parenting stress are discussed.

Keywords: Parental reflective functioning, parenting stress, attachment, psychopathology, intervention

Introduction

The transition to parenthood is a major life event that involves substantial physiological, psychological, and social adjustments, which can be accompanied by considerable distress (Parfitt & Ayers, 2014). Parenting stress, in particular, seems to develop when the parent perceives they have a lack of resources to meet the demands of being a parent and to successfully cope with these adjustments (Deater-Deckard, 1998; Deater-Deckard & Scarr, 1996). Parenting stress has been shown to negatively influence parenting characteristics such as sensitivity, child investment, quality of parenting, dyadic pleasure, and cooperation between parents (Creasey & Jarvis, 1994; Crnic et al., 2005; Foster et al., 2008; McMahon & Meins, 2012; Nelson et al., 2009). Similarly, it seems to negatively influence child development, as expressed in higher levels of behavioral problems and child negativity (Casalin et al., 2014; Crnic et al., 2005; de Cock et al., 2017; Fallucco et al., 2016). Further, parenting stress is often associated with poor parental mental health, as observed in increased risk for postpartum depression (Leigh & Milgrom, 2008; Thomason et al., 2014). Consequently, it is critically important to investigate factors contributing to parenting stress, especially for first-time parents, as the transition to parenthood is considered a high risk period which may result in adverse outcomes for both parent and child (Cowan & Cowan, 1995; Epifanio et al., 2015; Mckenzie & Carter, 2013; Parfitt & Ayers, 2014).

Many previous studies have examined the relationship between the transition to parenthood and parenting stress, and suggest that parenting stress can be understood as the result of everyday difficulties in being in a family with children (reviewed by Deater-Deckard, 2004). In addition, parenting stress seems to arise in the context of relationships (with self, partner, child) and its severity depends upon the quality of those relationships (Abidin, 1992; de Cock et al., 2017; Halpern-Meekin & Turney, 2016). A considerable body of research has focused on the quality of the relationship between parents, with relationship dissatisfaction being associated with higher parenting stress (Deater-Deckard, 1998; Deater-Deckard & Scarr, 1996; Parfitt & Ayers, 2014).

Although parenting stress seems to be an inevitable aspect of parenthood, this may be especially true for individuals with attachment insecurities (i.e., high attachment anxiety and/or avoidance) who are prone to experiencing high levels of stress and arousal, especially in the context of the parent–infant relationship (Mills-Koonce et al., 2011; Vasquez et al., 2002). Attachment anxiety is related to fears of abandonment and rejection, whereas

attachment avoidance reflects discomfort with closeness and intimacy (Bartholomew & Horowitz, 1991; Brennan et al., 1998). Research points to the importance of these parental attachment dimensions on parenting stress (Mazzeschi et al., 2015; Rholes et al., 2006; Vieira et al., 2012). In addition, important gender differences in the relationship between parental attachment and parenting stress can be expected (Blatt, 2004). In Western societies, men typically exhibit higher levels of attachment avoidance, while women have higher levels of attachment anxiety (Blatt, 2004; Zuroff & Fitzpatrick, 1995), probably as a result of societal emphasis on the need for self-definition in men and the capacity for relatedness in women (Luyten & Blatt, 2013). Further, gender incongruence (i.e., high attachment anxiety in men and high attachment avoidance in women) has been hypothesized to be associated with increased risk for maladjustment and psychopathology because of incongruent sociocultural expectations (Luyten & Blatt, 2013). Therefore, one could expect that gender incongruence in the attachment dimensions would be associated with higher parenting stress. However, to date, no study has investigated this hypothesis.

Within contemporary attachment theory, there has been much attention to the role of parental reflective functioning (PRF) for understanding the transition to parenthood, and particularly parents' capacity to deal with parenting stress. PRF refers to the parent's ability to reflect upon his/her own and his/her child's internal mental experience, and to understand the child's behavior as being driven by underlying mental states, such as thoughts, feelings, desires, and intentions (Slade, 2005). This capacity to envision mental states in relation to one's child can be distorted in several ways. In this regard, recent theories have identified three important dimensions of PRF. A first dimension refers to a pre-mentalizing mode of experiencing the subjectivity of the child as expressed by a tendency to make maladaptive and malevolent attributions about the child, often in combination with an inability to enter the child's internal subjective world (pre-mentalizing modes; PM). The second dimension refers to the extent the parent's believes he/she understands the child's mind (certainty of mental states; CMS), whereas the third dimension involves the extent to which the parent is genuinely interested in the mental states of the child (interest and curiosity in mental states; IC) (Luyten, Mayes, et al., 2017; Luyten, Nijssens, et al., 2017). Overall, PRF is considered a key feature of adaptive parenting, as it is thought to enable the parent to understand why their child behaves in certain ways (Turner et al., 2008), which is also an essential capacity needed to cope with the inevitable stresses of parenthood.

In this regard, McMahon and Meins (2012) reported that mothers who used more mental-state words to describe their child (indicative of high PRF) reported less parenting stress. Also, Rutherford et al. (2013) found that mothers' interest and curiosity in mental states (IC), a key dimension of PRF, was related to increased stress tolerance while soothing a crying infant in a simulated baby paradigm. Conversely, mothers who tend to make negative attributions about the child's behavior (PM)—characteristic of low PRF—showed decreased stress tolerance (Rutherford et al., 2015) and seemed to experience higher levels of parenting stress (Deater-Deckard, 1998; Hassall et al., 2005). Relatedly, Duncan et al. (2009) suggested that parents' own skills and capacities to regulate their thoughts and emotions are crucial with regard to the level of parenting stress and the coping strategies available to them when facing stressors in their caregiving role. Indeed, PRF may be especially important in regulating and modulating experiences of distress, as it may enable parents to reflect on their own and their child's experiences. In turn, this understanding may facilitate affect regulation because it helps the parent to put his/her own experience into perspective (Grienenberger et al., 2005; Slade, Grienenberger, et al., 2005). Hence, PRF may foster feelings of efficacy in dealing with potentially distressing situations and interactions. By contrast, parents with poorer PRF may lack feelings of control and efficacy, and may increasingly believe that interactions spiral out of control, leading to even higher levels of parenting stress and feelings of parental incompetence.

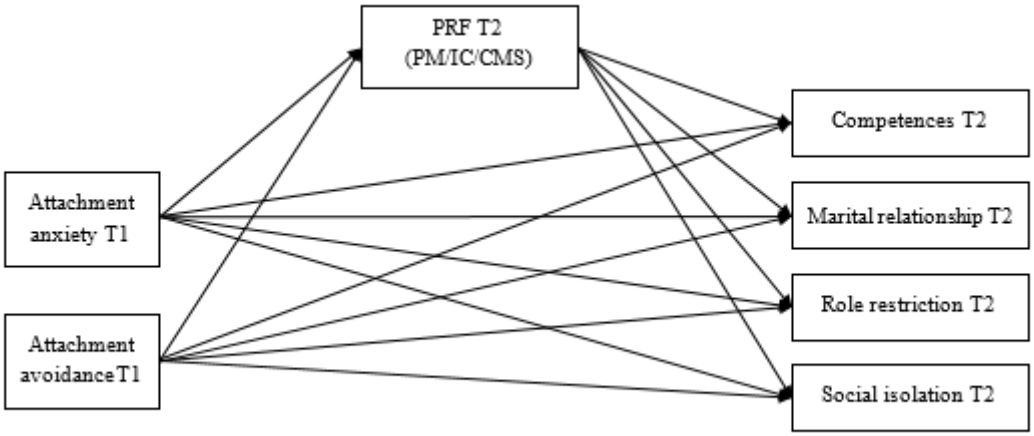
Studies have suggested that PRF is also closely related to parental attachment (Arnott & Meins, 2007; Fonagy et al., 1991; Slade, Grienenberger, et al., 2005), indicating that PRF might mediate the relationship between parental attachment and parenting stress. However, although attachment and PRF might be causally linked, the so-called 'loose coupling hypothesis' suggests that this may not necessarily be the case (Sharp & Fonagy, 2008). More specifically, in securely attached parents, PRF can vary considerably, and parental attachment security is not necessarily related to high levels of PRF. Parental insecure attachment, on the contrary, is almost invariably related to lower PRF, and to consequent heightened distress and decreased wellbeing in both parent and child (Luyten, Mayes, et al., 2017; Luyten, Nijssens, et al., 2017).

Based on the extant literature reviewed above, we investigated the role of PRF in the relationship between parental attachment dimensions and parenting stress, using data from a two-wave prospective study from infancy to toddlerhood among biological first-time parents and their children (N=106).We expected that insecure attachment dimensions (i.e.,

attachment anxiety and avoidance) would be related to increased parenting stress both cross-sectionally and longitudinally, and that PRF dimensions (i.e., prementalizing modes, interest and curiosity in mental states, and certainty about mental states) would mediate these longitudinal relationships (Figure 1). We expected the strongest mediation effects for pre-mentalizing modes (PM), as the tendency of parents to attribute malevolent mental states to their children can be expected to be associated with considerable stress, as attributing such improbable mental states might lead parents to increasingly see the child as obstructing the caregiver-child relationship. Yet, a lack of interest in the child's mental states (IC) or being overly uncertain (CMS) might also cause parenting stress, as both could be expected to lead to parents struggling to understand their child's behaviors and experiences. Finally, we explored whether these relationships were similar or different for mothers and fathers.

Figure 1

Theoretical mediation model of PRF in the relationship between parental attachment and parenting stress



Method

Participants

Participants were first-time parents of a healthy, biological child aged 8–13 months. At time 1 (T1), 92 couples were contacted, of whom 84 completed the questionnaires. Eight couples did not meet the inclusion criteria, so the final sample consisted of 76 couples (82.60%). Mothers and fathers differed significantly in age ($t(134.62) = 3.57$, $p < .001$),

with mothers being a mean 29.31 years (*SD* = 3.00; range 23–39) and fathers 31.48 years (*SD* = 4.39; range 20–47). The majority of parents had attained higher education (82.9% and 72.8% for mothers and fathers, respectively). The 76 infants (45 girls [59.2%] and 31 boys [40.8%]) were a mean 10.11 months old (*SD* = 1.24; range 8–13) at T1. Hence, overall, the study sample represented a relatively homogeneous group of parents, consisting mainly of middle-class, well-educated parents. This was also reflected by study variable mean scores within the normal (nonclinical) range.

The final sample at time 2 (T2) consisted of 53 couples (response rate 69.73%) and their infants (31 girls [58.5%], 22 boys [41.5%]). The infants were a mean 21.81 months old (*SD* = 1.31; range 19–26). The mean age of mothers was 29.69 (*SD* = 2.72; range 24–40) and of fathers 32.83 (*SD* = 4.42; range 26–48) years. Comparison of parents who participated at T2 and those who did not, revealed no significant differences with regard to parental gender, age, or educational level, nor child gender or age. In addition, no significant differences were found with regard to PRF and parenting stress. Together, this indicates that there was no attrition bias in this study.

Procedure

This study was conducted between November 2009 and December 2010 by undergraduate students at a large university in central Belgium. Students who followed a methodology course were trained and instructed to recruit couples who met the following inclusion criteria: (a) Dutch-speaking, (b) heterosexual couples who were (c) first-time parents of a healthy, biological child aged 8–13 months. Couples were recruited through the students' social network, play gardens and child care services. Eligible participants were told they would participate in a study about the characteristics of young parents and their relationship with their child. Participation was voluntary and full anonymity was guaranteed. Couples who agreed to participate provided written informed consent, and were then asked to complete a booklet with questionnaires. Approximately one year later, the same parents were contacted by regular mail and/or email, and were invited to participate in the second wave of the study by completing a second booklet with questionnaires. Parents that did not complete the booklet within two weeks, were encouraged to complete the set of questionnaires by up to three follow-up phone calls, after which they were considered dropouts. The study was approved by the Ethics Committee of KU Leuven (Belgium).

Measures

Parental attachment dimensions were assessed at T1 by the Experiences in Close Relationships questionnaire-Revised (ECR-R; Fraley et al., 2000), a 36-item self-report questionnaire, scored on a 7-point Likert scale. The ECR-R measures insecure attachment strategies in the context of adult romantic attachment (Brennan et al., 1998). Two dimensions underlying attachment are defined: *attachment anxiety* refers to fear of rejection and abandonment (18 items; e.g., "I am afraid that I will lose the love of the other"), whereas *attachment avoidance* refers to discomfort with closeness and dependence on others (18 items; e.g., "I don't like a relationship with the other to be too close"). Studies have supported the reliability and validity of the ECR-R and shown good temporal stability of the anxiety and avoidance subscales (Sibley et al., 2005; Sibley & Liu, 2004). In this study, internal consistencies of the subscales were good, with Cronbach's alphas of .87 for attachment anxiety and .86 for attachment avoidance.

Parental reflective functioning was assessed at T1 and T2 by the Parental Reflective Functioning Questionnaire (Luyten et al., 2009; Luyten, Mayes, et al., 2017), an 18-item self-report questionnaire scored on a 7-point Likert scale. The PRFQ includes three theoretically consistent and clinically meaningful subscales: *prementalizing modes* (PM), with 6 items that assess prementalizing modes reflecting the repudiation of or defense against mentalizing (e.g., "My child sometimes gets sick to keep me from doing what I want to do" or "My child cries around strangers to embarrass me"); *certainty about mental states* (CMS), with 6 items reflecting either being overly certain of mental states of the child (hypermentalizing) or overly uncertain (hypomentalizing) (e.g., "I always know what my child wants" or "I can always predict what my child will do"); and *interest and curiosity in mental states* (IC), with 6 items reflecting curiosity about the mental states of the child (e.g., "I am often curious to find out how my child feels" or "I like to think about the reasons behind the way my child behaves and feels"). Recent studies suggest that different dimensions of PRF may be associated with different developmental outcomes (Rutherford et al., 2015; Rutherford et al., 2013). Studies currently underway provide initial evidence for the reliability and validity of the PRFQ as a brief multidimensional measure of PRF. More specifically, Luyten, Mayes, et al. (2017) showed that the three subscales of the PRFQ provide good internal consistency (with Cronbach's alphas of .70, .82, and .75 for PM, CMS, and IC, respectively); were not, or only modestly, related to demographic features; and were generally related in theoretically expected ways to parental attachment

dimensions, emotional availability, parenting stress, and infant attachment status in the Strange Situation Procedure (Ainsworth & Bell, 1970). In the present study, Cronbach's alphas for PM, CMS, and IC were .73, .73, and .72, respectively.

Parenting stress was assessed at T1 and T2 by the the Dutch version of the Parenting Stress Index (PSI; Abidin, 1995), the Nijmeegse Ouderlijke Stress Index (de Brock et al., 1992). The PSI originally included 14 subscales to assess parenting stress and both parent and child functioning. In this study, only the parenting stress subscales were used: competence (13 items; e.g., "I can't make a decision without help"), role restriction (7 items; e.g., "I feel restricted by my obligations as a parent"), social isolation (6 items; e.g., "I am less interested in other people then before"), and marital relationship (7 items; e.g., "Raising a child has given more relational conflicts then expected"). We focused on these four dimensions separately, as each taps into different areas of parenting stress (Östberg et al., 2007). Respondents were asked to rate each item on a Likert-type scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). Studies have supported the reliability and validity of the PSI (de Brock et al., 1992). In our study, Cronbach's alphas were .85, .83, .60, and .73 for competence, role restriction, social isolation, and marital relationship, respectively.

Data Analyses

First, descriptive statistics and zero-order correlations among parental attachment dimensions, PRF dimensions, and parenting stress were computed. Second, given the clustered nature of the data (i.e., measures of the parents are nested within the parental couple), we investigated whether adding a couple-variable would increase the explained variances of the estimates. However, the Intraclass Correlation Coefficients showed design effects < 2, which justifies structural equation modeling (SEM) with nested data (Muthén & Satorra, 1995; Muthén, 1999). In addition, between-level couple variances were non-significant with exception of the "marital relationship" and "social isolation" subscale, which is understandable given the nature of these subscales (describing the couple relationship). Within-level couple variances, in contrast, were all significant. Therefore, SEM was used to investigate longitudinal mediational effects of PRF on parenting stress. Parenting stress was operationalized by the parenting stress subscales instead of using a total score because of the relevance of each individual dimension. Additionally, the sample size in this study favored the use of less complex models (e.g., models without latent variables; see http://davidakenny.net/cm/fit.htm).

Multiple SEM models were evaluated in AMOS following contemporary guidelines for the testing of mediational models (Baron & Kenny, 1986; Belsky et al., 2007; Cole & Maxwell, 2003; Hayes, 2009; Soenens et al., 2010), starting with a base model that included all direct paths between the predictor (i.e., parental attachment anxiety and avoidance at T1) and dependent (i.e., parenting stress at T2) variable. In a second step, a full mediation model was tested with only indirect effects through PRF at T2 (i.e., without direct paths from parental attachment dimensions to parenting stress subscales). Potential intervening effects (Hayes, 2009) were examined if the first criterion of mediation was not met (no direct association between predictor and outcome variable; Baron & Kenny, 1986). Finally, a partial mediation model was tested by adding all direct paths to the second model with indirect effects. Partial mediation is suggested when this final model fits better than the second model (Cole & Maxwell, 2003). To make inferences about the indirect effect, a Sobel test was used to calculate the significance of the mediation effect (Baron & Kenny, 1986; Sobel, 1982). Modification indices were used to evaluate potential modifications, using a step-by-step approach by omitting nonsignificant paths if this increased the model fit. Multi-group analysis (MGA) was used to investigate whether estimated parameter values of the model changed according to gender of the parent. We compared the fit of each model by inspecting several fit indices according to conventional criteria: The chi-square to *df* ratio is recommended to range from 5.0 to 2.0 to provide an acceptable fit for the model (Hooper et al., 2008). The comparative fit index (CFI) and Tucker-Lewis index (TLI) should be ≥ .90 for an acceptable fit and ≥ .95 for a good fit (Hu & Bentler, 1999). The root mean square error of approximation (RMSEA) should be ≤ .08 for an acceptable fit (Byrne, 1998) and ~ .06 for a good fit (Hu & Bentler, 1999). The confidence interval for the RMSEA should be between 0 and .07 to provide a good fit (Hooper et al., 2008; Steiger, 2007). Statistical analyses were carried out using SPSS version 22.0 and AMOS 18.0.

Table 1. Zero-Order Correlations, Means, and Standard Deviations among Study Variables (Mother and Father Reported Data Separately).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	*M* (*SD*)
1. Attachment anxiety_T1	—																2.10
																	(0.71)
2. Attachment avoidance_T1	.67**/	—															2.09
	.52**																(0.61)
3. PM_T1	.52**/	.31*/	—														1.68
	.24°	.19															(0.51)
4. CMS_T1	-.03/	-.06/	-.10/	—													3.57
	.05	.07	.02														(1.11)
5. IC_T1	.09/	-.09/	-.09/	.21/	—												5.87
	-.01	.06	-.16	-.16													(0.69)
6. PM T2	.49**/	.53**/	.52**/	.07/	-.19/	—											1.63
	.37**	.24°	.38**	.02	.03												(0.70)
7. CMS_T2	.22/	.21/	.16/	.44**/	.18/	.18/	—										3.65
	.31*	.04	.16	.56**	-.14	.16											(1.00)
8. IC_T2	-.16/	-.14/	-.13/	.07/	.57**/	-.15/	.01/	—									5.87
	-.11	-.05	-.31*	-.24°	.58**	-.23°	-.16										(0.72)
9. Competence_T1	.60**/	.28*/	.48**/	-.16/	.03/	.32*/	-.04/	-.29*/	—								1.89
	.37**	.23	.37**	-.25°	-.11	.26°	-.15	-.11									(0.59)
10. Role restriction_T1	.36**/	.23°/	.25°/	.15/	.14/	.33*/	.09/	-.15/	.60**/	—							2.60
	.18	.34*	.36**	-.21	-.10	.14	-.23	-.12	.69**								(0.90)
11. Social isolation_T1	.48**/	.26°/	.31*/	.15/	.34*/	.21/	.18/	-.13/	.58**/	.71**/	—						2.27
	.24°	.21	.26°	-.42**	-.16	.25°	-.11	-.28*	.51**	.63**							(0.66)
12. Marital relationship_T1	.33*/	.25°/	.17/	.04/	.25°/	.22/	.15/	.05/	.47**/	.62**/	.58**/	—					2.21
	.50**	.44**	.28*	-.11	-.24°	.47**	-.08	-.27°	.63**	.64**	.54**						(0.77)
13. Competence_T2	.39**/	.13/	.48**/	-.17/	.07/	.29*/	.06/	-.22/	.67**/	.34*/	.38**/	.30*/	—				1.67
	.43**	.29*	.22	-.07	.15	.78**	.08	-.21	.44**	.35*	.40**	.50**					(0.53)
14. Role restriction_T2	.38**/	.36**/	.29*/	-.03/	-.01/	.47**/	.16/	-.21/	.50**/	.76**/	.55**/	.44**/	.32*/	—			2.49
	.16	.16	.08	-.13	-.08	.47**	-.07	-.31*	.34*	.51**	.48**	.52**	.55**				(0.82)
15. Social isolation_T2	.30*/	.12/	.25°/	.21/	.13/	.38**/	.19/	-.07/	.31*/	.59**/	.67**/	.30*/	.32*/	.60**/	—		2.15
	.41**	.25°	.15	-.23	-.08	.60**	.05	-.27°	.43**	.38**	.64**	.54**	.78**	.58**			(0.73)
16. Marital relationship_T2	.05/	.08/	.07/	.12/	.07/	.24°/	.18/	.13/	.11/	.38**/	.34*/	.36**/	.30*/	.40**/	.65**/	—	2.11
	.42**	.35*	.15	-.08	.10	.54**	.06	-.11	.37**	.42**	.45**	.64**	.66**	.62**	.74**		(0.81)

Note. Data are shown for mothers (N=53) / fathers (N=53). Reported means are for mothers and fathers combined as there were no significant mean-level differences between mothers and fathers. T1, time 1; T2, time 2. PM = pre-mentalizing modes; CMS = certainty of mental states; IC = interest and curiosity in mental states.

°p<.10, *p<.05, **p<.01 (two-tailed test).

Results

Associations Among Parental Attachment Dimensions, PRF, and Parenting Stress

Zero-order correlations among the study variables were calculated for mothers and fathers separately (Table 1). The findings warranted the testing of PM at T2 as a potential mediator between parental attachment dimensions at T1 and parenting stress at T2. More specifically, mothers' attachment anxiety and avoidance at T1 were significantly related to PM at T2. For fathers, a significant positive correlation was found between attachment anxiety at T1 and PM at T2; however, only a marginal positive correlation was found between attachment avoidance at T1 and PM at T2. For both mothers and fathers, PM at T2 was significantly positively correlated with all domains of parenting stress, except for a marginally significant correlation with marital relationship at T2 in mothers. Further, PM at T2 could be both a mediating and an intervening variable: parental attachment anxiety and avoidance were often but not always directly related to parenting stress dimensions. No significant correlations were found between other subscales of the PRFQ (IC and CMS at T2) and parental attachment dimensions, except for a significant positive correlation between attachment anxiety at T1 and CMS at T2 in fathers. However, CMS at T2 was not related to any of the parenting stress subscales, excluding this variable as a possible mediator.

The Mediating Role of PRF

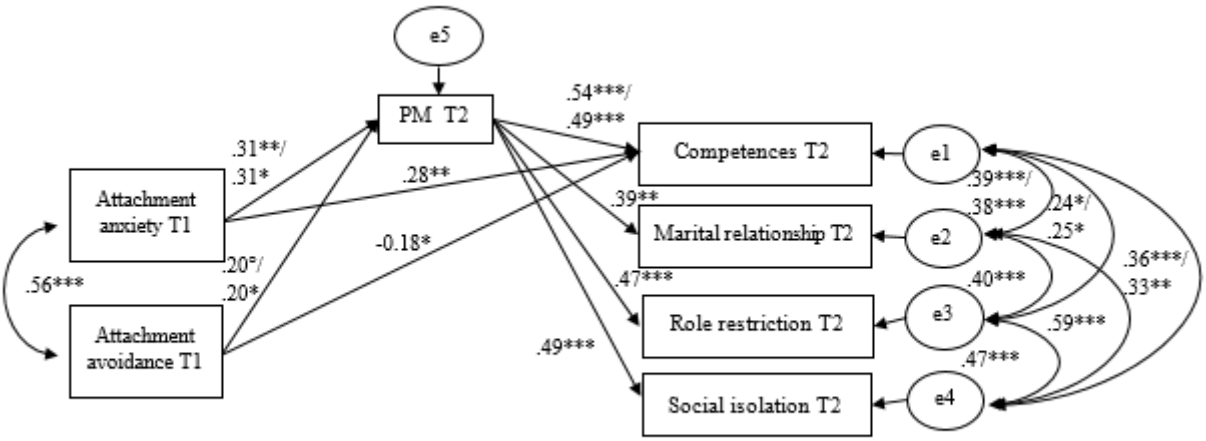
Structural equation modeling (SEM) was used to investigate longitudinal mediational effects of PM on parenting stress. The first model (*base model*), with only direct paths, did not provide a good fit to the data, $\chi^2(6) = 130.94$, $p < .01$, $\chi^2/df = 21.82$, CFI = .39, TLI = -.52, RMSEA = .45 (CI = .38 – .51). In this model, paths from attachment avoidance to parenting stress were nonsignificant, and thus removed. As there was a small trend for the path from attachment anxiety to role restriction ($p = .13$), we decided to retain it in the base model. Further, AMOS suggested adding covariances between all error variances. The revised model yielded a better fit to the data, $\chi^2(4) = 4.72$, $p = .32$, $\chi^2/df = 1.18$, CFI = 1.00, TLI = .99, RMSEA = .04 (CI = .00 – .16); $\Delta\chi^2(2) = 126.22$, $p < .001$. In this model, direct paths were significant from attachment anxiety to competence ($\beta = .42$, $p < .01$), marital relationship ($\beta = .26$, $p < .01$), role restriction ($\beta = .26$, $p < .01$), and social isolation ($\beta = .34$, $p < .01$).

The second model (*indirect effects model*) with only indirect effects did not have an acceptable fit to the data, $\chi^2(8) = 14.58$, $p = .07$, $\chi^2/df = 1.82$, CFI = .98, TLI = .93, RMSEA = .09 (CI = .00 – .16). All indirect paths were significant: from attachment anxiety and avoidance to PM at T2 ($\beta = .31$, $p < .01$ and $\beta = .20$, $p = .06$, respectively) and from PM at T2 to competence ($\beta = .54$, $p < .001$), marital relationship ($\beta = .40$, $p < .001$), role restriction ($\beta = .47$, $p < .001$), and social isolation ($\beta = .49$, $p < .001$). Sobel tests for the indirect effect between attachment anxiety and competence ($z = 2.75$, $p < .01$), marital relationship ($z = 2.51$, $p < .05$), role restriction ($z = 2.64$, $p < .01$), and social isolation ($z = 2.66$, $p < .01$) were all significant. Sobel tests for the indirect effect between attachment avoidance and parenting stress subscales were marginally significant (competence: $z = 1.84$, $p = .06$; marital relationship: $z = 1.77$, $p = .08$; role restriction: $z = 1.81$, $p = .07$; social isolation: $z = 1.82$, $p = .07$).

The *final model*, with both direct and indirect paths, did not provide a good fit to the data, $\chi^2(0) = .00$, CFI = 1.00, RMSEA = .34, as it was a fully saturated model with zero degrees of freedom RMSEA. We removed nonsignificant paths in a step-by-step manner, resulting in a model with a better fit, $\chi^2(6) = 5.74$, $p = .45$, $\chi^2/df = .96$, CFI = 1.00, TLI = 1.00, RMSEA = .00 (CI = .00 – .12). In this final model (Figure 2), direct paths from attachment anxiety and avoidance to competence were significant ($\beta = .28$, $p < .01$ and $\beta = -.18$, $p < .05$, respectively). All indirect paths remained significant: from attachment anxiety and avoidance to PM at T2 ($\beta = .31$, $p < .01$ and $\beta = .20$, $p = .06$, respectively) and from PM at T2 to competence ($\beta = .49$, $p < .001$), marital relationship ($\beta = .40$, $p < .001$), role restriction ($\beta = .47$, $p < .001$), and social isolation ($\beta = .49$, $p < .001$). This final model provided a significantly better fit to the data compared with the previous model with only indirect effects, $\Delta\chi^2(2) = 8.83$, $p < .05$. Sobel tests for the indirect effect between attachment anxiety and competence ($z = 2.61$, $p < .01$), marital relationship ($z = 2.51$, $p < .05$), role restriction ($z = 2.64$, $p < .01$), and social isolation ($z = 2.66$, $p < .01$) were all significant. Sobel tests for the indirect effect between attachment avoidance and parenting stress subscales were marginally significant (competence: Sobel $z = 1.80$, $p = .07$; marital relationship: $z = 1.77$, $p = .08$; role restriction: $z = 1.81$, $p = .07$; social isolation: $z = 1.82$, $p = .07$).

Figure 2

Final model with significant indirect and direct paths (mothers and fathers together)



Note. Standardized regression weights are given for the path coefficients (if values changed after adding direct paths to the indirect model, values are presented as value for the indirect model/value for the direct model).

°$p < .10$, *$p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed test).

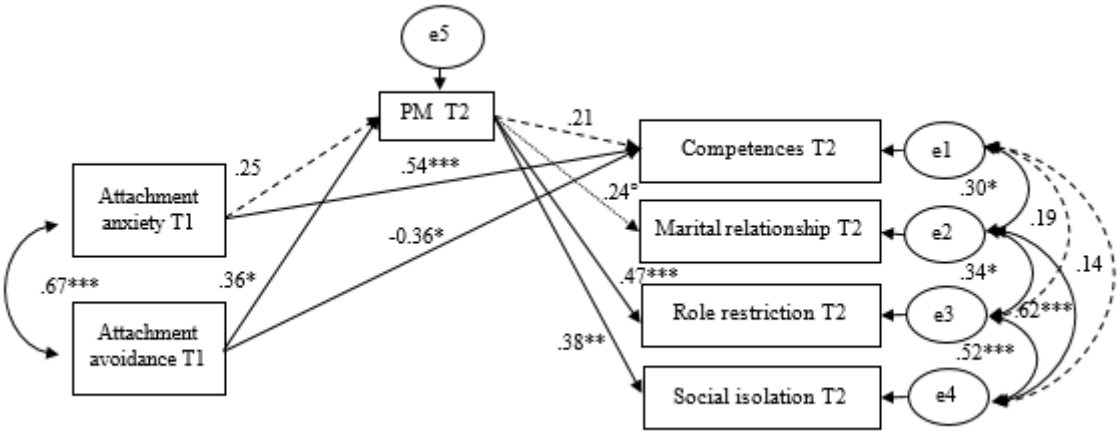
Gender Differences

Multi-group analysis (MGA) was used to investigate whether estimated parameter values of the model changed according to gender of the parent. The fully unconstrained model provided the best fit to the data for both mothers and fathers, $\chi^2(12) = 20.00$, $p = .07$, $\chi^2/df = 1.67$, CFI = .97, TLI = .91, RMSEA = .08 (CI = .00 – .14), with critical ratios for structural weights and residuals being significant ($p = .03$ and .001, respectively), allowing differences in path loadings and residuals across mothers and fathers. However, the critical ratio for structural covariances was nonsignificant ($p = .06$), supporting the invariance of these parameters across mothers and fathers. Pairwise parameter comparison indicated that the intercept of competences and the path from attachment anxiety, attachment avoidance, and PM at T2 on the one hand to competence on the other significantly differed across mothers and fathers. Furthermore, parameter estimates for mothers and fathers separately showed that, in mothers (Figure 3), the paths from attachment anxiety to PM at T2 ($\beta = .25$, $p = .11$), and from PM at T2 to competence ($\beta = .21$, $p = .14$) became nonsignificant,

indicating an intervening effect of PM in the relationship between attachment avoidance and parenting stress (from attachment avoidance to PM at T2: β = .36, *p* = .02, and from PM at T2 to marital relationship: β = .24, *p* = .07; role restriction: β = .47, *p* < .001; and social isolation: β = .38, *p* = .003), although the path from PM to marital relationship was only marginally significant. A Sobel test for the indirect effect between attachment avoidance and role restriction (z = 1.98, *p* < .05) was significant, for social isolation (z = 1.83, *p* = .07) there was a trend towards significance, and for the marital relationship (z = 1.43, *p* = .15) the Sobel test was not significant. Furthermore, there was a direct effect between both attachment anxiety and avoidance, and competence in mothers (β = .54, *p* < .001 and β = -.36, *p* = .03, respectively).

Figure 3

Final model with significant indirect and direct paths for mothers



Note. Standardized regression weights are given for the path coefficients. Full lines represent significant paths, dotted lines paths at trend level, and dashed lines non-significant paths.

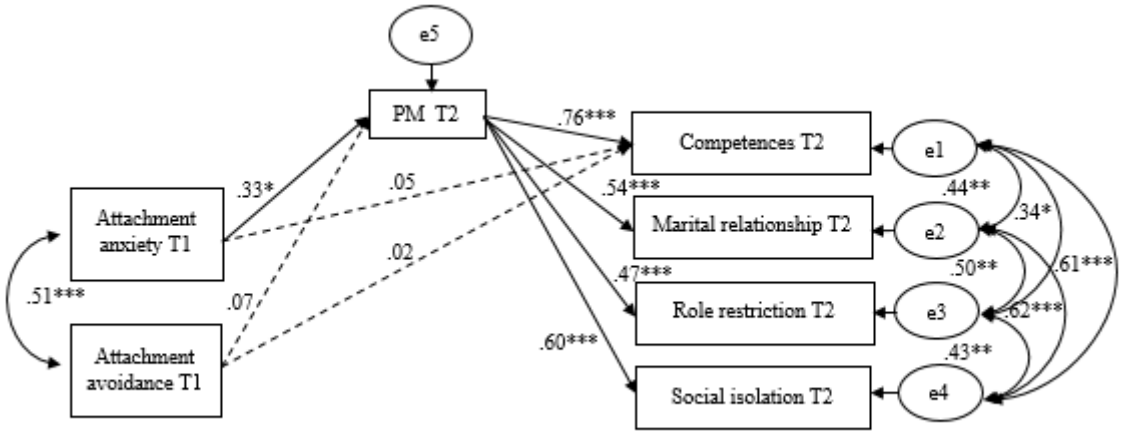
°*p* < .10, **p* < .05, ** *p* < .01, ***p* < .001 (two-tailed test).

In fathers (Figure 4), the path from attachment avoidance to PM at T2 (β = .07, *p* = .64) and competence (β = .02, *p* = .77), and from attachment anxiety to competence (β = .05, *p* = .54), became nonsignificant after MGA, suggesting full mediation of PM in the relationship between attachment anxiety and parenting stress dimensions (with significant paths from attachment anxiety to PM at T2: β = .33, *p* = .03, and from PM at T2 to

competence: β = .76, $p < .001$; marital relationship: β = .54, $p < .001$; role restriction: β = .47, $p < .001$; and social isolation: β = .60, $p < .001$). Sobel tests for the indirect effect between attachment anxiety and parenting stress subscales were significant for competence and social isolation (z = 2.13, $p < .05$ and z = 2.04, $p < .05$, respectively), for marital relationship and role restriction (z = 1.99, $p = .05$ and z = 1.90, $p = .06$, respectively) trends towards significance were found.

Figure 4

Final model with significant indirect and direct paths for fathers



Note. Standardized regression weights are given for the path coefficients. Full lines represent significant paths and dashed lines non-significant paths.

*$p < .05$, **$p < .01$, ***$p < .001$ (two-tailed test).

Discussion

Although many studies have explored the relationship between parental attachment and parenting stress (Mills-Koonce et al., 2011; Rholes et al., 1995; Vasquez et al., 2002; Vieira et al., 2012), none has focused on the putative role of PRF in the relationship between parental attachment and parenting stress. Yet, recent research indicates the importance of PRF and related constructs such as Maternal Mind-Mindedness in the experience of parenting stress (McMahon & Meins, 2012; Rutherford et al., 2015; Rutherford et al., 2013). Therefore, we attempted to disentangle both cross-sectional and longitudinal relationships among PRF, parental attachment, and parenting stress in early parenthood. More

specifically, this study aimed to understand the potential role of PRF in parenting stress by investigating PRF as a potential mediator in the relationship between parental attachment and parenting stress.

As expected, significant positive associations were found among parental attachment, PRF, and parenting stress dimensions, although the correlational patterns were slightly different for mothers and fathers, and significant associations were mainly found for PM. In line with our theoretical expectations, PM in particular mediated the relationship between insecure attachment dimensions and parenting stress, although results differed somewhat for attachment anxiety and avoidance. More specifically, PM fully mediated the relationship between attachment anxiety and parenting stress with regard to marital relationship, role restriction, and social isolation, whereas parenting stress concerning parental competence was partly mediated by PM. Attachment avoidance, on the other hand, was only indirectly positively related to parenting stress. Interestingly, in the final model, a direct and negative association between attachment avoidance and parental competence emerged, suggesting that higher levels of attachment avoidance were related to less concern about parental competence. This is consistent with a broad array of naturalistic and experimental research demonstrating the tendency of avoidant-attached individuals to deny and underreport negative emotions and distress, whereas anxious-attached people tend to exaggerate their distress and thus typically tend to report high levels of distress (Collins, 1996; Fraley & Shaver, 1998; Maunder et al., 2006; Mikulincer & Shaver, 2007; Nygren et al., 2012; Vieira et al., 2012).

Hence, insecure attachment (characterized by high levels of attachment anxiety or avoidance) is typically associated with serious impairments in PRF, expressed in maladaptive and inaccurate PRF (i.e., high PM), which then gives rise to parenting stress, most probably because parents increasingly fail to understand their child. Low levels of IC and CMS, by contrast, seem not necessarily associated with parenting stress, although one can imagine that extremely low scores on these dimensions of PRF might also be quite maladaptive. But at least in this relatively well-functioning group of parents, it was particularly PM that seemed to be associated with parenting stress. In more at-risk samples, different results may be obtained. Yet, it may also be that IC and CMS reflect more adaptive dimensions of PRF that are related to other, more positive features of parenting. For instance, Rutherford et al. (2015; 2013) found that IC and PM were related to persistence and stress tolerance during a simulated baby paradigm in which parents had to comfort an

inconsolably crying infant. Therefore, results of this study must be interpreted with caution, and more research in larger groups oversampling for at-risk parents is needed to further clarify the results found in this study, particularly with regard to the IC and CMS subscales. Nevertheless, our findings seem to support and strengthen the idea of PRF being a multidimensional construct with each dimension tapping into different features of parental or child psychological functioning.

Finally, MGA revealed some interesting gender differences in line with formulations concerning the influence of gender incongruence (i.e., a higher risk for maladjustment in men with high attachment anxiety, and in women with high attachment avoidance, because of incongruent sociocultural expectations) (Blatt, 2004; Luyten & Blatt, 2013). Indeed, in our sample, higher levels of parenting stress in mothers were associated with higher levels of attachment avoidance (via PM), whereas in fathers this was the case for higher levels of attachment anxiety. In addition, the maternal model—compared with the final joint model—showed a higher negative loading of the path from attachment avoidance to competence, again pointing toward the importance of attachment avoidance in understanding maladjustment in women.

Limitations and Implications for Research

Limitations of the study should be acknowledged. First, measures of parental attachment dimensions, PRF and parenting stress were assessed within parental couples (i.e., mothers and fathers separately), which suggest a possible interdependency of data. However, as mentioned in the data analyses section, addition of a couple-variable was not indicated and thus justified the use of SEM with nested data. Nevertheless, future research in larger samples using actor-partner interdependency models, for instance, is needed.

Second, although comparison of parents who participated at T2 and those who did not, did not reveal any significant differences, results must be interpreted with caution due to potential attrition bias. In addition, the sample size was relatively small, which may have led to limited statistical power, particularly in exploring potential gender differences. Although the results were statistically and theoretically consistent, the results of the MGA analysis should be considered exploratory and interpreted with caution due to limited statistical power.

Third, in this study, we focused only on PRF as a possible mechanism explaining the relationship between parental attachment and parenting stress. However, PRF is unlikely

to be the single most important factor influencing parenting stress and should be considered in the context of a variety of factors (parental psychopathology, family structure, life events, genetic predisposition), including child features (i.e., temperament) (Deater-Deckard, 2004; Sharp & Fonagy, 2008). In addition, parenting stress itself can also influence PRF, leading to even more parenting stress. Recent research on the impact of arousal on mentalizing capacities showed that distress activates the attachment system and the use of hyperactivating or deactivating attachment strategies (associated with attachment anxiety and avoidance, respectively), in turn causing impairments in mentalizing, which can be accompanied by the use of prementalizing modes (Fonagy & Luyten, 2009; Luyten & Fonagy, 2015; Schneider-Hassloff et al., 2015). Further research with multi-wave studies is needed to specify these evocative person–environment interactions and to identify the contributions of each of these parameters.

Fourth, the study sample was relatively homogeneous, comprising mainly middle-class, well-educated parents, in which a higher frequency of secure attachment (i.e., low levels of attachment anxiety and avoidance) is reasonable to assume. Correspondingly, results revealed that many of the parents had scores in the normal (nonclinical) range on the study variables. Yet, even within this relatively well-educated and well-functioning group, the effects of distortions in PRF could be clearly demonstrated, with PM seeming to be a sensitive indicator differentiating between vulnerable and nonvulnerable parents with regard to the prerequisites of experiencing parental stress, such as less confidence in their parental competence, more relational problems, greater social isolation, and less freedom in choosing activities other than parenting. Studies in larger groups oversampling for at-risk parents are needed before generalizations can be made to clinical samples, and to further clarify the role of the different PRF dimensions.

Nevertheless, findings of this study suggest that PRF should be targeted in prevention and intervention programs, particularly as it may interact with insecure parental attachment in predicting parenting stress, and both parental and child mental health. Specifically, both parental attachment anxiety and avoidance were associated with parenting stress, mainly because they were associated with a tendency to attribute hostile mental states to one's child (PM). Hence, these findings suggest that PRF, and PM in particular, should be addressed in intervention programs. To date, several intervention programs that specifically address parental attachment and PRF have been developed for different populations (Baradon et al., 2008; Borelli et al., 2012; Goyette-Ewing et al., 2003; Kalland

et al., 2015; Nijssens et al., 2012; Pajulo et al., 2012; Sadler et al., 2013; Sadler et al., 2006; Slade, 2007; Slade, Sadler, et al., 2005; Sleed et al., 2013; Suchman et al., 2010; Suchman et al., 2011; Suchman et al., 2012). The common aim of these interventions is to enhance the parent's capacity for PRF, to improve the parent-infant relationship, and to decrease the risk for the intergenerational transmission of psychopathology. More specifically, these interventions help parents to maintain a more mentalizing stance by focusing on increasing the parent's interest and curiosity in their own and their infant's mental states (IC) rather than focusing solely on expressed behaviour, by helping them to recognize the opacity of mental states (CMS) and by addressing the presence of pre-mentalizing modes (PM) (Luyten, Nijssens, et al., 2017). Both randomized trials and naturalistic studies have provided promising evidence for the effects of these interventions on both children and parents (Kalland et al., 2015; Ordway et al., 2014; Sadler et al., 2013; Suchman et al., 2011). Yet, it largely remains to be determined whether their effects are primarily mediated through addressing PRF. In this regard, the PRFQ could be an easy to use screening tool to assess levels of PRF in future studies.

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CHAPTER 3

Parental Attachment and Child Development: A One-Year Prospective Study of the Mediating Role of Parental Reflective Functioning[2]

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[2] Nijssens, L., Vliegen, N., & Luyten, P. (2020). Parental attachment and child development: A one-year prospective study of the mediating role of parental reflective functioning. *Journal of Child and Family Studies, 29*(8), 2342-2354. https://doi.org/10.1007/s10826-020-01767-5

Abstract

Parental attachment and parental reflective functioning (PRF) have been shown to be related to attachment, mentalizing capacities, and psychopathology in children. Studies also suggest that parental insecure attachment is related to lower levels of PRF. However, no study has directly investigated whether PRF dimensions mediate the relationship between parental attachment dimensions and features of social-emotional development other than attachment, mentalizing, and psychopathology. We prospectively investigated whether PRF mediates the relationship between parental attachment dimensions (i.e., levels of attachment avoidance and anxiety) and social-emotional competences and problems, using data from a 1-year longitudinal study of first-time parents and their biological children (N = 106). We found that low PRF as assessed with the Parental Reflective Functioning Questionnaire at one-year follow-up, was an intervening variable in the relationship between parental attachment dimensions at time 1 and child social-emotional development at time 2. In particular, maternal attachment avoidance and paternal attachment anxiety were indirectly related to child competences and problems through high levels of prementalizing modes (i.e., attributing malevolent mental states to the child and an inability to enter the child's internal world). Additionally, in mothers only, there was a partial mediation effect of PM in the relation between attachment anxiety and child competences.

Keywords: Parental reflective functioning, attachment, child development, psychopathology, intervention.

Highlights:

- 1-year prospective study on the role of parental reflective functioning (PRF)
- Impairments in PRF are negatively related to child social-emotional development
- Parental attachment influences child development through distorted PRF

Introduction

Parental attachment has been thought to be a key factor in fostering secure attachment in children as well as in the development of children's social-emotional capacities (Bakermans-Kranenburg et al., 2005; Ordway et al., 2015). Consistent with these assumptions, studies have shown an association between parental and child attachment (e.g., Arnott & Meins, 2007; Berthelot et al., 2015; van Ijzendoorn, 1995). However, only a handful of studies have examined the relationship between parental attachment and other aspects of child social-emotional development beyond the development of attachment security. Furthermore, most of these studies have been conducted over a decade ago. For example, Crowell and Feldman (1989) showed that maternal attachment as measured by the Adult Attachment Interview (AAI; George et al., 1984) was related to toddlers' social-emotional behaviors as coded on a free-play session and problem solving tasks. In line with these results, van Ijzendoorn et al. (1991) found that parental insecure attachment as measured by the AAI was related to maladaptive social-emotional child development in toddlers as measured by the Nijmegen-California Child Q-Sort (NCCS; Block & Block, 1980). They also found interesting sex differences, in that maternal attachment insecurity was related to less resilience and control in their children, whereas paternal attachment insecurity was related to less social, less timid, and more aggressive behavior in their children. Esbjørn et al. (2013) investigated associations among parental romantic attachment as measured by the Experiences in Close Relationships Questionnaire-Revised (ECR-R; Fraley et al., 2000) and child anxiety as measured by the Screen for Child Anxiety Related Emotional Disorders (SCARED-R; Muris et al., 1998; Muris et al., 1999). They found that child anxiety was related to both maternal and paternal attachment anxiety, but child anxiety was only related to paternal (but not maternal) attachment avoidance. These findings stress the need for further research investigating the role of both maternal and paternal attachment in early social-emotional development, as mothers and fathers may play a different role in child development.

Furthermore, it has become clear that the influence of parental attachment on child development might be less pronounced than was originally expected. The growing evidence for considerable fluctuations in attachment and the role of genetic factors and gene–environment interplay in explaining developmental trajectories associated with attachment plays an important role in this context (Fearon et al., 2014; Fraley et al., 2011). As a result,

recent theoretical developments focus on the role of broader socioecological factors associated with child development (Luyten et al., 2020).

In this regard, the capacity for parental reflective functioning (PRF) or parental mentalizing, that is, the capacity of parents to envision their child in terms of internal mental states (Slade, 2005), is increasingly assumed to be an important factor. More specifically, PRF refers to the parent's capacity to reflect upon both his/her own and the child's internal mental experience, and to understand the child's behavior in the context of underlying mental states, such as thoughts, feelings, desires, and intentions (Slade, 2005). PRF is thought to underlie caregiver sensitivity, as it permits caregivers to respond sensitively and appropriately to their infant's physical and emotional needs in a consistent and sensitive way, which in turn engenders in the infant attachment security and the development of emotional expression and communication (Rostad & Whitaker, 2016; Turner et al., 2008). Several studies have shown that parental sensitivity mediates the relationship between PRF and infant attachment (Ensink, Normandin, et al., 2016; Grienenberger et al., 2005; Stacks et al., 2014). Within a context of secure relationships with caregivers who pay appropriate attention to the role of internal mental states, the child is enabled to learn about self and others, fostering aspects of his/her social-emotional development such as adaptive socio-cognitive skills, an increased sense of self-efficacy, and self- and affect regulation (Ensink & Mayes, 2010; Fonagy & Target, 2005; Luyten, Nijssens, et al., 2017; Sharp & Fonagy, 2008; Slade, 2005). PRF is thus considered to be part of a broader, inbuilt evolutionary mechanism that is involved in the intergenerational transmission of culturally and personally relevant knowledge that people need to understand themselves and others in their intrinsically social and interpersonal world (Luyten, Nijssens, et al., 2017).

Being mentalized by the parent has indeed been demonstrated to promote attachment security (for a meta-analysis, see Zeegers et al., 2017). Several studies reported associations among PRF and (subsequent) child attachment (Arnott & Meins, 2007; Berthelot et al., 2015; Fonagy et al., 1991; Kelly et al., 2005; Koren-Karie et al., 2002; Luyten, Mayes, et al., 2017; Meins et al., 2012; Oppenheim & Koren-Karie, 2002; Pazzagli et al., 2018). Further, there is growing empirical evidence for the role of PRF with regard to child development beyond attachment (for a review, see Ensink & Mayes, 2010; Katznelson, 2014). However, these studies are still relatively scarce and have mainly been conducted in mothers of school-aged children. Maternal PRF, for instance, has been positively related to infant emotion-regulation capacities (Heron-Delaney et al., 2016), child internalizing and

externalizing problems (Benbassat & Priel, 2012; Ensink, Bégin, et al., 2016, 2017; Ensink, Leroux, et al., 2017; Esbjørn et al., 2013; Ordway et al., 2014; Smaling et al., 2016; Wong et al., 2017), and child mentalizing capacities (Benbassat & Priel, 2012; Ensink et al., 2015; Meins et al., 2002; Rosso & Airaldi, 2016; Rosso et al., 2015; Scopesi et al., 2015; Sharp et al., 2006). Studies on the respective roles of maternal and paternal RF are still scarce in this area, and thus there is a need to further investigate the respective role of PRF of fathers and mothers.

Moreover, most studies in this area have considered PRF as a unidimensional feature. However, it has become increasingly clear that PRF is a multidimensional capacity. For instance, maternal use of appropriate mind-related comments while playing with their infant was longitudinally related to secure attachment, whereas inappropriate, non-attuned mind-related comments were not (Arnott & Meins, 2007; Meins et al., 2012). Similarly, Miller et al. (2019) demonstrated that appropriate MMM (and not nonattuned MMM) was longitudinally related to attachment security in middle childhood. In addition, these authors reported that the relation between appropriate MMM and secure child attachment in mothers was mediated by maternal responsiveness and infant attachment security, while in fathers mediation was only found for infant security. Smaling et al. (2016), in turn, found that self-focused maternal PRF was positively related to child externalizing behavior and negative emotionality in offspring, while relation-focused PRF was negatively associated with child physical aggression.

To the best of our knowledge, however, no study has investigated the role of PRF, and specific subdimensions of PRF, in the relationship between parental attachment and child social-emotional development in early childhood. In this study, we therefore investigated whether both maternal and paternal PRF mediated the relation between parental attachment dimensions (i.e., levels of attachment avoidance and anxiety) and children's social-emotional development (i.e., social-emotional competences and problems), using data from a two-wave prospective study from infancy to toddlerhood among biological first-time parents and their children (N = 106). Given the increasing evidence for the multidimensionality of reflective functioning, including PRF (Krink et al., 2018; Luyten, Mayes, et al., 2017; Rostad & Whitaker, 2016; Rutherford et al., 2015; Rutherford et al., 2013), we used the Parental Reflective Functioning Questionnaire (PRFQ; Luyten, Mayes, et al., 2017) to assess PRF.

With regard to the assessment of parental attachment, two broad research traditions have been developed. One tradition has relied on interview-based measures of adult attachment, such as the AAI, the other on self-report measures, such as the ECR-R (Mikulincer & Shaver, 2007). The AAI assesses individuals' state of mind with regard to past attachment experiences, while the ECR-R measures more manifest attitudes and feelings with regard to attachment relationships. Studies investigating associations among self-reported attachment and interview-based assessment of states of mind with regard to attachment experiences have shown mixed results, ranging from nonsignificant to modest associations (Ravitz et al., 2010). This may not be surprising, as the AAI and self-report questionnaires measuring attachment dimensions are substantially different in their conceptualization of attachment as well as in used methodology (Bernier & Matte-Gagné, 2011). Nevertheless, despite differences between these two approaches, both states of mind attachment with regard to past attachment experiences assessed using interviews as well as self-reported thoughts and feelings with regard to current attachment relationships are thought to emerge from a person's attachment experiences with caregivers that are underpinned by similar underlying dimensions, i.e., attachment anxiety and attachment avoidance (Mikulincer & Shaver, 2007). Research also shows that self-reported measures of attachment insecurity have been found to be related, similarly as the AAI, to problems with emotion regulation and a variety of negative parenting behaviors such as impairments in parental responsiveness and sensitivity (Jones et al., 2015). Moreover, there is growing evidence that each of these assessment traditions tap into distinct aspects of attachment. Therefore, both measures may relate in unique ways to personal and relational functioning (Bernier & Matte-Gagné, 2011; Fortuna & Roisman, 2008; Roisman et al., 2007). In this study, we used the ECR-R as we were primarily interested in the influence of attachment as a dimensional feature of parents, rather than focusing on typological distinctions between parents as is typical of interview-based approaches to attachment. Although sex differences in the distribution of attachment insecurity have not been reported in studies using the AAI (Bakermans-Kranenburg & van Ijzendoorn, 2009a, 2009b; van IJzendoorn & Bakermans-Kranenburg, 2010), studies with self-report questionnaires of attachment such as the ECR-R are thought to be more strongly affected by sex differences (van IJzendoorn & Bakermans-Kranenburg, 2010). Indeed, a meta-analysis of sex differences in romantic attachment showed that men tend to score higher on attachment avoidance and lower on attachment anxiety than women (Del Giudice, 2011).

The present study

In line with the literature review above, we expected parental attachment dimensions to be directly as well as indirectly, namely through PRF, related to child social-emotional development. More specifically, we hypothesized that insecure parental attachment dimensions would be negatively related to indices of child social-emotional development. Furthermore, we expected that PRF dimensions would mediate the longitudinal relationships between parental attachment dimensions assessed at baseline and child social-emotional competences and problems at follow-up 1 year later. No a priori hypotheses were made with regard to potential sex differences in predicting child social-emotional development, given the scarcity of available studies in this context. However, we did expect the strongest mediation effects for the PRF dimension "prementalizing modes" (PM), which is characterized by the parent's tendency to make maladaptive and malevolent attributions about the child, in both mother and fathers. Indeed, empirical research suggests that indices of more adaptive PRF (such as "interest and curiosity in mental states" and "certainty about mental states") vary in the degree to which they are related to parental attachment dimensions, whereas maladaptive PRF (i.e., PM) is strongly related to parental attachment anxiety and avoidance (Burkhart et al., 2017; Luyten, Mayes, et al., 2017; Pazzagli et al., 2018; Rostad & Whitaker, 2016).

Method

Participants

At time 1 (T1), the study sample consisted of 76 first-time parental couples and their infants aged 8–13 months. Mothers and fathers differed significantly in age ($t(134.62) = 3.57$, $p < .001$), with mothers being a mean 29.31 years ($SD = 3.00$; range 23–39) and fathers 31.48 years ($SD = 4.39$; range 20–47). The majority of parents had attained higher education (82.9% for mothers and 72.8% for fathers). The 76 infants, comprising 45 girls (59.2%) and 31 boys (40.8%), were a mean 10.11 months old ($SD = 1.24$; range 8–13) at T1.

The final sample at time 2 (T2) consisted of 53 couples (response rate 69.73%) and their infants (31 girls [58.5%], 22 boys [41.5%]). The mean age of the mothers was 29.69 ($SD = 2.72$; range 24–40) and the fathers 32.83 ($SD = 4.42$; range 26–48) years. The infants were a mean 21.81 months old ($SD = 1.31$; range 19–26). A comparison of parents who participated at T2 and those who did not revealed no significant differences with regard to parental sex, age, or educational level, or child sex or age.

Procedure

Participants were recruited by undergraduate university students in central Belgium in return for credits in a methodology course. Prior to contacting potential participants, students were educated and trained in the principles of research and the study itself. Students were instructed to recruit Dutch-speaking, heterosexual couples who were first-time parents of a healthy biological child aged 8–13 months. Couples who agreed to participate were told they would participate in a study about the characteristics of young parents and their relationship with their child. Participation was voluntary and confidentiality was guaranteed. There was no compensation provided for parents who participated in the study. Eligible participants were home visited by the students and written informed consents by both parents were obtained. Parents were then asked to complete a booklet of questionnaires, which was collected by the students two weeks later. Approximately 1 year later, the same parents were contacted by post and/or e-mail and invited to participate in the second wave of the study by completing a second booklet of questionnaires. Parents who did not complete the booklet within 2 weeks were contacted by up to three follow-up telephone calls to encourage them to complete the set of questionnaires, after which they were considered dropouts if they had not responded.

Measures

Parental attachment dimensions were assessed at T1 by using the Experiences in Close Relationships Questionnaire-Revised (ECR-R; Fraley et al., 2000), a 36-item self-report questionnaire scored on a 7-point Likert scale. The ECR-R measures insecure attachment strategies in the context of adult romantic attachment (Brennan et al., 1998). Two dimensions underlying attachment are defined: *attachment anxiety* refers to fear of rejection and abandonment (18 items; e.g., “I am afraid that I will lose the love of the other”), whereas *attachment avoidance* refers to discomfort with closeness and dependence on others (18 items; e.g., “I don’t like a relationship with the other to be too close”). Studies have supported the reliability and validity of the ECR-R (Sibley et al., 2005; Sibley & Liu, 2004). In this study, internal consistencies of the subscales were good, with Cronbach’s alphas of .87 for attachment anxiety and .86 for attachment avoidance.

Parental reflective functioning was assessed at T2 by using the PRFQ (Luyten, Mayes, et al., 2017), an 18-item self-report questionnaire scored on a 7-point Likert scale. The PRFQ assesses three basic dimensions of PRF: *prementalizing modes* (PM), reflecting

the repudiation of or defense against mentalizing (6 items; e.g., "My child sometimes gets sick to keep me from doing what I want to do"); *certainty about mental states* (CMS), reflecting the parent's ability to recognize the opacity of mental states (6 items; e.g., "I always know what my child wants"); and *interest and curiosity in mental states* (IC), reflecting active curiosity about and willingness to understand the mental states of the child (6 items; e.g., "I am often curious to find out how my child feels"). Experimental data support the reliability and preliminary validity of the PRFQ (Luyten, Mayes, et al., 2017). In the present study, Cronbach's alphas for PM, CMS, and IC were .73, .73, and .72, respectively.

Child social-emotional capacities were measured by using the Brief Infant-Toddler Social and Emotional Assessment (BITSEA; Briggs-Gowan & Carter, 2002) at T2. The BITSEA is a 42-item parent-report questionnaire for children aged 12–36 months (scored on a 3-point Likert scale), pertaining to two domains, namely *problems* (31 items; e.g., "Hits, shoves, kicks, or bites children – not including brother or sister") and *competences* (11 items; e.g., "Tries to help when someone is hurt, for example gives a toy"). Higher scores on the problems scale indicate a higher risk for the development of social-emotional or behavioral problems (i.e., internalizing and externalizing problems), whereas lower scores on the competences scale indicate a higher risk for delayed development of social-emotional competences such as compliance, empathy, mastery motivation, and prosocial peer interactions (Briggs-Gowan & Carter, 2007). Research has shown very good reliability and validity for the BITSEA (Briggs-Gowan et al., 2004; Kruizinga et al., 2012). In this study, we calculated average scores for competences and problems. Cronbach's alphas in this study were .67 for problems and .60 for competences.

Data analyses

First, descriptive statistics were calculated to describe the sample. A power analysis was conducted based on other studies suggesting small to medium effect sizes between attachment dimensions and child socio-emotional development (Fearon et al., 2010; Madigan et al., 2013; Madigan et al., 2016; Verhage et al., 2016). Similarly, small to medium effect sizes have been shown to be typical for the relation between PRF on the one hand and child attachment and socio-emotional development on the other (Zeegers et al., 2017). For medium effect sizes, the required sample size is $n = 85$ ($p < .05$) and $n = 125$ ($p < .01$) (power = .80) (Cohen, 1992). Second, we computed zero-order correlations among

parental attachment dimensions, PRF dimensions, and child social-emotional capacities for mothers and fathers separately (see Table 1). Structural equation modeling (SEM) in mothers and fathers separately was used to investigate longitudinal mediational effects of PRF on child competences and problems. We evaluated multiple SEM models, starting with a base model that included all direct paths between the predictor (parental attachment anxiety and avoidance at T1) and dependent (child social-emotional competences and problems at T2) variables. Next, we tested a full mediation model with only indirect effects through PRF at T2 (i.e., without direct paths from parental attachment dimensions to child social-emotional competences and problems). In a final step, we tested partial mediation by adding all direct paths to the second model with indirect effects (Cole & Maxwell, 2003). Potential intervening effects (Hayes, 2009) were examined if the first criterion of mediation was not met (no direct association between predictor and outcome variable; Baron & Kenny, 1986). We used modification indices to evaluate potential modifications with a step-by-step approach, omitting nonsignificant paths if this increased the model fit. We compared the fit of each model by inspecting several fit indices according to conventional criteria (Byrne, 1998; Hooper et al., 2008; Hu & Bentler, 1999; Steiger, 2007): The ratio of χ^2 to *df* is recommended to range from 5.0 to 2.0 to provide an acceptable fit for the model. The comparative fit index (CFI) and Tucker-Lewis index (TLI) should be ≥ .95 for a good fit, and the root mean square error of approximation (RMSEA) should be ≤ .06 for a good fit. The confidence interval for the RMSEA should be between 0 and .07 to provide a good fit.

SPSS version 22.0 and AMOS 18.0 for was used for all statistical analyses.

Results

Preliminary Analyses

Table 1 shows the descriptive statistics for parental attachment dimensions, child social-emotional competences and problems, and PRF dimensions. None of the child and parent demographic features were significantly related to child social-emotional competences and problems. None of the children had mother- or father-reported scores below the clinical cut-off score for competences (≤ 15). For problems, six versus ten percent of the children scored above the clinical cut-off score (≥ 14) as reported by fathers and mothers, respectively.

There was a significant correlation between mother- and father-reported child socio-emotional problems ($r = .38$, $p < .01$), but not with regard to reported child competences (*r*

= .09, p = .51). In addition, there was a significant negative association between father-reported problems and mother-reported competences (r = –.34, p < .05), while the relation between mother-reported problems and father-reported competences showed a small trend towards significance (r = –.24, p = .09). Paternal nor maternal attachment and PRF dimensions were significantly associated with maternal or paternal child competences and problems.

We also examined possible differences between mothers and fathers with regard to parental attachment dimensions, PRF dimensions, and self-reported child social-emotional development using paired samples t-tests. As expected, mothers scored slightly higher on attachment anxiety than fathers, although the difference was not significant (p = .10). Fathers had significantly higher levels of attachment avoidance (p < .05). There was no significant difference between mothers and fathers for levels of PM and CMS, but levels of IC were significantly higher in mothers (p < .05). Finally, there was no significant difference in the mother- and father-reported child competences, and there was a trend that mothers reported higher child problems compared to fathers (p = .07).

Associations Among Parental Attachment Dimensions, PRF, and Child Social-Emotional Development

Zero-order correlations among the study variables were calculated for mother- and father-reported data separately (Table 1). Both attachment anxiety and attachment avoidance at T1 were highly significantly related to PM at T2 in mothers and in fathers, although correlations in fathers were slightly weaker. We found no significant correlations with the other subscales of the PRFQ (IC and CMS), except for a significant positive correlation between attachment anxiety at T1 and CMS at T2 in fathers.

At T2, for both mothers and fathers, PM was significantly negatively correlated with child social-emotional competences. Further, PM in fathers was significantly positively correlated with child social-emotional problems, whereas this association was marginal in mothers. Furthermore, attachment anxiety and avoidance were negatively related to child social-emotional competences in mothers (but not in fathers). Neither attachment anxiety or avoidance in either mothers or fathers was significantly related to child social-emotional problems. Finally, we found no significant correlations between CMS and social-emotional competences and problems.

Hence, the findings warranted the testing of PM as a potential mediator between parental attachment dimensions and child social-emotional competences and problems.

Table 1

Zero-Order Correlations, Means, and Standard Deviations among Study Variables for Mother- and Father-Reported Data

	1	2	3	4	5	6	7	*M* (*SD*)
1. Competences	—							1.69 (0.22) / 1.63 (0.24)
2. Problems	–.20/ –.22	—						0.28 (0.16) / 0.24 (0.12)
3. Anxiety	–.43**/ –.04	.10/ .20	—					2.21 (0.75) / 1.99 (0.66)
4. Avoidance	–.33*/ –.12	.17/ .14	.67**/ .52**	—				1.99 (0.59) / 2.19 (0.61)
5. PM	–.40**/ –.31*	.25°/ .33*	.49**/ .37**	.53**/ .24°	—			1.62 (0.65) / 1.64 (0.74)
6. CMS	–.08/ .21	–.01/ .07	.25/ .31*	.22/ .04	.18/ .17	—		3.71 (0.89) / 3.59 (1.10)
7. IC	.07/ .34*	.29*/ –.07	–.14/ –.11	–.13/ –.04	–.15/ –.23°	.01/ –.19	—	6.03 (0.59) / 5.70 (0.79)

Note. Data are presented as mother data (n = 53)/father data (n = 53). PM = pre-mentalizing modes; CMS = certainty about mental states; IC = interest and curiosity in mental states.
° $p < .10$, * $p < .05$, ** $p < .01$.

The Mediating Role of PM on Child Competences and Problems in Mothers

The first (base) model with only direct paths did not provide a good fit to the data, $\chi^2(1) = 1.44$; $\chi^2/df = 1.44$; $p = .23$; CFI = 0.99; TLI = 0.93; RMSEA = .09 (CI = .00, .40). In this model, only the path from attachment anxiety to child social-emotional competences was significant ($\beta = –.39$, $p < .05$). Removal of the nonsignificant paths yielded a model with a good fit to the data, $\chi^2(1) = 0.11$; $\chi^2/df = 0.11$; $p = .74$; CFI = 1.00; TLI = 1.00; RMSEA = .00 (CI = .00, .26).

The second model, with only indirect effects, yielded a good fit to the data, $\chi^2(5) = 5.86$; $\chi^2/df = 1.18$; $p = .32$; CFI = 0.97; TLI = 0.99; RMSEA = 0.06 (CI = .00, .21). The paths from attachment avoidance to PM ($\beta = .36$; $p < .05$) and from PM to child social-emotional competences ($\beta = –.40$; $p < .01$) were significant, while the paths from attachment anxiety to PM ($\beta = .25$; $p = .11$) and from PM to child social-emotional problems ($\beta = .25$; $p = .06$) showed a trend toward positive associations, but these trends failed to reach significance. We first removed the path from attachment anxiety to PM, which led to a model that provided an adequate fit to the data, $\chi^2(6) = 8.93$; $\chi^2/df = 1.40$; $p = .21$; CFI = 0.96; TLI = 0.93; RMSEA = 0.09 (CI = .00, .21). The paths from attachment avoidance to PM ($\beta = .53$; $p < .001$) and from PM to child social-emotional competences ($\beta = –.40$; $p < .01$) remained significant, while the path from PM to child social-emotional problems remained marginally significant ($\beta = .25$; $p = .06$). Next, we removed the path from PM to child social-emotional problems, which led to a model that did not provide a good fit to the data, $\chi^2(3) = 7.26$; $\chi^2/df = 2.42$; $p = .06$; CFI = 0.92; TLI = 0.86; RMSEA = 0.17 (CI = .00, .32). We therefore decided to keep the first model with all the indirect paths (including the marginally significant paths) as the final indirect effects model.

The final model, with both direct and indirect paths, provided a good fit to the data, $\chi^2(4) = 1.18$; $\chi^2/df = .29$; $p = .88$; CFI = 1.00; TLI = 1.00; RMSEA = 0.00 (CI = .00, .10). The paths from attachment avoidance to PM ($\beta = .36$; $p < .05$) and from attachment anxiety to child social-emotional competences ($\beta = –.31$; $p < .05$) were significant. The paths from attachment anxiety to PM ($\beta = .25$; $p = .11$) and from PM to social-emotional competences ($\beta = –.25$; $p = .08$) and problems ($\beta = .25$; $p = .06$) showed a trend towards significance. We first removed the path from attachment anxiety to PM, which led to a model that also provided a good fit to the data, $\chi^2(5) = 3.68$; $\chi^2/df = .74$; $p = .60$; CFI = 1.00; TLI = 1.00; RMSEA = 0.00 (CI = .00, .16). The paths from attachment avoidance to PM ($\beta = .53$; $p < .001$) and from attachment anxiety to child social-emotional competences ($\beta = –.32$; $p < .05$) remained significant. The paths from PM to child social-emotional competences ($\beta = –.25$; $p = .06$) and problems ($\beta = .25$; $p = .06$) showed a trend towards significance. This model did not differ in terms of goodness of fit from the previous model ($\Delta\chi^2 = 2.5(1)$, *ns*). We then removed the path from PM to child social-emotional problems, leading to a model that yielded an adequate fit to the data, $\chi^2(2) = 2.55$; $\chi^2/df = 1.28$; $p = .30$; CFI = 0.99; TLI = 0.97; RMSEA = 0.07 (CI = .00, .30). The paths from attachment avoidance to PM ($\beta = .53$; $p < .001$) and from attachment anxiety to child social-emotional competences ($\beta = –.31$; p

< .05) remained significant. The path from PM to child social-emotional competences showed a trend towards significance (β = –.25; p = .06). Finally, we removed the path from PM to child social-emotional competences. This model did not provide a good fit to the data, $\chi^2(3) = 5.59$; $\chi^2/df = 1.86$; p = .13; CFI = 0.96; TLI = 0.91; RMSEA = 0.13 (CI = .00, .30). The paths from attachment avoidance to PM (β = .53; p < .001) and from attachment anxiety to child social-emotional competences (β = –.43; p < .001) remained significant.

Thus, the final model contained a direct path from attachment anxiety to child social-emotional competences, and indirect paths from attachment anxiety and avoidance to child social-emotional competences and problems (see Figure 1). Hence, PM partially mediated the relation between attachment anxiety and child social-emotional competences, and played an intervening role in the relation between attachment avoidance and child social-emotional competences and problems.

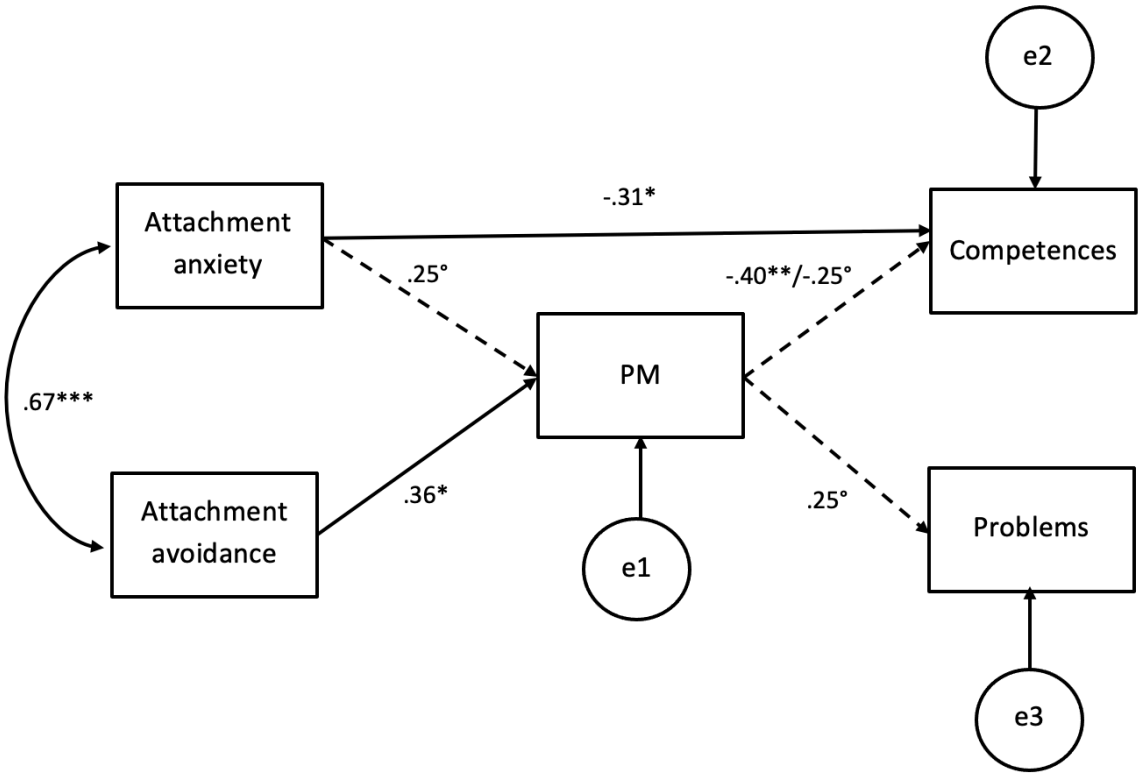
The Mediating Role of PM on Child Competences and Problems in Fathers

The first (base) model, with only direct paths, did not provide a good fit to the data, $\chi^2(1) = 2.53$; $\chi^2/df = 2.53$; p = .11; CFI = .90; TLI = .41; RMSEA = .17 (CI = .00, .45). As expected, in this model, paths from attachment anxiety and avoidance to child social-emotional competences and problems were nonsignificant. Therefore, only indirect effects through PM were investigated.

The second model, with only indirect effects, yielded a good fit to the data, $\chi^2(5) = 2.52$; $\chi^2/df = .50$; p = .77; CFI = 1.00; TLI = 1.00; RMSEA = 0.00 (CI = .00, .13). The paths from attachment anxiety to PM (β = .33; p < .05), and from PM to child social-emotional competences (β = –.31; p < .05) and problems (β = .33; p < .05) were significant. The path from attachment avoidance to PM, however, was nonsignificant (β = .07; p = .64). Removing this nonsignificant path yielded a model that also provided a good fit to the data, $\chi^2(6) = 2.73$; $\chi^2/df = 0.46$; p = .84; CFI = 1.00; TLI = 1.00; RMSEA = 0.00 (CI = .00, .10). This model did not differ in terms of goodness of fit from the previous model ($\Delta\chi^2 = 0.21$ (1), *ns*). Because of the nonsignificant path between attachment avoidance and PM in the previous unrestricted model, we decided to keep the restricted model as the final model (see Figure 2). These results indicate an intervening effect of PM in the relation between attachment anxiety and child social-emotional competences and problems in fathers.

Figure 1

Final model of the role of PM in the relationship between parental attachment dimensions and child social-emotional competences and problems in mothers

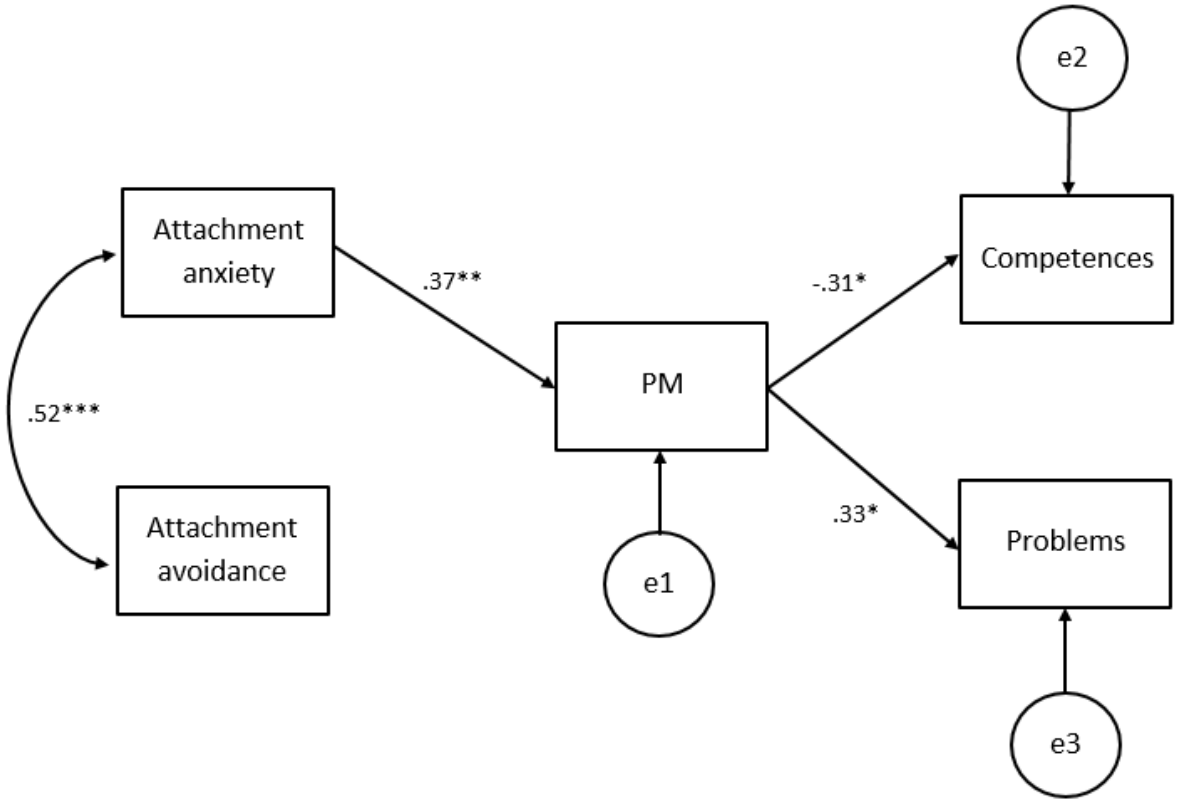


Note. Rectangles indicate measured variables and the small circles reflect residuals (e). The bidirectional arrow depicts covariance and unidirectional arrows depict hypothesized directional links. Standardized regression weights are given for the path coefficients (if values changed after adding direct paths to the indirect model, values are presented as value for the indirect model/value for the direct model).

$N = 53$; ° $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 2

Final intervening model of the role of PM in the relationship between parental attachment dimensions and child social-emotional competences and problems in fathers



Note. Rectangles indicate measured variables and the small circles reflect residuals (e). The bidirectional arrow depicts covariance and unidirectional arrows depict hypothesized directional links. Standardized regression weights are given for the path coefficients.
$N = 53$; * $p < .05$, ** $p < .01$, *** $p < .001$.

Discussion

Although many studies have explored the relationships among parental attachment, PRF, and infant attachment, few have focused on the putative role of PRF in the relationship between parental attachment and child development. This is the first study to attempt to disentangle prospective relationships among parental attachment dimensions, PRF, and the development of child social-emotional capacities, using a multidimensional measure of PRF.

As expected, maternal attachment anxiety and avoidance were negatively related to subsequent child social-emotional competences in toddlerhood. However, the same associations were not found for social-emotional problems in toddlerhood. Similarly, we found no direct associations between fathers' attachment dimensions and social-emotional child development. This lack of direct associations between parental attachment and subsequent child social-emotional development may not be surprising in the light of current socioecological views on child development that de-emphasize the unique role of parental attachment in fostering developmental trajectories in their children (Luyten et al., 2020). This assumption is further supported by results of the mediation analyses, showing that attachment dimensions were only indirectly related to the development of child social-emotional competences and problems through high levels of PM in both mothers and fathers. For example, we found parental PM in toddlerhood to be an intervening variable in the relationship between parental attachment dimensions in infancy and child social-emotional competences and problems in toddlerhood. More specifically, higher levels of paternal attachment anxiety and maternal attachment avoidance in infancy led to higher PM in toddlerhood, which in turn was related to fewer competences and more problems in the toddlers' social-emotional development. These sex-related results are consistent with research on the role of sex differences in attachment. Attachment avoidance seems to be more common in men, whereas attachment anxiety is more common in women (Blatt, 2004; Zuroff & Fitzpatrick, 1995), especially in Western societies that place a greater emphasis on the need for self-definition in men and on the capacity for relatedness in women (Luyten & Blatt, 2013). In this context, sex incongruence (i.e., high levels of attachment anxiety in men and high levels of attachment avoidance in women) has been hypothesized to be associated with an increased risk for maladjustment and psychopathology in both parents and their children because of incongruent socio-cultural expectations (Luyten & Blatt, 2013). This may explain why high levels of attachment anxiety in fathers were associated with more child social-emotional problems and fewer competences, whereas in mothers this was the case for high levels of attachment avoidance.

Additionally, in mothers only, we found PM to partially mediate the relation between attachment anxiety and child social-emotional competences. Maternal attachment thus seemed to influence child social-emotional development both directly and indirectly. The fact that in mothers only, attachment was directly and prospectively associated with child socio-emotional competences may not be surprising, as mothers are still the primary

caregivers in most Western countries, particularly in the early stages of development, and thus may have more influence on the developmental trajectory of their child (Leckman et al., 1999). This finding is also consistent with findings reported by van Ijzendoorn et al. (1991), showing that maternal attachment insecurity was related to less resilience and control in their children. Contrary to our study in which no direct (and only indirect) relations between paternal attachment and child social-emotional development were found, the study of van Ijzendoorn et al. (1991) also reported a direct association between attachment insecurity and indices of externalizing problems in fathers. However, differences in results obtained may be due to methodological issues, in that our study used the ECR-R to assess adult attachment dimensions, whereas van Ijzendoorn et al. (1991) used the AAI to measure adult attachment. We also used different measures of child social-emotional development (BITSEA versus NCCS). As mentioned before, both measurement methods are thought to tap into different features of child development, and this could also explain the differences in results. Further research is needed to expand on hypothesized differences in the role of mothers and fathers in predicting developmental trajectories.

Finally, in line with previous research pointing out the unique role of PM in understanding the development of emotional problems (Burkhart et al., 2017; Krink et al., 2018; Luyten, Mayes, et al., 2017; Pazzagli et al., 2018; Rostad & Whitaker, 2016; Rutherford et al., 2015), we found effects only for the maladaptive dimension of PRF, that is, PM, and not for the other PRF dimensions (IC and CMS). These results are also congruent with theoretical assumptions that maladaptive PRF negatively influences child social-emotional development (e.g., Ensink & Mayes, 2010; Fonagy & Target, 2005; Sharp & Fonagy, 2008; Slade, 2005). Specifically, parents with high levels of PM tend to make malevolent attributions about their child's mind, which may lead to a feeling of non-markedness in the child. Subsequently, this might hamper the child's development of the capacity to reflect on emotions and their impact, resulting in affect regulation problems (Fonagy et al., 2002). Affect regulation problems have been shown to be associated with problems in social-emotional development (e.g., Halligan et al., 2013). These findings also further extend the assumption of a loose coupling between attachment and PRF, suggesting that insecure attachment (characterized by high levels of attachment anxiety and/or avoidance) is associated with maladaptive and inaccurate PRF (PM), but not necessarily with other, more adaptive features of PRF (IC and CMS). This hypothesis is also in line with research on the impact of arousal on mentalizing capacities showing that distress

activates the attachment system and the use of hyperactivating or deactivating attachment strategies (which are associated with attachment anxiety and avoidance, respectively), in turn causing impairments in mentalizing, which can be accompanied by the use of PM (Fonagy & Luyten, 2009; Luyten & Fonagy, 2015).

Together, these findings, if replicated, might have implications for clinical interventions, particularly for insecurely attached parents. Early interventions focusing on the parent's sensitivity and appropriate responsiveness to the infant's cues, as well as promoting PRF by helping the parent understand the child's behavior in the context of his/her internal mental experience, could serve important preventive functions with regard to children's social-emotional development. Finally, it is important to include both parents in early intervention programs, as mothers and fathers may provide unique contributions with regard to child development.

We acknowledge several limitations of the current study. First, the sample size was relatively small, which may have led to limited statistical power to detect small effects which seem to be typical in this area. Yet, on the whole, findings seem quite robust and consistent with theoretical expectations, although some relatively substantial correlations only were significant at the trend level.

Second, the sample was relatively homogeneous, comprising mainly middle-class, well-educated mothers and fathers. Yet, even within this relatively well-educated and well-functioning group, impairments in PRF were prospectively related to child socio-emotional problems and competences. Yet, studies in at-risk and in clinical samples are needed to further investigate the purported role of PRF in explaining the development of children's socio-emotional problems and competences.

Third, only parental self-report measures were used to assess parental attachment dimensions, PRF, and child social-emotional development. Multimethod and multi-informant studies are therefore needed to see whether our results can be replicated when other measurement methods are used. For example, we used the ECR-R to measure parental attachment dimensions that stem from attachment strategies in close relationships instead of the AAI that assesses state of mind attachment. As noted, associations among the ECR-R and the AAI are typically weak, possibly due to conceptual and methodological differences between both measurement methods (Bernier & Matte-Gagné, 2011; Ravitz et al., 2010). Nevertheless, both measures are thought to be equally important in predicting parental features and child development, as they may have unique and differential

contributions towards these outcomes (Bernier & Matte-Gagné, 2011; Fortuna & Roisman, 2008; Roisman et al., 2007). Similarly, studies examining the association between multiple informants suggest that there is only a modest association between observer-related and parental or child self-report measures of child social-emotional development (e.g., Gartstein & Marmion, 2008; Karp et al., 2004; Van Roy et al., 2010). Future research should therefore apply a multi-method and multi-informant approach (De Los Reyes & Kazdin, 2005). In this regard, it would also be interesting to investigate whether PRF accounts for differences in ratings of child development, as informant discrepancies are thought to be related to the attributions that different informants have about the causes of the child's behaviors (De Los Reyes & Kazdin, 2005).

Finally, we focused on PRF as a possible mechanism explaining the relationship between parental attachment and child social-emotional capacities. In line with recent theoretical developments concerning the role of epistemic trust and social learning, which warn against a simplistic and linear understanding of the relationship between parental attachment and child development, findings of this study stress the importance of considering the broader caregiving environment in determining children's social-emotional development (Luyten et al., 2020; Luyten, Nijssens, et al., 2017; Sharp & Fonagy, 2008). In this regard, child developmental trajectories are also thought to be influenced by evocative person–environment interactions (Klahr & Burt, 2013; Marceau et al., 2013), where child features increasingly influence the parent–child interaction, including PRF. Children who have deficits in social-emotional competences may be, for example, more challenging for their parents, leading to higher levels of attachment insecurity in the parents and an ensuing vicious cycle of increasing impairments in social-emotional skills in children and increasing attachment insecurity in parents. In infancy, these evocative person–environment correlations may be weaker, with parental features being the most important factor driving effects on child development, whereas parent and child features may become progressively more interdependent. Multi-wave longitudinal studies are needed to investigate the potential role of such evocative person–environment interactions.

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CHAPTER 4

Parental Reflective Functioning and Theory of Mind Acquisition: A Developmental Perspective[3]

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Abstract

This study investigated Theory of Mind (ToM) development in 83 children aged 3–5 years, and its associations with parental reflective functioning (PRF), using a multidimensional and developmental approach. Results showed that ToM dimensions (i.e., affective, belief-desire, and cognitive) gradually increased with age. All dimensions of PRF (i.e., prementalizing modes, certainty about mental states, and interest and curiosity in mental states) were associated with ToM dimensions, with different dimensions being differentially related to ToM, including age-related effects.

***Keywords*:** Parental reflective functioning, Theory of Mind, social cognition

Statement of contribution

(i) What is already known on this subject:

- Theory of Mind (ToM) and parental reflective functioning (PRF) are multidimensional constructs
- Affective, belief-desire and cognitive ToM develop progressively

(ii) What the present study adds:

- Differential age-related relations among parental reflective functioning and ToM
- Features of parental reflective functioning facilitate or impede ToM development

Background

Many studies have been conducted to better understand the development of Theory of Mind (ToM)—that is, the capacity to attribute mental states to self and others, and to understand people's actions and interactions as being driven by underlying internal beliefs, emotions, desires, and intentions—in children (Premack & Woodruff, 1978). ToM is considered an essential and perhaps even central capacity for children to navigate their increasingly complex social world. Consistent with this assumption, several studies have shown important associations between ToM and social and psychological functioning (e.g., Astington, 2003; Slaughter et al., 2002). In addition, impairments in ToM have been associated with several psychological disorders (Baron-Cohen, 2000; Bora et al., 2016; Bora & Berk, 2016; Brüne, 2005; Hezel & McNally, 2014; Sharp et al., 2011; Uekermann et al., 2010).

ToM is considered a multidimensional construct that includes cognitive features, affective capacities, and belief-desire understanding (Blijd-Hoogewys & van Geert, 2016; Ensink & Mayes, 2010; Hughes & Leekam, 2004; Wellman, 2018; Wellman & Liu, 2004). Cognitive ToM is typically studied by the assessment of false-belief reasoning, that is, the realization that internal beliefs can differ from the real, external world, and that individuals' actions depend on their beliefs rather than on the real situation (Flavell, 1993; Wellman et al., 2001). False-belief understanding thus specifically refers to representational mental states of belief and knowledge (Hughes & Leekam, 2004). Affective ToM is typically studied using emotion-understanding paradigms (i.e., the ability to recognize facial expressions and/or to attribute emotional states to self and others). Belief-desire reasoning, finally, involves more complex capacities related to emotion attribution, such as the recognition that someone's behavior is affected by that person's beliefs and desires, as well as an awareness of the affective outcomes of someone's actions (e.g., understanding that someone will feel good if they get what they desired, and feel bad if they do not) (Bartsch & Wellman, 1995).

Overall, studies of the development of ToM converge to suggest that there is an important transition within the pre-school years, wherein children gradually master more sophisticated emotion understanding, as well as false-belief and belief-desire reasoning (e.g., Bartsch & Wellman, 1995; de Rosnay et al., 2004; Harris et al., 1989; Pons et al., 2004; Wellman, 2012). Although there is a great deal of intraindividual variation and much overlap over time in the development of these capacities, it seems that affective ToM

emerges first in development followed by belief-desire reasoning based on true beliefs (i.e., between 3 and 4 years of age). Subsequently, between the ages of 4 and 5, the child develops false-belief understanding (Kim, 2015; Pons et al., 2004; Wellman, 2012). From 6 years of age onward, the child is able to jointly consider the role of false beliefs and desires in attributing emotions (Bartsch & Wellman, 1995; Bradmetz & Schneider, 1999, 2004; de Rosnay et al., 2004; Harris et al., 1989; Kim, 2015; Ruffman & Keenan, 1996).

There is still considerable debate concerning the factors that influence the onset and development of ToM. Several (often complementary) theories have been proposed to better understand the acquisition of ToM, ranging from biological and maturational (Scholl & Leslie, 2001) to experience-based theories (Ensink & Mayes, 2010; Hughes & Devine, 2015a, 2015b). Hence, it is likely that both genetics and environment play an important role in the acquisition of ToM (Ensink & Mayes, 2010). Indeed, it has been shown that all normally developing children—independent of individual and cultural differences—eventually master ToM in the pre-school years (Wellman, 2012). Moreover, a critical stage in ToM development seems to be between 3.5 and 4.5 years of age, during which ToM increases substantially, probably reflecting a largely biologically determined maturation effect (Blijd-Hoogewys & van Geert, 2016; Wellman et al., 2001). Environmental factors are thought to contribute to the variability among children in ToM acquisition (Wellman, 2012), in the sense that they seem to "push" the child toward earlier or later ToM development.

A growing body of research has focused on the role of parental mentalizing or parental reflective functioning (PRF) in the development of ToM (Ensink & Mayes, 2010). PRF refers to parents' ability to reflect upon their own and their child's internal mental experience, and to understand the child's behavior as being driven by underlying mental states, such as thoughts, feelings, desires, and intentions (Slade, 2005).

One research tradition in this context has focused on the role of parental mental-state talk (i.e., explicitly referring to internal mental states when speaking to their child), which has been shown to be positively related to aspects of the child's ToM understanding, such as emotion recognition and false-belief understanding (Devine & Hughes, 2018; Tompkins et al., 2018). Maternal mind-mindedness (i.e., the parents' tendency to verbalize emotional states in interactions with their children), in turn, has been shown to be related to subsequent ToM capacities, such as emotion understanding, perspective taking, false-belief understanding, and belief-desire reasoning (Devine & Hughes, 2018; Kirk et al., 2015;

Laranjo et al., 2014; Meins et al., 2013; Meins et al., 2002). Further, studies have shown that the affective ToM capacities of the parent prospectively predicted child ToM (Sabbagh & Seamans, 2008), and representational measures of PRF have been shown to be prospectively related to emotion understanding (Steele et al., 1999) and mentalizing capacities in childhood (Ensink et al., 2015; Rosso et al., 2015; Scopesi et al., 2015) and in adolescence (Benbassat & Priel, 2012).

However, the majority of studies in this area focused solely on emotion understanding or false-belief understanding and were conducted within the broader range of pre-school years (3–6-year-olds) or in children of a specific age group (e.g., 5-year-olds). Therefore, there is a need for research investigating associations between PRF and the development of the different dimensions of ToM (i.e., emotion, false-belief, and belief-desire understanding) including age-specific relations.

In addition, recent developments have suggested that PRF is multidimensional (Luyten, Mayes, et al., 2017; Luyten, Nijssens, et al., 2017; Smaling et al., 2016). The Parental Reflective Functioning Questionnaire (PRFQ; Luyten et al., 2009; Luyten, Mayes, et al., 2017), for instance, distinguishes between three key dimensions of PRF (Luyten, Mayes, et al., 2017; Luyten, Nijssens, et al., 2017). The first dimension, *prementalizing modes* (PM), refers to a non-mentalizing stance that is often characteristic of parents with (severe) impairments in PRF. PM is characterized by the tendency of parents to make maladaptive and malevolent attributions about their child (e.g., "My child cries around strangers to embarrass me") and an inability to enter into the child's internal subjective world (e.g., "Often, my child's behavior is too confusing to bother figuring out"). The second dimension, *certainty of mental states* (CMS), refers to the parent's (in)ability to recognize that mental states are inherently opaque. There is considerable variability in how certain parents are when attributing mental states to their child, ranging from being overly certain (i.e., no recognition of the opacity of mental states, characterized by intrusive mentalizing or hypermentalizing) to being overly uncertain (i.e., an almost complete lack of certainty about the child's mind, characterized by hypomentalizing), or even a combination of both hypermentalizing and hypomentalizing. Recognizing the opacity of mental states (e.g., "I can sometimes misunderstand the reactions of my child") is considered adaptive PRF, while being overly certain or uncertain is thought to be characteristic of distorted PRF. The third dimension refers to parental *interest and curiosity in the child's mental states* (IC), that is, the willingness of the parent to understand the child "from the inside out" (e.g., "I

am often curious to find out how my child feels"). A lack of genuine interest and curiosity in the child's mind can also be associated with both hypomentalizing and hypermentalizing. High levels of IC, for example, may reflect intrusive hypermentalizing (i.e., excessive mentalizing that goes far beyond what is probable), whereas very low levels of IC may reflect an absence of interest in the child's mental states (e.g., "I believe there is no point in trying to guess what my child feels").

Although it is likely that different dimensions of PRF (e.g., PM, CMS, and IC) are associated with ToM, no study to date has directly investigated these associations. This will be the focus of the present study.

The Present Study

This study focused on the role of PRF before, during and after the average threshold for ToM acquisition, which is typically situated around age 4 (Blijd-Hoogewys & van Geert, 2016; Kim, 2015; Pons et al., 2004; Wellman, 2012; Wellman et al., 2001).

The first objective of this study was to investigate the different ToM dimensions (affective, belief-desire, and cognitive ToM understanding) within and across the different age groups (children aged 3, 4, and 5 years). Based on the literature reviewed above, we expected to observe an increase in affective and belief-desire ToM from the age of 3 years onward, followed by the development of cognitive ToM in 4-year-olds.

The second aim was to investigate the relationship between the different dimensions of PRF and the ToM dimensions across these age ranges. We expected high levels of PRF (i.e., medium to high IC and CMS) to be positively associated with ToM dimensions, and low levels of PRF (i.e., high PM) to be negatively associated with ToM. In addition, we hypothesized that associations between PRF and ToM development would be most pronounced in the younger and older age group. Indeed, parents with high levels of PRF may "push" their children across the threshold earlier, particularly with regard to more basic ToM (i.e., emotion recognition and belief-desire reasoning). By contrast, the absence of PRF and distorted mentalizing in particular, as indicated by PM, may hamper the acquisition of ToM capacities in younger and older children (i.e., before and after the average threshold for ToM development).

Method

Participants and Procedures

Dutch-speaking mothers of a biological child aged 3 to 5 years were contacted via several daycare centers across Belgium and requested to participate in a study on child social-emotional development. Participation was entirely voluntary, and confidentiality was guaranteed. Mothers who agreed to participate provided written informed consent and were then asked to complete a booklet of questionnaires. Next, a random subgroup of mothers was invited to participate in the second part of the study together with their child. During this part of the study (which took place a maximum of 3 months after the first part of the study), the children participated in a 45-minute standardized ToM experiment in a quiet room in their home situation. During the experiment, the child was alone with the experimenter who presented the tasks. The tasks were not counterbalanced, meaning that the ToM task battery was administered in a fixed order for each child. The study was approved by the Ethics Committee of the University of Leuven, Belgium.

In total, approximately 570 mothers were contacted, of whom 385 completed the questionnaires. Twenty-three questionnaires were removed because the children fell outside the age range specified in the inclusion criteria (i.e., 3–5 years), leaving a sample of 362 mothers and children, from which 83 mother–child pairs (22.9%) were randomly selected to complete the battery of ToM measures.

Overall, the children were a mean 54.5 months old (*SD* = 9.04; range 36.0–71.0) and comprised 42 girls (50.6%) and 41 boys (49.4%). There were no significant differences between boys and girls in terms of mean age. The mean age of the mothers was 35.6 years (*SD* = 3.95; range 28.0–45.5) and the majority of mothers (82%) had attained higher education. No significant differences were found for maternal age, educational level, or working status between mothers of boys versus girls, or between mothers whose children participated in the ToM experiment and those who did not. Finally, there were no significant differences between children who participated in the ToM experiment and those who did not with regard to child sex or age.

Measures

Parental reflective functioning was assessed with the Parental Reflective Functioning Questionnaire (PRFQ; Luyten et al., 2009; Luyten, Mayes, et al., 2017), an 18-item self-report questionnaire scored on a 7-point Likert scale. The PRFQ includes three

subscales: *prementalizing modes* (PM), with six items that assess modes of thinking that reflect the repudiation of or defense against mentalizing; *certainty about mental states* (CMS), with six items reflecting being either overly certain (hypermentalizing) or overly uncertain (hypomentalizing) of the mental states of the child; and *interest and curiosity in mental states* (IC), with six items reflecting curiosity about the mental states of the child. Adequate PRF is reflected by low PM and medium to high CMS and IC. Distorted PRF, on the other hand, is reflected by high PM and extremely low (i.e., scores 1 and 2) or extremely high (i.e., scores 6 and 7) CMS and IC. In the current sample, mothers on average reported moderate to high scores on IC (M = 5.72; SD = 0.82; range 3.33–7.00) and CMS (M = 4.35; SD = 1.10; range 2.00–7.00), with some mothers reporting very high scores (i.e., 7). None of the mothers reported very low scores on IC or CMS (i.e., an indicator of hypomentalizing), which is more likely to occur in at-risk samples. Recent studies have supported the reliability and validity of the PRFQ (Luyten, Mayes, et al., 2017). In the present study, Cronbach's alphas for PM, CMS, and IC were .60, .79, and .69, respectively.

ToM development was measured by using a series of nine different ToM tasks (22 items) that assess different domains of ToM understanding, such as affective, belief-desire, and cognitive ToM. *Affective ToM* (8 items) was assessed by two emotion-recognition tasks, measuring the child's ability to recognize four basic emotions (i.e., happy, sad, angry, or scared) (a) by describing how a person (same gender as the child) is feeling in a series of four pictures, and (b) by pointing towards a particular facial expression on a matrix with four gender-matched pictures (Denham, 1986). *Belief-desire ToM* (8 items) was measured by presenting the child with a series of stories and assessing the child's ability to understand the protagonist's feelings when a belief and a desire for a particular object was met or not met (Harris et al., 1989; Wellman & Woolley, 1990). *Cognitive ToM* (6 items) was measured by (a) two perspective-taking tasks, assessing the child's ability to take the visual perspective of the experimenter: the 'Mouse task' and the 'Cat and ice-cream task' (Flavell et al., 1968); (b) two unexpected content false-belief tasks, assessing the child's capacity for false-belief reasoning based on the understanding of deceptive contents: the 'Smarties task' (Hogrefe et al., 1986) and the 'Coke and milk task' (Harris et al., 1989); and (c) two change-of-location false-belief tasks, assessing the child's capacity for false-belief understanding based on predicting the protagonist's search behavior after an unexpected transfer of an hidden object: the 'Sally-Anne task' and the 'Frog-chocolate task' (Wimmer & Perner, 1983).

The answers to each of the questions in the abovementioned tasks were scored as correct (1 point) or incorrect (0 points), with a maximum score of 22 (sum of items). A total ToM score (i.e., general ToM) was computed as the mean of all items. ToM dimensions (i.e., affective, belief-desire, and cognitive) were computed by calculating mean item scores based on the items that were categorized in these dimensions. A detailed description of the ToM tasks is provided in the Appendix (see Supplementary Materials). The selected tasks are designed for children aged 3–5 years and have shown good test–retest reliability and internal consistency (Hughes et al., 2000). In the present study, Cronbach's alphas for affective, belief-desire, and cognitive ToM were .58, .84, and .65, respectively.

Data analyses

A power analysis was conducted based on other studies typically reporting medium effect sizes concerning the association between PRF and child ToM (Devine & Hughes, 2018; Tompkins et al., 2018). For medium effect sizes, the required sample size is $n = 85$ ($p < .05$, power = .80) for testing Pearson's correlations, and $n = 76$ ($p < .05$, power = .80) for testing multiple regression with three independent variables (Cohen, 1992).

First, descriptive statistics (i.e., Pearson's correlations, independent-samples *t*-tests, and one-way ANOVAs) were calculated to describe the sample. Second, we computed zero-order correlations among PRF dimensions and ToM dimensions. Third, a one-way MANCOVA was used to examine whether ToM dimensions differed based on age groups. Hence, the children were divided into three subgroups according to their age, namely 3-year-olds ($N = 22$), 4-year-olds ($N = 32$) and 5-year-olds ($N = 29$). Post-hoc pairwise comparisons were conducted to determine whether the different age groups differed in terms of ToM development. Finally, we conducted hierarchical multiple regression analyses (HMRAs) to determine the unique proportion of variance explained by each set of predictors (i.e., PRF dimensions and child age), including potential interaction effects. More specifically, we first conducted sequential polynomial regression analyses to investigate the nature of the relation between the independent (i.e., child age and PRF dimensions) and dependent (i.e., ToM dimensions) variables (i.e., linear or quadratic). Next, we tested main effects of the predictor variables (i.e., child age and PRF dimensions) and whether the relation between child age and ToM dimensions was moderated by PRF dimensions. For each PRF dimension, a separate regression model was analyzed. For these analyses, all variables were mean-centered and entered sequentially as follows: (1) child age; (2) PRF

dimension; (3) the interaction term between child age and PRF dimension. In these analyses, significant moderation effects were indicated by significant standardized regression coefficients and significant changes in R^2 for the interaction terms (Aiken & West, 1991). We plotted simple slopes for the association between low and high (one standard deviation below and above the mean, respectively) levels of the predictor variable (i.e., child age) and ToM dimensions for low and high (one standard deviation below and above the mean, respectively) levels of the moderator (PRF dimensions) (see www.jeremydawson.co.uk/slopes.htm). For each regression model, we calculated Cohen's f^2 as a measure of the effect size (Cohen, 1992).

Results

Descriptive Statistics

There were no significant associations between the mothers' demographic features on the one hand, and PRF dimensions and ToM acquisition on the other. Further, comparison of mothers with lower (primary and secondary education) and higher (graduate school and university) educational levels did not reveal any significant differences in maternal PRF dimensions or the child's ToM performance. In addition, no significant effects of maternal working status on maternal PRF or child ToM performance were showed. Next, we compared boys and girls in terms of their ToM understanding, as some previous studies have found sex differences in favor of girls (e.g., Blijd-Hoogewys & van Geert, 2016; Charman et al., 2002). However, no sex differences were found in our sample. In addition, no significant differences were found between boys and girls with regard to their mother's PRF capacities. Finally, there was a significant relationship between child age and ToM performance (r = .49, p < .001; r = .40, p < .001; r = .33, p = .002; and r = .40, p < .001 for general, affective, belief-desire, and cognitive ToM, respectively), but not between maternal age and ToM performance. Yet, no significant associations were found between child or maternal age and PRF. Given the significant correlations between child age and ToM development, all further correlational analyses were controlled for child age.

Zero-order Correlations Among Study Variables

The different ToM dimensions were positively correlated with general ToM (p < .001). Further, belief-desire ToM was positively associated with affective (r = .35, p = .001) and with cognitive (r = .23, p = .04) ToM. Correlations among PRF dimensions showed

only a negative trend toward significance between PM and CMS ($r = –.21$, $p = .06$). Finally, zero-order correlations among PRF and ToM showed that PM was negatively associated with affective ToM ($r = –.24$, $p = .03$), whereas IC was significantly positively associated with affective ToM ($r = .23$, $p = .04$). None of the other correlations were significant (see Table 1).

Table 1

Zero-Order Correlations Among Dimensions of Parental Reflective Functioning and Theory of Mind (N = 83)

	1	2	3	4	5	6	7
1. PM	—						
2. CMS	–.21°	—					
3. IC	–.05	.00	—				
4. General ToM	–.16	.07	.12	—			
5. Affective ToM	–.24*	.17	.23*	.59***	—		
6. BD ToM	–.14	–.06	.16	.84***	.35**	—	
7. Cognitive ToM	.08	.05	–.11	.56***	–.02	.23*	—

Note: PM = prementalizing modes. CMS = certainty about mental states. IC = interest and curiosity about mental states. ToM = Theory of Mind. BD = Belief-desire.
°$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$.

Age Differences in ToM

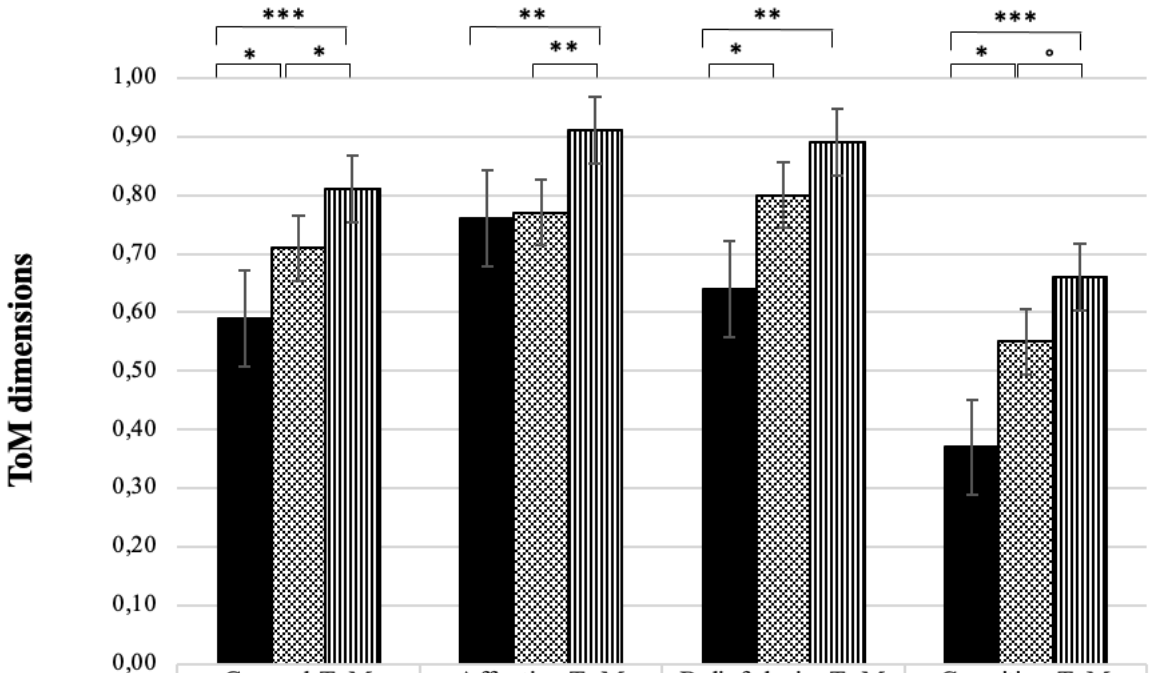
There was a statistically significant difference between the age groups (i.e., children aged 3, 4, and 5 years) on the combined ToM dimensions, $F(8, 152) = 3.65$, $p = .001$, Wilks' $\lambda = .70$, partial $\eta^2 = .16$. Post-hoc univariate tests showed that there was a statistically significant difference between age groups in general ToM development ($F(2, 79) = 11.20$, $p < .001$, partial $\eta^2 = .22$), as well as in the affective ($F(2, 79) = 6.15$, $p = .003$, partial $\eta^2 = .14$), belief-desire ($F(2, 79) = 5.76$, $p = .005$, partial $\eta^2 = .13$), and cognitive ($F(2, 79) = 7.47$, $p = .001$, partial $\eta^2 = .16$) ToM dimensions.

The mean scores for general, affective, belief-desire, and cognitive ToM development within each age group, as well as significant mean-level differences over time, are shown in Figure 1. Post-hoc pairwise comparisons showed, as expected, that general

ToM significantly increased between age 3 and 4 years (p = .020), age 4 and 5 years (p = .011), and age 3 and 5 years (p < .001). Affective ToM significantly increased between age 4 and 5 years (p = .005) and age 3 and 5 years (p = .003). Belief-desire ToM significantly increased between age 3 and 4 years (p = .036) and age 3 and 5 years (p = .001). Cognitive ToM significantly increased between age 3 and 4 years (p = .029), age 4 and 5 years (p = .073), and age 3 and 5 years (p < .001).

Figure 1

Mean Scores for General, Affective, Belief-Desire, and Cognitive Theory of Mind in Different Age Groups of Pre-School Children



	General ToM	Affective ToM	Belief-desire ToM	Cognitive ToM
3-year-olds	0,59	0,76	0,64	0,37
4-year-olds	0,71	0,77	0,80	0,55
5-year-olds	0,81	0,91	0,89	0,66

Note: ToM = Theory of Mind. *p < .05, **p < .01, ***p < .001, °p < .10.

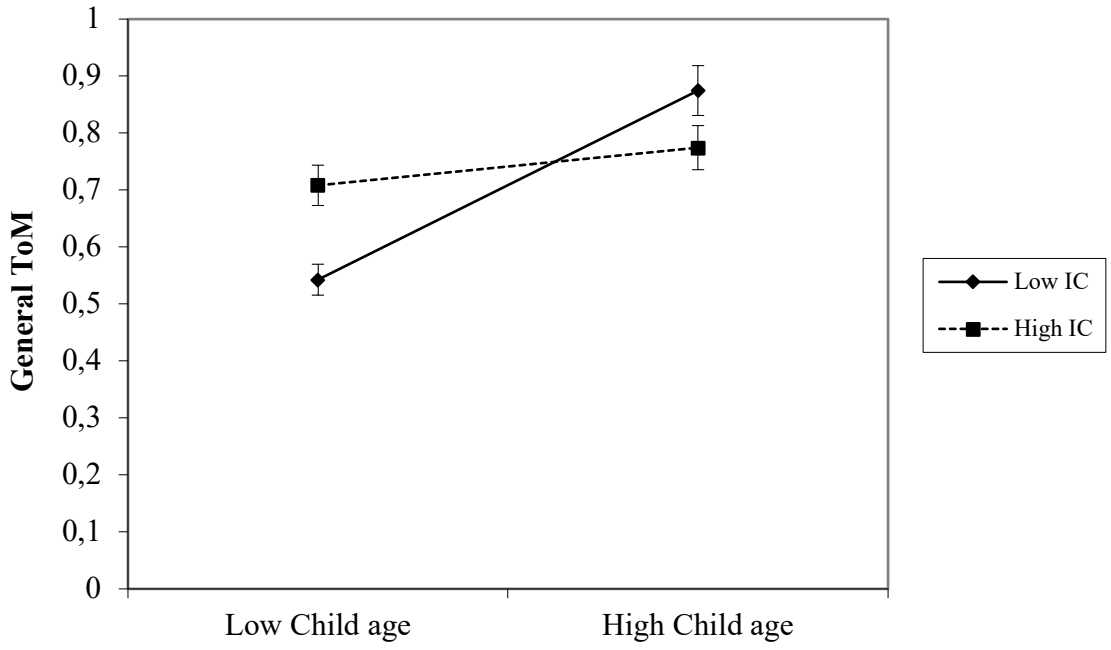
PRF and ToM Dimensions

Sequential polynomial regression analyses (see Supplementary Tables) showed that general ToM was best predicted by a linear model of child age and a quadratic model of maternal PM (see Table S1). Affective ToM was best predicted by a linear model of child age, maternal IC, and maternal CMS, and a quadratic model of maternal PM (see Table S2). A linear model of child age and maternal IC and a quadratic model of maternal PM best predicted belief-desire ToM (see Table S3). Finally, cognitive ToM was best predicted by a linear model of child age and a quadratic model of maternal CMS (see Table S4).

HMRAs showed that general ToM was best predicted by (1) a combination of child age ($\beta = .42$, $p < .001$) and maternal PM^2 ($\beta = -.48$, $p < .001$), explaining 38% of the variance and representing a large effect (Model 2: $R^2 = .38$, $F(3) = 16.00$, $p < .001$, Cohen's $f^2 = .61$; see Table S5); and (2) a combination of child age ($\beta = .56$, $p < .001$) and the interaction between child age and maternal IC ($\beta = -.31$, $p = .002$), explaining 34% of the variance and representing a large effect (Model 2: $R^2 = .34$, $F(3) = 13.39$, $p < .001$, Cohen's $f^2 = .52$; see Table S6).

Figure 2

Moderation Effect of IC in the Relationship Between Child Age and General Theory of Mind (95% confidence interval)



The significant two-way interaction between child age and maternal IC is plotted in Figure 2, showing that maternal IC moderated the relation between child age and general ToM. Low levels of IC were associated with lower levels of general ToM at younger child age, whereas low IC at older child age was associated with higher levels of general ToM. High IC, on the other hand, was associated with higher levels of general ToM at younger child age. However, general ToM did not further increase with age in children of mothers with high IC, leading to lower levels of general ToM at older child age (compared to children of mothers with low IC). Finally, maternal CMS did not significantly predict general ToM, leading to a model with only child age (β = .49, p < .001) as a significant predictor of general ToM (Model 1: R^2 = .24, $F(1)$ = 25.52, p < .001, Cohen's f^2 = .32; see Table S7).

Affective ToM was best predicted by (1) a combination of child age (β = .32, p = .001) and maternal PM^2 (β = –.53, p < .001), explaining 35% of the variance and representing a large effect (Model 2: R^2 = .35, $F(3)$ = 14.25, p < .001, Cohen's f^2 = .54; see Table S8); (2) a combination of child age (β = .43, p < .001), IC (β = .20, p = .046), and the interaction between child age and maternal IC (β = –.20, p = .053), explaining 24% of the variance and representing a medium to large effect (Model 3: R^2 = .24, $F(3)$ = 8.41, p < .001, Cohen's f^2 = .32; see Table S9); and (3) a combination of child age (β = .36, p = .001) and the interaction between child age and maternal CMS (β = .17, p = .099), explaining 21% of the variance and representing a medium to large effect (Model 3: R^2 = .21, $F(3)$ = 7.07, p < .001, Cohen's f^2 = .27; see Table S10).

The significant two-way interaction between child age and maternal IC is plotted in Figure 3, showing that maternal IC moderated the relation between child age and affective ToM. At younger child age, lower levels of IC were associated with lower levels of affective ToM, whereas higher levels of IC were associated with higher levels of affective ToM. At older child age, there was no significant difference in affective ToM acquisition between children of mothers with high versus low IC. Figure 4 shows the significant two-way interaction between child age and maternal CMS, indicating that higher levels of CMS were associated with higher levels of affective ToM, but only at older child age.

Figure 3

Moderation Effect of IC in the Relationship Between Child Age and Affective Theory of Mind (95% confidence interval)

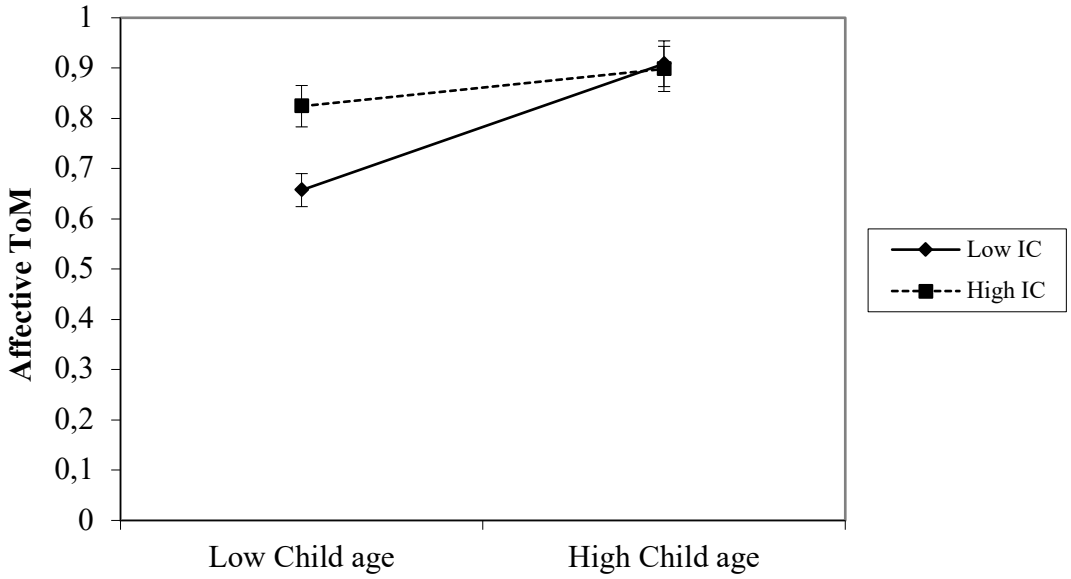
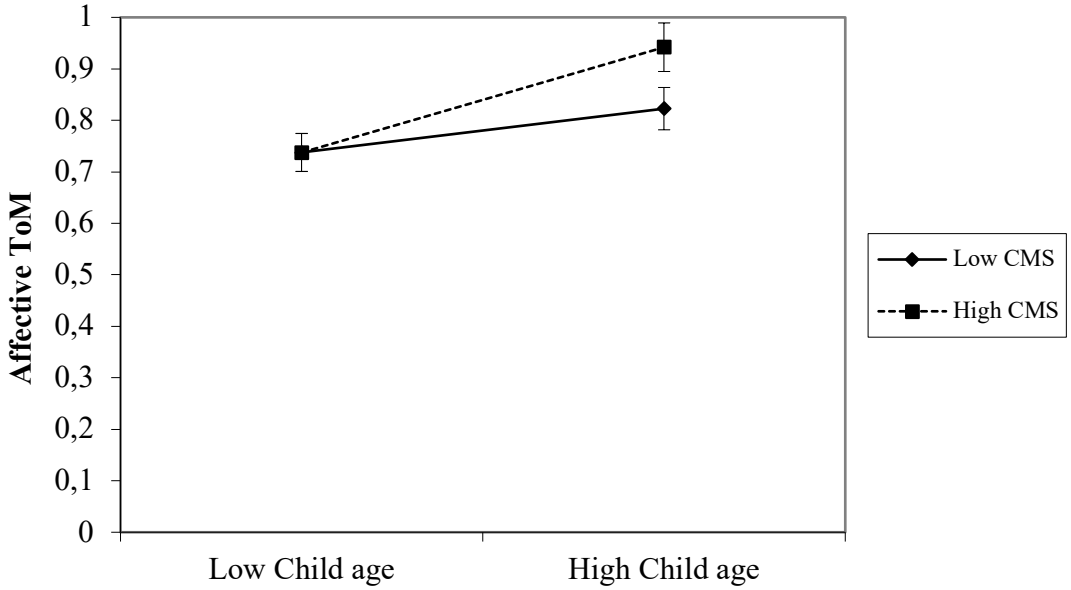


Figure 4

Moderation Effect of CMS in the Relationship Between Child Age and Affective Theory of Mind (95% confidence interval)

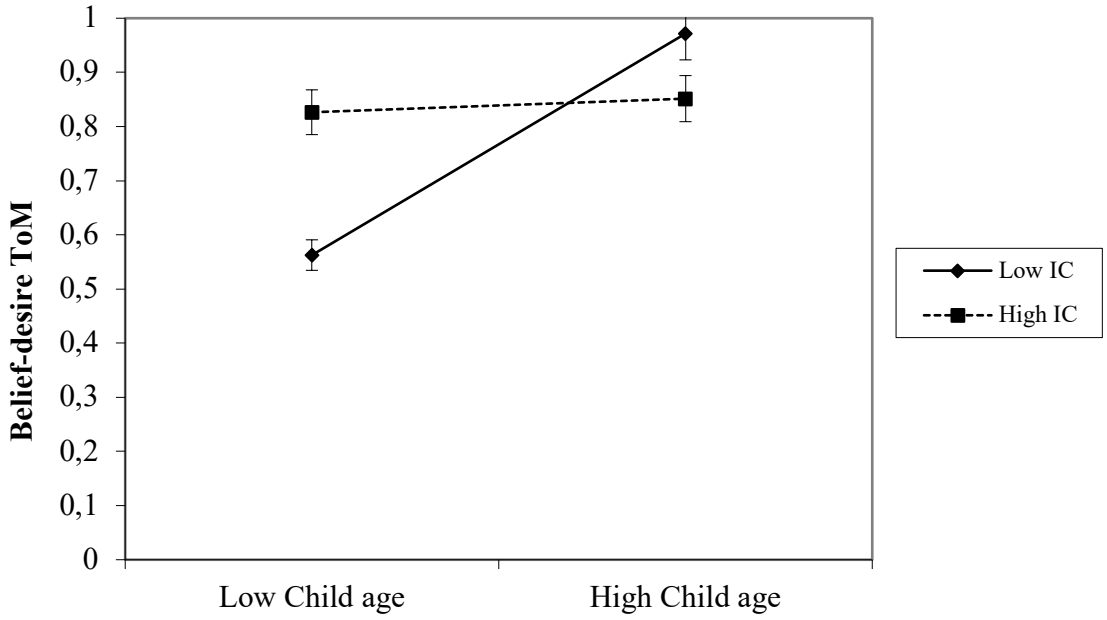


Belief-desire ToM was best predicted by (1) a combination of child age (β = .27, p = .009) and maternal PM^2 (β = –.42, p = .004), explaining 22% of the variance and representing a medium to large effect (Model 2: R^2 = .22, $F(3) = 7.28$, $p < .001$, Cohen's f^2 = .28; see Table S11); and (2) a combination of child age (β = .40, $p < .001$) and the interaction between child age and maternal IC (β = –.29, p = .006), explaining 21% of the variance and representing a medium to large effect (Model 3: R^2 = .21, $F(3) = 7.00$, $p <$ .001, Cohen's f^2 = .27; see Table S12).

Figure 5 shows that maternal IC moderated the relation between child age and belief-desire ToM. At younger child age, lower levels of IC were associated with lower levels of belief-desire ToM, whereas higher levels of IC were associated with higher levels of belief-desire ToM. The reversed pattern was visible at older child age, showing that lower and higher IC were associated with higher and lower belief-desire ToM, respectively. Finally, maternal CMS did not significantly predict belief-desire ToM, leading to a model with only child age (β = .33, p = .002) as a significant predictor of belief-desire ToM (Model 1: R^2 = .11, $F(1) = 10.06$, p = .002, Cohen's f^2 = .12; see Table S13).

Figure 5

Moderation Effect of IC in the Relationship Between Child Age and Belief-Desire Theory of Mind (95% confidence interval)



Cognitive ToM was best predicted by child age (β = .40, p < .001), explaining 16% of the variance and representing a medium effect (Model 1: R^2 = .16, $F(1)$ = 15.05, p > .001, Cohen's f^2 = .19). Adding maternal PM (see Table S14), IC (see Table S15), or CMS (see Table S16) to the model did not provide an improvement in fit, although these models were also significant.

Discussion

This study investigated the development of ToM acquisition and associations among PRF and ToM from a multidimensional and developmental perspective, in a sample of 83 mothers and their pre-school children. As expected, results showed that general ToM significantly increases with child age. This was also true for the individual ToM dimensions (i.e., affective, belief-desire, and cognitive ToM). In line with our hypotheses, pre-school children performed better on affective and belief-desire ToM understanding than on cognitive ToM. It thus seems that children learn to recognize and attribute emotional mental states before they acquire the capacity for cognitive perspective taking and reasoning about (false) beliefs. Second, results shed further light on the role of PRF in ToM development, and were largely consistent with the hypothesis that separate PRF dimensions may have differential associations with ToM dimensions, thus supporting a multidimensional perspective on PRF (Luyten, Mayes, et al., 2017; Luyten, Nijssens, et al., 2017; Smaling et al., 2016) and ToM acquisition (Blijd-Hoogewys & van Geert, 2016; Wellman, 2018).

Distorted PRF—operationalized as the tendency of mothers to make malevolent attributions about their child's behavior (i.e., PM)—impeded the development of children's general, affective, and belief-desire ToM throughout the pre-school years. More specifically, there was a quadratic association between PM and these ToM dimensions, consistent with the notion that higher levels of maternal PM may hamper ToM acquisition, particularly with regard to emotion understanding (i.e., recognizing and attributing emotions). These results are congruent with theoretical assumptions that maladaptive PRF negatively influences child social-emotional development (e.g., Ensink & Mayes, 2010; Fonagy & Target, 2005; Sharp & Fonagy, 2008; Slade, 2005) and previous research indicating the role of PM in understanding the development of emotional problems (Burkhart et al., 2017; Krink et al., 2018; Luyten, Mayes, et al., 2017; Nijssens et al., 2020; Pazzagli et al., 2018; Rostad & Whitaker, 2016; Rutherford et al., 2015). Indeed, PM is characterized by misreading the child's mind and making inaccurate assumptions about the

child's behavior, often leading to an incongruent response to the child's mental state. This may impede children's capacity to accurately recognize and attribute affective mental states in themselves and others (Fonagy et al., 2002). The quadratic effect of maternal PM further suggested that low levels of PM may not impede ToM development, which is consistent with Winnicott's idea of the 'good-enough' parent (Winnicott, 1971). Parents are never 'perfect', and a tendency to make maladaptive attributions with regard to the child's inner world may not hamper ToM development if such attributions are not frequently made by parents.

Interestingly, an effect of maternal PM was not found for cognitive ToM development. This is consistent with the notion that PM may lead to problems in affective ToM, but does not seem to impact cognitive features implicated in ToM (Luyten, Nijssens, et al., 2017). Finally, these results support the hypothesis that individual differences in children's ToM may exhibit nonlinear relations with environmental factors, such as PRF (Blijd-Hoogewys & van Geert, 2016; Devine & Hughes, 2018). One should be careful in drawing causal conclusions from these findings, as relationships between PRF and ToM may be bidirectional. For example, it may well be that child factors (e.g., problems with affect regulation) may lead to increased levels of PM in parents.

The second dimension of PRF—interest and curiosity in mental states (i.e., IC)—showed age-related effects with regard to the development of general, affective, and belief-desire ToM. Results showed that mothers' interest and curiosity in the mental states of their children was associated with earlier acquisition of ToM, with higher levels of maternal IC being associated with higher levels of general, affective, and belief-desire ToM at younger child age. Little interest in the child's mental states (i.e., low IC) was, by contrast, associated with lower levels of these ToM dimensions in younger children. However, the difference between high and low maternal IC in relation to ToM acquisition disappeared as children grew older. At higher child age, results showed similar levels of affective ToM in children of mothers with high versus low IC, and even a slight disadvantage associated with high maternal IC (compared to low maternal IC) with regard to general and belief-desire ToM development. It thus seems that mothers with high IC may "push" their children across the threshold for ToM acquisition earlier, particularly with regard to more basic ToM (i.e., emotion recognition and belief-desire reasoning). However, later on in development, high maternal IC seemed to hamper further development of general, affective, and belief-desire ToM, which was reflected in only a slight increase of these ToM dimensions with child age.

For children of mothers with low IC, the development of these ToM dimensions linearly increased with child age, even to a point where they overtook children of mothers with high IC. These findings may reflect the importance of separateness of minds, especially as children grow older and their strivings for autonomy increase (Luyten et al., 2019). Indeed, adequate PRF encompasses the parent's capacity to show interest in the child's mind and to sensitively attune to the child's mental states, while at the same time recognizing the child's mind as separate and agentive (Fonagy et al., 2002). The assumption that high levels of maternal IC may become intrusive and maladaptive is further strengthened by studies showing an association between IC and maternal intrusiveness (Luyten, Mayes, et al., 2017). Yet, again, an alternative explanation may be that when children show lower ToM capacities, it may increase parents' interest and curiosity in the child's internal world, especially when communication becomes more verbal and delays in ToM understanding become more explicit, as is the case in older children.

With regard to CMS, higher levels of CMS were associated with higher levels of affective ToM, but only at older child age. In younger children (i.e., before the average threshold ToM is reached), levels of affective ToM were similar in children of mothers with high or low CMS. It thus seems that the advantage of high maternal CMS appears especially after the age at which children typically develop affective ToM. Alternatively, better affective ToM capacities in the child may lead to more certainty in the parent about the child's mental states.

Taken together, the results of the study suggest a combined biological maturation and environmentally determined model of ToM development. Normally developing children seem to increasingly acquire ToM as they grow older, independent of their mothers' PRF, which supports the hypothesis that biological maturation progresses throughout the pre-school years (Scholl & Leslie, 2001). However, PRF does seem to have an important contribution in accelerating or inhibiting ToM development, especially in younger and older pre-school children, which supports the hypothesis that environmental factors may play an important role before and after the average threshold for ToM acquisition (Ensink & Mayes, 2010; Fonagy & Luyten, 2016; Hughes & Devine, 2015a, 2015b; Kim, 2015; Wellman, 2012). Alternatively, evocative or passive gene–environment correlations may play a role in this context (Devine & Hughes, 2018). For example, child factors might reduce or amplify the associations among PRF and ToM, leading to different results in different age groups. Further, it is important to be aware of the risk of child-to-

parent effects, whereby the child elicits poor mentalizing (i.e., hypermentalizing, intrusive mentalizing, or prementalizing) in the parent. Better ToM capacities, by contrast, could lead to higher levels of PRF, in particular CMS. Further longitudinal research is needed to clarify the nature of the associations among PRF and ToM.

These findings may have important clinical implications with regard to parent–child intervention programs and emphasize the importance of addressing PRF in prevention and intervention programs. To date, a number of mentalization-based interventions that may foster parents' mentalizing have been developed (for an overview, see Camoirano, 2017; Luyten, Nijssens, et al., 2017). The common aim of these interventions is to help parents to maintain a more mentalizing stance of curiosity and inquiry while envisioning the child's mind, rather than focusing solely on expressed behavior. The findings of this study suggest that promoting PRF may also foster the child's own capacity for mentalizing. In this regard, it seems particularly important to target the tendency of the parent to attribute hostile mental states to the child (i.e., PM), as the presence of prementalizing modes hampers the child's capacity for affect recognition and the understanding of emotions and desires in self and others. Further, with younger children (i.e., < 4 years), intervention programs should focus on increasing the parent's interest and curiosity in their own and their child's internal experiences (i.e., IC), and helping parents to recognize the opacity of mental states (i.e., CMS). When children are older (i.e., from age 5 onward), attention should shift to addressing inappropriate parental IC (i.e., hypermentalizing or intrusive mentalizing) and developing a more robust sense of knowledge about the child's mind (i.e., CMS). Yet, from a clinical perspective, it may be equally important to consider potential child-to-parent effects. For instance, cognitive capacities in children may lead parents to believe that their children have good ToM capacities, and that they as parents seem to know the mind of their children quite well, while in reality the children may not perform so well in the domains of affective and belief-desire reasoning. If this is the case, the therapeutic task with these parents may be to help them realize that they do not know the mind of their child as well as they think they do.

Finally, limitations of the study should be acknowledged. First, the sample was relatively small and homogeneous, and comprised mainly well-educated and well-functioning mothers. It might be that the contribution of PRF has a different pattern in fathers or at-risk samples. Second, the design of this study was cross-sectional and focused only on PRF as a possible mechanism explaining individual differences in ToM. However,

it is important not to overestimate the role of PRF in ToM development. PRF is unlikely to be the single most important factor influencing ToM development and should be considered in the context of a variety of factors (e.g., parental psychopathology, family structure, life events, early adversities, and genetic predisposition). Hence, it is also important to be aware of bidirectional relations. Further research with multiwave studies in different samples (e.g., at-risk, adoptive, fathers) is needed to specify possible person–environment interactions and to identify the unique contributions of each of the parameters. In follow-up research with a cross-lagged longitudinal design, it would also be important to counterbalance the ToM tasks within and between subjects to control for potential confounds created by sequence, order, and learning effects.

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Supplementary Materials: Appendix

Theory of Mind (ToM) development was measured by using a series of ToM tasks that assess different domains of ToM understanding, such as affective (i.e., emotion recognition and attribution), belief-desire (based on true beliefs), and cognitive (i.e., perspective-taking and false-belief reasoning) ToM. Following an extensive review of the existing literature on ToM, we selected a set of nine different ToM tasks covering the above domains. An overview of the ToM tasks, the order of assessment, and the categorization of test questions (i.e., affective, belief-desire, cognitive) is provided in Table A1.

Table A1

Overview Theory of Mind Task Battery

	Cognitive (N = 6)	Affective (N = 8)	Belief-desire (N = 8)
Smarties task	(1)		
Sally-Anne task	(1)		
Frog-chocolate task	(1)		
Perception task 1: Mouse	(1)		
Perception task 2: Cat and ice-cream	(1)		
Coke and milk task	(1)		(2)
Emotion-recognition task 1		(4)	
Emotion-recognition task 2		(4)	
Belief-desire task: Storytelling			(6)

False belief task 1: Smarties task. The experimenter shows a tube of Smarties (chocolate candy) to the child and asks what is inside the tube. When the child has answered the question, the experimenter opens the Smarties tube and shows that it really contains a pencil instead of candy. The experimenter then introduces the child to "Isabella", a cuddly mouse-like toy that had not "seen" what the tube of Smarties contains. The experimenter tells the child: "*This is Isabella the mouse. If I now asked Isabella what she thinks is inside the tube of Smarties, what do you think she would answer?*" A child with properly developed Theory of Mind will give the correct answer ("*Smarties*"). This well-known task was

developed by Hogrefe and colleagues (Hogrefe et al., 1986). It is defined as a cognitive task, measuring the child's capacity for false-belief reasoning based on the understanding of deceptive contents.

False belief task 2: Sally-Anne task. The experimenter shows a picture to help the child keep track of the story she is telling about two girls, Sally and Anne. The story reads as follows: "*Sally has a basket and Anne has a box. Sally puts a ball in her basket, and then she goes outside. While Sally is outside, Anne moves the ball from the basket to the box. Sally returns.*" The experimenter then asks the child: "*Where will Sally look for her ball?*" A child with properly developed Theory of Mind will give the correct answer ("*In the basket*"). The Sally-Anne task (Wimmer & Perner, 1983) is a change-of-location false-belief task, which belongs to the cognitive category of ToM understanding.

False belief task 3: Frog-chocolate task. The experimenter shows a cuddly frog toy to the child and says: "*This is Charlie the frog; His favourite candy is chocolate. Charlie hides his piece of chocolate in this little red box because he is going for a swim.*" While the experimenter is telling the story, she shows Charlie's actions by putting a piece of chocolate in a red box. She then hides Charlie so that the child can no longer see him and shows a new plush toy, while saying: "*This is Boris the bear. Boris wants to play a prank on Charlie and takes his piece of chocolate out of the little red box and puts it in a white box.*" The experimenter again supports the story by acting out how Boris takes the chocolate out of the red box and puts it into a white box. Now, the experimenter takes Charlie the frog again and asks: "Charlie has finished swimming and wants to eat his piece of chocolate. Where will Charlie look for his chocolate?" A child with properly developed Theory of Mind will give the correct answer ("In the red box"). This task was developed by the same authors as the Sally-Anne task (Wimmer & Perner, 1983). Again, it is a cognitive change-of-location false-belief task.

Perception task 1: Mouse. The experimenter places a picture of a mouse so that it is clearly visible in front of the child. He or she then divides the picture horizontally in half by placing a rectangular piece of cardboard on the picture, so the child can now only see the mouse's feet, while the experimenter can only see the mouse's head. The experimenter then asks: "*Can you tell me what I am looking at?*" A child with properly developed Theory of Mind will give the correct answer ("*The head*"). This task was developed by Flavell and colleagues (Flavell et al., 1968). It is classified as a cognitive perception task, since the child has to take the perspective of the experimenter in order to provide a correct answer.

Perception task 2: Cat and ice-cream. The experimenter shows the child piece of paper on which a picture of a cat is printed on one side, and a picture of an ice-cream cone is printed on the other side. The experimenter clearly shows both sides of the paper. She then holds the piece of paper in between herself and the child so that the child is facing the cat and the experimenter is facing the ice-cream. The experimenter then asks: "*At which picture am I currently looking?*" A child with properly developed Theory of Mind will give the correct answer ("*The ice-cream*"). Similar to the previous perspective task (i.e., Mouse) and developed by the same authors (Flavell et al., 1968), this task is also classified as a cognitive perception task.

Belief desire task: Coke and milk. The experimenter shows two cuddly toys (a rabbit and a rat) and tells the child a story: "*This is the story of two friends, Chris the rat and Larry the rabbit. Chris the rat is a little naughty and likes teasing his friend Larry the rabbit. Larry loves Coke a lot. Mmm! It is his favourite drink. Look, this is Larry's can of Coke. Larry does not like any other drink, especially not milk, yuck! How does Larry feels when he gets some coke?*" Any positive emotion is a correct answer to this question. This question is classified as belief-desire reasoning, since the child has to think about Larry's feelings and has to understand that Larry desires Coke. The story then continues: "*One day Larry the rabbit goes for a walk, and Chris the rat decides to tease his friend Larry. He empties the can of Coke and pours milk into the can. Larry returns from his walk and is very thirsty. He sees the can of Coke on the table, but he cannot see what's inside. So when Larry returns and he sees his can of Coke on the table, how does he feel?*" This question is categorized a belief-desire question based on false beliefs. As this is the only false belief-desire question in the study, and previous studies have shown that children on average acquire belief-desire understanding based on false belief at age 6, this question was removed from the test battery. To end the task, a cognitive false-belief question "*What does Larry think is in the can?*" (correct answer: "Coke") and a second belief-desire question "*How does Larry feel when he takes a sip?*" (correct answer: a negative emotion) are asked (Harris et al., 1989).

Emotion recognition task 1. In this affective task, which is based on a similar task developed by Denham (1986), the child is presented with a consecutive series of four pictures displaying in turn a happy, sad, angry, and scared face. The person on the picture has the same gender as the child (i.e., female faces for girls and male faces for boys). After being shown each picture, the child is asked the following question: "*How does this person feel?*"

Emotion recognition task 2. This affective task is similar to the previous one and is also based on the emotion recognition task by Denham (1986). The child is now simultaneously presented with four gender-matched pictures, showing happy, sad, angry, and scared faces. The experimenter then asks the child to point to the picture showing a particular emotion.

Belief-desire task: Story-telling. A total of six stories are told to the child, each with a very similar story line in which a person is looking for a certain object. After each story, the child is asked how the person feels. Two stories have a happy end as the person finds the object he or she is looking for. The child thus should answer with a positive emotion. In the four remaining stories the person does not find the object he or she was looking for, but either finds something else or find nothing at all. To give a correct answer, the child should mention a negative emotion when answering the question. These stories were written by Wellman and Woolley (1990) and are categorized as belief-desire tasks since the child has to think about the feelings of the characters and has to realize that they *believe* the *desired* object is hidden in a certain place.

Supplementary Tables

Table S1

Polynomial Regression Analysis for Child Age and PRF Dimensions in Predicting General ToM

	Model 1			Model 2		
	b	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.00	.49***	.01	.00	.49***
Child Age ^{2}				.00	.00	–.11
F (*df*)		25.52***(1)			13.47***(2)	
Δ*F*		25.52***			1.32	
R^2		.24			.25	
ΔR^2		.24			.01	
PM	–.04	.03	–.17	.06	.03	.23
PM^2				–.10	.02	–.58***
F (*df*)		2.43(1)			10.47***(2)	
Δ*F*		2.43			17.99***	
R^2		.03			.21	
ΔR^2		.03			.18	
IC	.04	.02	.18	.03	.03	.12
IC^2				–.03	.02	–.13
F (*df*)		2.68(1)			1.87(2)	
Δ*F*		2.68			1.07	
R^2		.03			.05	
ΔR^2		.03			.01	
CMS	.02	.02	.13	.02	.02	.12
CMS^2				–.02	.01	–.12
F (*df*)		1.40(1)			1.31(2)	
Δ*F*		1.40			1.22	
R^2		.02			.03	
ΔR^2		.02			.02	

Note. Independent variables were centered at their means.

$N = 83$; *** $p < .001$.

Table S2

Polynomial Regression Analysis for Child Age and PRF Dimensions in Predicting Affective ToM

	Model 1			Model 2		
	b	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.00	.40***	.01	.00	.40***
Child Age ^{2}				.00	.00	–.05
F (*df*)		15.49***(1)			7.80**(2)	
Δ*F*		15.49***			.24	
R^2		.16			.16	
ΔR^2		.16			.00	
PM	–.07	.03	–.25*	.04	.04	.16
PM^2				–.11	.02	–.60***
F (*df*)		5.34*(1)			13.49***(2)	
Δ*F*		5.34*			20.37***	
R^2		.06			.25	
ΔR^2		.06			.19	
IC	.06	.03	.27*	.06	.03	.25*
IC^2				–.01	.03	–.06
F (*df*)		6.35*(1)			3.26*(2)	
Δ*F*		6.35*			.23	
R^2		.07			.08	
ΔR^2		.07			.00	
CMS	.04	.02	.21°	.03	.02	.19°
CMS^2				–.02	.01	–.14
F (*df*)		3.57°(1)			2.57°(2)	
Δ*F*		3.57°			1.54	
R^2		.04			.06	
ΔR^2		.04			.02	

Note. Independent variables were centered at their means.

$N = 83$; ° $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Table S3

Polynomial Regression Analysis for Child Age and PRF Dimensions in Predicting Belief-desire ToM

	Model 1			Model 2		
	b	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.003	.33**	.01	.003	.34**
Child Age ^{2}				.00	.00	–.13
F (*df*)		10.06**(1)			5.78**(2)	
Δ*F*		10.06**			1.44	
R^2		.11			.13	
ΔR^2		.11			.02	
PM	–.06	.04	–.15	.07	.05	.18
PM^2				–.12	.04	–.48**
F (*df*)		1.96(1)			6.80**(2)	
Δ*F*		1.96			11.38**	
R^2		.02			.15	
ΔR^2		.02			.12	
IC	.07	.04	.20°	.05	.04	.15
IC^2				–.03	.04	–.11
F (*df*)		3.20°(1)			2.02(2)	
Δ*F*		3.20°			.84	
R^2		.04			.05	
ΔR^2		.04			.01	
CMS	–.002	.03	–.01	–.001	.03	–.004
CMS^2				.01	.02	.03
F (*df*)		.003(1)			.03(2)	
Δ*F*		.003			.06	
R^2		.00			.00	
ΔR^2		.00			.00	

Note. Independent variables were centered at their means.

$N = 83$; ° $p < .10$, ** $p < .01$.

Table S4

Polynomial Regression Analysis for Child Age and PRF Dimensions in Predicting Cognitive ToM

	Model 1			Model 2		
	b	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.00	.40***	.01	.00	.40***
Child Age ^{2}				.00	.00	–.03
F (*df*)		15.05***(1)			7.49**(2)	
Δ*F*		15.05***			.09	
R^2		.16			.16	
ΔR^2		.16			.00	
PM	.02	.04	.05	.09	.06	.24
PM^2				–.07	.04	–.28°
F (*df*)		.18(1)			1.85 (2)	
Δ*F*		.18			3.50°	
R^2		.00			.04	
ΔR^2		.00			.04	
IC	–.01	.04	–.04	–.03	.04	–.08
IC^2				–.03	.04	–.09
F (*df*)		.13(1)			.33(2)	
Δ*F*		.13			.53	
R^2		.00			.01	
ΔR^2		.00			.01	
CMS	.02	.03	.10	.02	.03	.08
CMS^2				–.04	.02	–.24
F (*df*)		.79(1)			2.83°(2)	
Δ*F*		.79			4.83*	
R^2		.01			.07	
ΔR^2		.01			.06	

Note. Independent variables were centered at their means.

$N = 83$; ° $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Table S5

HMRA for the Interaction of Child Age and PM in Predicting General ToM

	Model 1			Model 2			Model 3		
	b	SE_b	*β*	*b*	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.00	.49***	.01	.00	.42***	.01	.00	.43***
PM				.05	.03	.19	.05	.03	.19
PM^2				–.08	.02	–.48***	–.08	.03	–.48*
Child Age × PM							.00	.00	.04
Child Age × PM^2							.00	.00	–.03
F (*df*)	25.52***(1)			16.00***(3)			9.38***(5)		
Δ*F*	25.52***			8.78***			.04		
R^2	.24			.38			.38		
ΔR^2	.24			.14			.00		

Note. Independent variables were centered at their means.

$N = 83$; * $p < .05$, *** $p < .001$.

Table S6

HMRA for the Interaction of Child Age and IC in Predicting General ToM

	Model 1			Model 2			Model 3		
	b	SE_b	*β*	*b*	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.00	.49***	.01	.00	.47***	.01	.00	.56***
IC				.02	.02	.11	.02	.02	.09
Child Age × IC							–.01	.00	–.31**
F (*df*)	25.52***(1)			13.39***(2)			13.39***(3)		
Δ*F*	25.52***			1.19			10.28**		
R^2	.24			.25			.34		
ΔR^2	.24			.01			.09		

Note. Independent variables were centered at their means.

$N = 83$; ** $p < .01$, *** $p < .001$.

Table S7

HMRA for the Interaction of Child Age and CMS in Predicting General ToM

	Model 1			Model 2			Model 3		
	b	SE_b	*β*	*b*	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.00	.49***	.01	.00	.48***	.01	.00	.48***
CMS				.01	.02	.07	.01	.02	.07
Child Age × CMS							.00	.00	.04
F (*df*)	25.52***(1)			12.90***(2)			8.55***(3)		
Δ*F*	25.52***			.45			.13		
R^2	.24			.24			.25		
ΔR^2	.24			.00			.00		

Note. Independent variables were centered at their means.

N = 83; *** *p* < .001.

Table S8

HMRA for the Interaction of Child Age and PM in Predicting Affective ToM

	Model 1			Model 2			Model 3		
	b	SE_b	*β*	*b*	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.00	.40***	.01	.00	.32**	.01	.00	.24*
PM				.04	.03	.14	.03	.04	.11
PM^2				–.09	.02	–.53***	–.07	.04	–.42*
Child Age × PM							–.01	.00	–.21
Child Age × PM^2							.00	.00	.29
F (*df*)	15.49***(1)			14.25***(3)			8.90***(5)		
Δ*F*	15.49***			11.60***			.91		
R^2	.16			.35			.37		
ΔR^2	.16			.19			.02		

Note. Independent variables were centered at their means.

N = 83; * *p*< .05, ** *p* < .01, *** *p* < .001.

Table S9

HMRA for the Interaction of Child Age and IC in Predicting Affective ToM

	Model 1			Model 2			Model 3		
	b	SE_b	*β*	*b*	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.00	.40***	.01	.00	.37***	.01	.00	.43***
IC				.05	.02	.21*	.05	.02	.20*
Child Age × IC							–.01	.00	–.20°
F (*df*)	15.49***(1)			10.32***(2)			8.41***(3)		
Δ*F*	15.49***			4.48*			3.86°		
R^2	.16			.21			.24		
ΔR^2	.16			.05			.04		

Note. Independent variables were centered at their means.

$N = 83$; ° $p < .10$, * $p < .05$, *** $p < .001$.

Table S10

HMRA for the Interaction of Child Age and CMS in Predicting Affective ToM

	Model 1			Model 2			Model 3		
	b	SE_b	*β*	*b*	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.00	.40***	.01	.00	.38***	.01	.00	.36**
CMS				.03	.02	.15	.03	.02	.16
Child Age × CMS							.00	.00	.17°
F (*df*)	15.49***(1)			9.01***(2)			7.07***(3)		
Δ*F*	15.49***			2.29			2.79°		
R^2	.16			.18			.21		
ΔR^2	.16			.02			.03		

Note. Independent variables were centered at their means.

$N = 83$; ° $p < .10$, ** $p < .01$, *** $p < .001$.

Table S11

HMRA for the Interaction of Child Age and PM in Predicting Belief-desire ToM

	Model 1			Model 2			Model 3		
	b	SE_b	*β*	*b*	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.00	.33**	.01	.00	.27**	.01	.00	.25*
PM				.06	.05	.15	.05	.05	.12
PM^2				–.10	.04	–.42**	–.07	.06	–.29
Child Age × PM							.00	.01	.09
Child Age × PM^2							.00	.00	.08
F (*df*)	10.06**(1)			7.28***(3)			4.53**(5)		
Δ*F*	10.06**			5.35**			.53		
R^2	.11			.22			.23		
ΔR^2	.11			.11			.01		

Note. Independent variables were centered at their means.

$N = 83$; * $p < .05$, ** $p < .01$, *** $p < .001$.

Table S12

HMRA for the Interaction of Child Age and IC in Predicting Belief-desire ToM

	Model 1			Model 2			Model 3		
	b	SE_b	*β*	*b*	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.00	.33**	.01	.00	.31**	.01	.00	.40***
IC				.05	.04	.15	.04	.03	.13
Child Age × IC							–.01	.00	–.29**
F (*df*)	10.06**(1)			6.08**(2)			7.00***(3)		
Δ*F*	10.06**			1.97			7.82**		
R^2	.11			.13			.21		
ΔR^2	.11			.02			.08		

Note. Independent variables were centered at their means.

$N = 83$; ** $p < .01$, *** $p < .001$.

Table S13

HMRA for the Interaction of Child Age and CMS in Predicting Belief-desire ToM

	Model 1			Model 2			Model 3		
	b	SE_b	*β*	*b*	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.00	.33**	.01	.00	.34**	.01	.00	.34**
CMS				–.01	.03	–.05	–.01	.03	–.05
Child Age × CMS							.00	.00	–.06
F (*df*)	10.06**(1)			5.11**(2)			3.49*(3)		
Δ*F*	10.06**			.24			.34		
R^2	.11			.11			.12		
ΔR^2	.11			.00			.00		

Note. Independent variables were centered at their means.

N = 83; * *p*< .05, ** *p* < .01.

Table S14

HMRA for the Interaction of Child Age and PM in Predicting Cognitive ToM

	Model 1			Model 2			Model 3		
	b	SE_b	*β*	*b*	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.00	.40***	.01	.00	.38***	.02	.00	.51***
PM				.08	.05	.21	.10	.05	.28°
PM^2				–.05	.03	–.19	–.13	.06	–.52*
Child Age × PM							.01	.01	.15
Child Age × PM^2							–.01	.00	–.48°
F (*df*)	15.05***(1)			5.85**(3)			4.29**(5)		
Δ*F*	15.05***			1.21			1.77		
R^2	.16			.18			.22		
ΔR^2	.16			.03			.04		

Note. Independent variables were centered at their means.

N = 83; ° *p* < .10, * *p*< .05, ** *p* < .01, *** *p* < .001.

Table S15

HMRA for the Interaction of Child Age and IC in Predicting Cognitive ToM

	Model 1			Model 2			Model 3		
	b	SE_b	*β*	*b*	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.00	.40***	.01	.00	.41***	.01	.00	.46***
IC				–.03	.03	–.10	–.04	.03	–.11
Child Age × IC							–.01	.00	–.17
F (*df*)	15.05***(1)			8.02**(2)			6.33**(3)		
Δ*F*	15.05***			.99			2.64		
R^2	.16			.17			.19		
ΔR^2	.16			.01			.03		

Note. Independent variables were centered at their means.

N = 83; ** $p < .01$, *** $p < .001$.

Table S16

HMRA for the Interaction of Child Age and CMS in Predicting Cognitive ToM

	Model 1			Model 2			Model 3		
	b	SE_b	*β*	*b*	SE_b	*β*	*b*	SE_b	*β*
Child Age	.01	.00	.40***	.01	.00	.40***	.02	.00	.57***
CMS				.01	.02	.02	–.00	.03	–.02
CMS^2				–.04	.02	–.25*	–.04	.02	–.22*
Child Age × CMS							.00	.00	–.07
Child Age × CMS^2							.00	.00	–.27*
F (*df*)	15.05***(1)			7.38***(3)			5.46***(5)		
Δ*F*	15.05***			3.14*			2.24		
R^2	.16			.22			.26		
ΔR^2	.16			.06			.04		

Note. Independent variables were centered at their means.

N = 83; * $p < .05$, *** $p < .001$.

CHAPTER 5

Knowing Your Child's Mind and Its Relationship with Theory of Mind Acquisition[4]

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Abstract

Research suggests that parental reflective functioning (PRF)—that is, the parent's capacity to envision the mind of the child—is a key factor in understanding the child's reflective capacities. Yet, most existing measures of PRF assume that it is a broad trait-like feature. This study investigated cross-sectional relationships between domain-specific PRF, operationalized as mothers' estimates of the Theory of Mind (ToM) capacities of their children (mother's ToM estimates; MTE), and ToM acquisition in 83 preschool children, using a multidimensional approach. Results showed that the accuracy of MTE was positively related to the children's capacity for ToM, while the degree of certainty of inaccurate MTE was negatively related to ToM acquisition. The implications of these findings for the conceptualization of PRF and its relationship to ToM and other features of social cognition in children are discussed.

Keywords: Parental reflective functioning, Theory of Mind, social cognition, emotion understanding, mental state estimation

Highlights:

- Theory of Mind (ToM) and parental reflective functioning (PRF) are multidimensional constructs.
- Associations among PRF and ToM acquisition are domain-specific.
- Inaccuracy of mother's ToM estimates (MTE) hampers ToM development in their children.
- Higher certainty with regard to inaccurate MTE is associated with lower child ToM performance.

Introduction

Over the past decades, there has been much research aimed at gaining a better understanding of mentalizing, which refers to someone's ability to understand and reflect upon their own and other's expressions and behaviours in terms of thoughts, wishes, intentions, feelings, and desires (Fonagy et al., 2002). This capacity to attribute mental states to self and others is considered to be the hallmark of understanding the nature and depth of social interactions, and provides humans with resilience while navigating a complex social world (Ensink & Mayes, 2010). A well-known operationalization of mentalizing in developing children is Theory of Mind (ToM), a multidimensional construct that refers to the understanding that people's actions and interactions are driven by underlying internal beliefs, emotions, desires, and intentions (Premack & Woodruff, 1978). General ToM understanding is thought to consist of three components, namely, cognitive, affective, and belief-desire ToM, which include the understanding of beliefs and knowledge (e.g., false-belief reasoning and perspective taking), affects (e.g., emotion recognition and attribution), and desires (e.g., belief-desire reasoning), respectively (Blijd-Hoogewys & van Geert, 2016; Ensink & Mayes, 2010; Hughes & Leekam, 2004; Wellman, 2018; Wellman & Liu, 2004).

Although mentalizing and ToM are conceptually related, the notion of mentalizing is used as an umbrella term to refer to the capacity to reflect on oneself and others and all the components of this capacity, involving both cognitive processes (e.g., perspective taking) as well as affective processes (e.g., emotional attunement and self-regulation) and the capacity to reflect on the mental states of both oneself and others (Luyten et al., 2020). ToM, at least in its original meaning, is a theoretical concept that specifically refers to other-oriented, and typically more cognitive, processes involved in recognizing and understanding mental states (Jańczak, 2021). Hence, ToM mainly focuses on the capacity to reflect on the mind of others, in particular the cognitive processes associated with this capacity.

Young children are considered to be predisposed to develop mentalizing skills (Fonagy et al., 2002). As part of a cognitive and biological maturation process, children gradually master more sophisticated ToM understanding throughout the preschool years, with a substantial increase between 42 and 56 months of age (Blijd-Hoogewys & van Geert, 2016; Wellman et al., 2001). However, this maturation process needs to be rooted in an adequate social learning environment for ToM understanding to develop fully (Ensink & Mayes, 2010; Kim, 2015). Moreover, environmental factors are thought to contribute to the intraindividual variation among children in ToM acquisition, in the sense that they seem to

accelerate or delay children's ToM development (Devine & Hughes, 2018; Wellman, 2012). In this context, a growing body of research has focused on the role of parental mentalizing, or parental reflective functioning (PRF), in the developmental trajectory of ToM acquisition (Ensink & Mayes, 2010). PRF refers to a specific expression of the more general capacity to mentalize in which the parent reflects upon their own and their child's internal mental experience, and understands the child's behaviour as being driven by underlying mental states, such as thoughts, feelings, desires, and intentions (Slade, 2005). PRF therefore encompasses a parental stance involving an awareness of and interest in the internal psychological world of the child (Zeegers et al., 2017). Parents with high levels of PRF typically focus on what their child is thinking and feeling, and model this focus on reasoning about mental states, for example, through pretend play in early development or long discussions with their adolescent son or daughter about their interests or fears later on in development, all of which involve experiences of joint perspective taking and affect regulation. These interactions are thought to foster and scaffold the child's development of mentalizing and ToM understanding (Luyten, Nijssens, et al., 2017; Midgley et al., 2017).

Over the past decades, several operationalizations of PRF have been developed, ranging from more global to specific measures (for a review, see Schiborr et al., 2013), each tapping into different features of PRF. Some of these operationalizations have been used in studies investigating the potential role of PRF in promoting ToM development. For example, research shows that parental mental-state talk (i.e., the parent explicitly referring to internal mental states when speaking to the child) is related to affective ToM (Doan & Wang, 2010; Dunn, Brown, & Beardsall, 1991; Dunn, Brown, Slomkowski, et al., 1991; Taumoepeau & Ruffman, 2006, 2008) and cognitive ToM (Adrián et al., 2007; Dunn, Brown, Slomkowski, et al., 1991; Ensor et al., 2014; Peterson & Slaughter, 2003; Symons et al., 2006), as well as ToM understanding more generally (Ruffman et al., 2002). Maternal mind-mindedness (MMM; Meins & Fernyhough, 2010), which refers to parents' tendency to verbalize emotional states in interactions with their children, has been shown to be related to affective, cognitive, and belief-desire ToM (de Rosnay et al., 2004; Hughes et al., 2018; Laranjo et al., 2014; Lundy, 2013; Meins et al., 2013; Meins et al., 1998; Meins et al., 2003; Meins et al., 2002). However, the above-mentioned relationships were not replicated in two studies that failed to find direct associations between MMM and subsequent emotion understanding or false-belief understanding (Ereky-Stevens, 2008; Licata et al., 2016). Further, the affective ToM capacities of the parent have been associated with child general

ToM understanding (Sabbagh & Seamans, 2008), and representational measures of PRF have been associated with affective (Steele et al., 1999) and cognitive ToM (Ensink et al., 2015; Rosso & Airaldi, 2016; Rosso et al., 2015; Scopesi et al., 2015). Similarly, the key dimensions of the Parental Reflective Functioning Questionnaire (PRFQ; Luyten et al., 2009; Luyten, Mayes, et al., 2017) have been associated with affective, belief-desire, and cognitive ToM (Nijssens et al., 2021). Finally, Sharp and colleagues (Sharp et al., 2006) found that parental hypermentalizing (excessive mentalizing, characterized by undue certainty about the child's mind, but in a way that is often distorted or intrusive) negatively influences ToM development in the child. For instance, poor maternal accuracy regarding the responses of their children on a socio-cognitive reasoning task, which can be seen as a functional measure of PRF, was negatively associated with child ineffective social-cognitive reasoning.

Taken together, the above-mentioned results emphasize the specificity of PRF, as different operationalizations and features of PRF have been differentially related to different components of ToM. However, the majority of existing studies of ToM typically focus on only one component of ToM, such as affective (e.g., emotion understanding) or cognitive (e.g., false-belief reasoning) ToM. Hence, in line with the multidimensional nature of both PRF and ToM, there is a need for more research investigating associations between different operationalizations of PRF and the different ToM components to identify those specific associations.

The Present Study

The present paper presents a cross-sectional study among biological mothers and their offspring aged 3–5 years (n = 83), investigating associations among PRF and child ToM using a multidimensional approach (i.e., including different ToM dimensions). As mentioned in the Introduction, parental mentalizing is considered an umbrella concept for several operationalizations of PRF, each tapping into different features of PRF. Unlike existing studies that examine the associations between parent and child mentalizing capacities by using representational (e.g., the Adult Attachment Interview or Parent Development Interview), interactional (e.g., MMM), or questionnaire-based (e.g., PRFQ) measures of PRF, the current study uses a functional, domain-specific measure of PRF, namely, PRF with regard to specific features of ToM in their children. More specifically, mothers were asked to estimate the performance of their children on ToM tasks. The

accuracy and degree of certainty of the mothers' estimations of their children's ToM performance (i.e., the mothers' ToM estimates; MTE) were used as a proxy of PRF. Hence, MTE incorporates two core features of PRF. First, an important hallmark of PRF is having the child's mind in mind, which may be reflected by enhanced knowledge about the child's mental states (i.e., making accurate estimations about the child's mind). Second, the parent must maintain a not-knowing stance (i.e., recognizing the opacity of mental states), as being too certain about the child's mental states is characteristic of distorted mentalizing, especially when the parent is highly certain while making inaccurate estimations of the child's mind. Therefore, certainty of MTE is divided in terms of the degree of certainty related to the accuracy of the estimation (i.e., degree of certainty of accurate versus inaccurate estimations).

Both MTE and ToM are considered to be offline, trait-like measures of mentalizing. Similar to ToM, MTE taps into explicit, cognitive-oriented mentalizing in a specific context. In addition, ToM and MTE both share a focus on other-focused mentalizing, although research on ToM has mostly focused on mentalizing about an abstract character, whereas MTE focuses on mentalizing about one's own child. Additionally, MTE includes features of self-oriented mentalizing (i.e., self-reported scores of the degree of certainty while making estimations about their child's ToM performance).

Based on the literature reviewed above, we expected high levels of domain-specific PRF (i.e., accuracy of affective, cognitive, and belief-desire MTE) to be positively associated with ToM dimensions, and low levels of domain-specific PRF (as expressed by high or low levels of certainty of affective, cognitive, and belief-desire MTE) to be negatively associated with ToM dimensions. In addition, given the domain-specific nature of each of the MTE measures, we expected associations to be particularly strong for congruent measures of MTE and ToM. Finally, we examined interaction effects with age, as age-related differences in the associations among MTE and ToM may exist. Consistent with the suggestion that PRF may accelerate or delay ToM acquisition (Devine & Hughes, 2018; Nijssens et al., 2021; Wellman, 2012), we expected associations among MTE and ToM to be particularly pronounced in younger and older children.

Method

Participants and Procedures

This study was part of a broader research project on PRF and ToM development and was approved by the Ethics Committee of the university of Leuven. Undergraduate students collected data as part of their master thesis. More specifically, they asked Dutch-speaking mothers of a biological child aged 3–5 years to participate in a study on child social-emotional development. Eligible mothers were recruited through the student's social network and nursery schools. Participation was voluntary and full anonymity was guaranteed. Mothers who agreed to participate provided written informed consent. In the first part of the study, mothers were asked to complete a booklet of questionnaires. Approximately 570 mothers were contacted. In total, 385 of these completed the questionnaires, of whom 23 did not meet the inclusion criteria because their children were outside the age range 3–5 years. From the remaining sample of 362 mothers and children, 83 mother–child pairs (22.9%) were randomly selected and invited to participate in the second part of the study together with their children. All contacted mothers agreed to participate in the second part of the study (which took place a maximum of 3 months after the first part through house visits). During this part of the study, the children participated in a standardized ToM experiment while the mothers filled in a second questionnaire about their estimations of the child's performance on the ToM tasks. This questionnaire included a detailed description of the ToM tasks and test questions that were presented to the child. For each test question, the mothers were asked to indicate whether they thought their child would be able to provide the correct answer, and to indicate how certain they were of their estimation. At the end of the ToM assessment, children received an age-appropriate children's book as a gift for their participation.

The children were a mean 54.5 months old (*SD* = 9.04; range 36.0–71.0) and comprised 42 girls (50.6%) and 41 boys (49.4%). The mean age of the mothers was 35.6 years (*SD* = 3.95; range 28.0–45.5). The majority of mothers (82%) had attained higher education. Full demographic information is provided in Table 1.

Mothers of boys and girls did not differ significantly in terms of their age, educational level, or working status. In addition, there were no significant differences in the mean age of the boys and girls. Finally, no significant differences were found with regard to maternal age or educational level, or child gender or age, between mothers and children who participated in the ToM experiment and those who did not.

Table 1

Demographic Data of Mothers and Children

	Mothers (n = 83)	Children (n = 83)
Age (years)[a]	35.61 (3.95)	4.54 (0.75)
Work (hours per week)[a]	25.98 (12.66)	
Work (days per week)[a]	3.84 (1.67)	
Relationship status (years)[a]		
Duration of relationship	11.78 (4.56)	
Living together	9.60 (3.54)	
Marriage	7.10 (3.52)	
Educational level (%)		
Primary education	2.40	
Secondary education	15.70	
Higher education (graduate school)	38.60	
Higher education (university)	43.40	
Working status (%)		
Unemployed	3.60	
Labourer	9.60	
White-collar worker	60.20	
Self-employed	10.80	
Other	15.80	

Note: [a] Mean (*SD*).

Measures

ToM development was measured by using a series of ToM tasks that assess different domains of ToM understanding, such as affective (i.e., emotion recognition and attribution), belief-desire (based on true beliefs), and cognitive (i.e., perspective taking and false-belief reasoning) ToM. Following an extensive review of the existing literature on ToM, we selected a set of nine different ToM tasks (22 items in total) designed for children aged 3–6 years, to measure general ToM development, as well as affective (8 items), belief-desire (8 items), and cognitive (6 items) ToM (Denham, 1986; Flavell et al., 1968; Harris et al., 1989; Hogrefe et al., 1986; Wellman & Woolley, 1990; Wimmer & Perner, 1983). Each item was scored as correct (1 point) or incorrect (0 points), with a maximum score of 22 (sum of items). A total ToM score (i.e., general ToM) was computed as the mean of all items. ToM dimensions (i.e., affective, belief-desire, and cognitive) were computed by

calculating mean item scores based on the items that were categorized in these dimensions. A detailed description of the ToM tasks is described elsewhere (Nijssens et al., 2021). The selected tasks have been shown to have good test–retest reliability and internal consistency (Hughes et al., 2000), and have been used in various studies (Meins et al., 2002). In the present study, Cronbach's alphas for general, affective, belief-desire, and cognitive ToM were .80, .58, .84, and .65, respectively.

Maternal PRF was measured by the mother's ability to predict the ToM performance of her child, as well as her degree of certainty in making these estimations. More specifically, the mother was asked whether she thought her child would be able to provide the correct answer on a specific ToM item, and to indicate on a scale from 0 to 100% how certain she was of her estimation. The accuracy and degree of certainty of this estimation was named the mother's ToM estimates (MTE). MTE comprises three subscales, namely accuracy, certainty of accurate estimations, and certainty of inaccurate estimations. These subscales were further divided into the different ToM classifications, which enabled us to measure MTE in general, as well as MTE with regard to affective, belief-desire, and cognitive ToM tasks. In the present study, Cronbach's alphas for accuracy and degree of certainty of MTE were .67 and .96, respectively.

Statistical Analyses

A power analysis was conducted based on other studies typically reporting medium effect sizes concerning the association between PRF and child ToM (Devine & Hughes, 2018; Tompkins et al., 2018). For medium effect sizes, the required sample size is $n = 85$ ($p < .05$, power = .80) for testing Pearson's correlations, and $n = 76$ ($p < .05$, power = .80) for testing multiple regression with three independent variables (Cohen, 1992).

First, Pearson's correlations were computed to investigate associations among demographic features, MTE, and ToM. Comparison of maternal levels of education and working status and their associations with ToM performance and MTE were analysed with an independent-samples *t*-test and a one-way analysis of variance, respectively.

Next, we conducted hierarchical multiple regression analyses (HMRAs) to determine the unique proportion of variance explained by each set of predictors (i.e., child age and MTE subscales) in predicting child ToM (i.e., general, affective, belief-desire, and cognitive), including potential interaction effects. For these analyses, all variables were mean-centred and entered sequentially as follows: (1) child age; (2) MTE subscales; (3) the

interaction term between child age and MTE subscales. In these analyses, significant moderation effects were indicated by significant standardized regression coefficients and significant changes in R^2 for the interaction terms (Aiken & West, 1991). For each regression model, we calculated Cohen's f^2 as a measure of the effect size (Cohen, 1992). We plotted simple slopes for the association between low and high (one standard deviation below and above the mean, respectively) levels of the independent variable (i.e., MTE accuracy or the degree of certainty of inaccurate MTE) and dependent variable (i.e., general ToM) for low and high (one standard deviation below and above the mean, respectively) levels of the moderator (i.e., child age) (see www.jeremydawson.co.uk/slopes.htm). SPSS version 27.0 was used for all statistical analyses.

Results

Descriptive Statistics

Associations among demographic features of the mother (age, working hours, working days, and durations of relationship, living together, and marriage) and the child (age) on the one hand, and MTE and ToM acquisition (general, affective, belief-desire, cognitive) on the other, were non-significant, except for age. As expected, there was a significant relationship between child age and ToM performance ($r = .49$, $p < .001$; $r = .40$, $p < .001$; $r = .33$, $p < .01$; and $r = .40$, $p < .001$ for general, affective, belief-desire, and cognitive ToM, respectively). Furthermore, child age (but not maternal age) was significantly positively associated with the accuracy of general, affective, and belief-desire MTE ($r = .44$, $p < .001$; $r = .37$, $p < .001$; $r = .34$, $p < .01$, respectively). Finally, maternal age (but not child age) was significantly positively associated with certainty of correct MTE ($r = .34$, $p < .01$), as well as with certainty of incorrect MTE ($r = .32$, $p < .01$). There were no significant differences in the child's ToM performance or MTE between mothers with lower (primary and secondary education) and higher (graduate school and university) levels of education. In addition, maternal working status (classified as unemployed, labourer, white-collar worker, self-employed, or other) showed no significant associations with either ToM performance of the child or MTE.

On average, mothers accurately estimated 73.23% (SD = 14.56%) of their child's general ToM performance. For cognitive, affective, and belief-desire ToM, accuracy was 60.24% (SD = 24.67%), 81.63% (SD = 17.93%), and 77.26% (SD = 23.68%), respectively. The degree of certainty of accurate MTE was on average 74.97% (SD = 12.98%), 67.00%

(*SD* = 15.94%), 80.07% (*SD* = 14.62%), and 75.07% (*SD* = 13.93%) for general, cognitive, affective, and belief-desire ToM, respectively. The degree of certainty of inaccurate estimations of general, cognitive, affective, and belief-desire ToM was on average 66.65% (*SD* = 15.10%), 64.41% (*SD* = 16.31%), 73.50% (*SD* = 18.93%), and 67.77% (*SD* = 17.25%), respectively.

Given the significant correlations of child and maternal age with ToM and MTE, correlational analyses were controlled for age of the mother and of the child.

Zero-Order Correlations Among MTE and ToM Dimensions

Zero-order correlations among MTE and ToM (see Table 2) showed that general accuracy of MTE was significantly positively associated with general, belief-desire, and cognitive ToM. Accuracy of affective MTE, in turn, was significantly positively associated with general and affective ToM. Accuracy of belief-desire MTE was significantly positively associated with general, belief-desire, and cognitive ToM. Accuracy of cognitive MTE was significantly positively associated with cognitive ToM.

Table 2

Zero-Order Correlations Among Maternal Theory of Mind Estimates and Theory of Mind

	General ToM	Affective ToM	BD ToM	Cognitive ToM
General Accuracy	.51***	.18	.43***	.39***
Accuracy Affective ToM	.25*	.42***	.06	.10
Accuracy BD ToM	.53***	.05	.69***	.22*
Accuracy Cognitive ToM	.13	–.07	–.03	.42***
Certainty accurate General MTE	–.03	–.07	–.10	.13
Certainty accurate Affective MTE	–.04	–.04	–.06	.05
Certainty accurate BD MTE	–.07	–.10	–.15	.13
Certainty accurate Cognitive MTE	–.07	–.11	–.15	.13
Certainty inaccurate General MTE	–.46**	–.49**	–.51**	.10
Certainty inaccurate Affective MTE	–.27	–.41*	–.33*	.24
Certainty inaccurate BD MTE	–.40*	–.36*	–.51**	.16
Certainty inaccurate Cognitive MTE	–.43**	–.44**	–.41*	–.04

Note: ToM = Theory of Mind. BD = Belief-desire. MTE = Maternal ToM Estimates.

$N = 83$; *$p < .05$, **$p < .01$, ***$p < .001$.

No significant associations were found for the degree of certainty of accurate MTE and ToM performance. The degree of certainty of inaccurate MTE, on the other hand, was significantly negatively associated with ToM. More specifically, certainty of inaccurate general MTE was negatively associated with general, affective, and belief-desire ToM. Certainty of inaccurate affective MTE was negatively associated with affective and belief-desire ToM. Certainty of inaccurate belief-desire MTE was negatively associated with general, affective, and belief-desire ToM. Finally, certainty of inaccurate cognitive MTE was negatively associated with general, affective, and belief-desire ToM.

Main and interaction effects of MTE and Child Age in predicting ToM

HMRAs showed that general ToM was best predicted by a combination of child age (β = .27, p < .01), accuracy of MTE (β = .49, p < .001), certainty of inaccurate MTE (β = –.17, p = .06), the interaction between child age and accuracy of MTE (β = .22, p < .05), and the interaction of child age and certainty of inaccurate MTE (β = .17, p < .05), explaining 52% of the variance, representing a large effect (Model 3: R^2 = .52, $F(5)$ = 16.22, p < .001, Cohen's f^2 = 1.08; see Table 3).

Table 3

Hierarchical Multiple Regression Analysis for Predicting General ToM

	Model 1			Model 2			Model 3		
	b	SE_b	β	*b*	SE_b	β	*b*	SE_b	β
CA	.01	.00	.47***	.01	.00	.30**	.01	.00	.27**
MTE-A				.55	.12	.43***	.62	.12	.49***
MTE-CI				.00	.00	–.21*	.00	.00	–.17°
CA×MTE-A							.03	.01	.22*
CA×MTE-CI							.00	.00	.17*
F (*df*)	21.62***(1)			22.18***(3)			16.22***(5)		
ΔF	21.62***			17.80***			4.35*		
R^2	.22			.47			.52		
ΔR^2	.22			.25			.06		

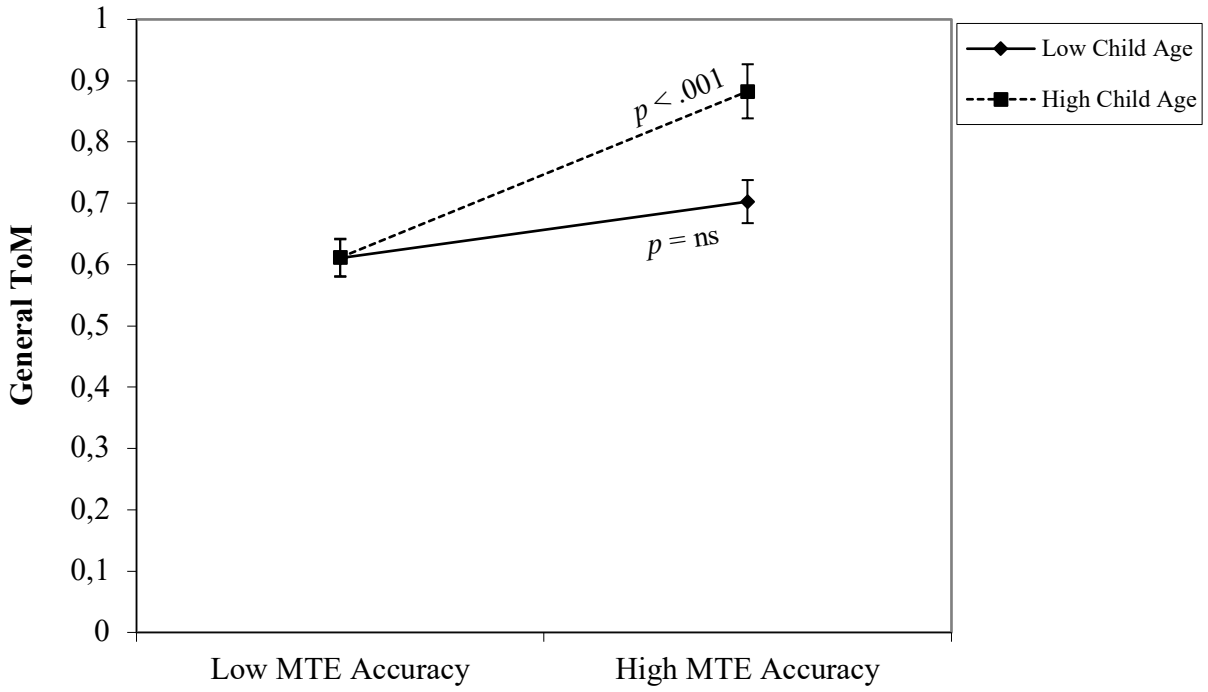
Note. Independent variables were centred at their means. ToM = Theory of Mind. CA = Child Age. MTE-A = accuracy of maternal ToM estimates. MTE-CI = certainty of inaccurate maternal ToM estimates.

N = 83; °p< .10, * p< .05, **p < .01, *** p < .001.

The significant two-way interaction between accuracy of MTE and child age as plotted in Figure 1, shows that child age moderated the relationship between maternal accuracy and general ToM. In older children (i.e., high levels of child age), maternal accuracy was significantly associated with general ToM acquisition. More specifically, general ToM was significantly higher in children of mothers who were highly accurate in their estimations compared with children of mothers who showed low MTE accuracy. For younger children (i.e., low levels of child age), there was no significant difference in general ToM development between children of mothers who scored low versus high on MTE accuracy. Figure 2 shows that the simple slopes for certainty of inaccurate MTE were nonsignificant in both younger and older children.

Figure 1

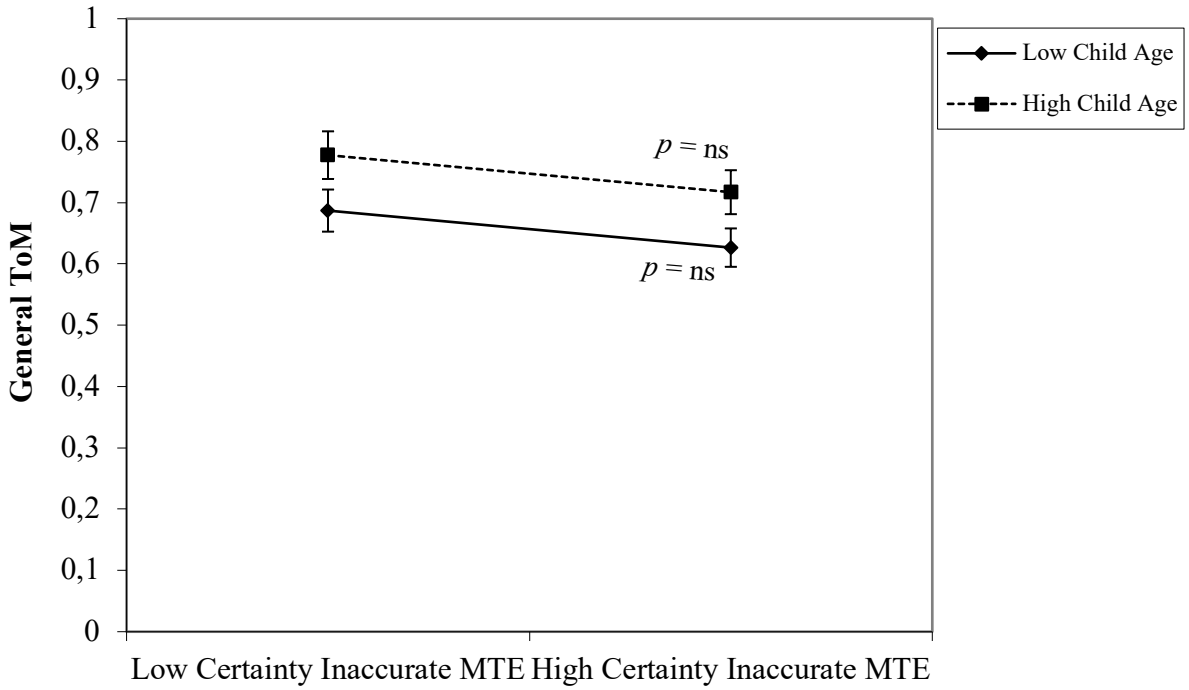
Moderation Effect of Child Age in the Relationship Between Accuracy of maternal Theory of Mind estimates (MTE) and General Theory of Mind (ToM)



Note. The low and high values reflect 1 *SD* below and above the mean, respectively. ns = nonsignificant. Bars indicate 95% confidence interval.

Figure 2

Moderation Effect of Child Age in the Relationship Between Certainty of Inaccurate maternal Theory of Mind estimates (MTE) and General Theory of Mind (ToM)



Note. The low and high values reflect 1 *SD* below and above the mean, respectively. ns = nonsignificant. Bars indicate 95% confidence interval.

Affective ToM was best predicted by a combination of accuracy of MTE ($\beta = .40$, $p < .01$) and certainty of inaccurate MTE ($\beta = –.23$, $p = .07$), explaining 30% of the variance and representing a large effect (Model 2: $R^2 = .30$, $F(3) = 6.97$, $p < .01$, Cohen's $f^2 = .43$; see Table 4).

Belief-desire ToM was best predicted by a combination of accuracy of MTE ($\beta = .71$, $p < .001$) and certainty of inaccurate MTE ($\beta = –.25$, $p < .01$), explaining 67% of the variance and representing a large effect (Model 2: $R^2 = .67$, $F(3) = 38.32$, $p < .001$, Cohen's $f^2 = 2.03$; see Table 5).

Cognitive ToM was best predicted by a combination of child age ($\beta = .35$, $p < .01$), accuracy of MTE ($\beta = .37$, $p < .001$), and certainty of inaccurate MTE ($\beta = –.20$, $p < .05$), explaining 35% of the variance and representing a large effect (Model 2: $R^2 = .35$, $F(3) = 12.68$, $p < .001$, Cohen's $f^2 = .54$; see Table 6).

Table 4

Hierarchical Multiple Regression Analysis for Predicting Affective ToM

	Model 1			Model 2			Model 3		
	b	SE_b	*β*	*b*	SE_b	*β*	*b*	SE_b	*β*
CA	.01	.00	.28*	.00	.00	.18	.00	.00	.23
MTE-A				.46	.15	.40**	.55	.16	.48**
MTE-CI				.00	.00	–.23°	.00	.00	–.29*
CA×MTE-A							.02	.01	.16
CA×MTE-CI							.00	.00	–.10
F (*df*)	4.21*(1)			6.97**(3)			4.54**(5)		
Δ*F*	4.21*			7.79**			.93		
R^2	.08			.30			.33		
ΔR^2	.08			.22			.03		

Note. Independent variables were centred at their means. ToM = Theory of Mind. CA = Child Age. MTE-A = accuracy of maternal Theory of Mind estimates. MTE-CI = certainty of inaccurate maternal Theory of Mind estimates.

$N = 83$; °$p < .10$, * $p < .05$, ** $p < .01$.

Table 5

Hierarchical Multiple Regression Analysis for Predicting Belief-desire ToM

	Model 1			Model 2			Model 3		
	b	SE_b	*β*	*b*	SE_b	*β*	*b*	SE_b	*β*
CA	.01	.00	.20	.00	.00	.02	.00	.00	.03
MTE-A				.87	.10	.71***	.90	.11	.74***
MTE-CI				.00	.00	–.25**	.00	.00	–.26**
CA×MTE-A							.01	.01	.06
CA×MTE-CI							.00	.00	–.04
F (*df*)	2.44(1)			38.32***(3)			22.66***(5)		
Δ*F*	2.44			54.10***			.39		
R^2	.04			.67			.67		
ΔR^2	.04			.63			.01		

Note. Independent variables were centred at their means. ToM = Theory of Mind. CA = Child Age. MTE-A = accuracy of maternal ToM estimates. MTE-CI = certainty of inaccurate maternal ToM estimates.

$N = 83$; ** $p < .01$, *** $p < .001$.

Table 6

Hierarchical Multiple Regression Analysis for Predicting Cognitive ToM

	Model 1			Model 2			Model 3		
	b	SE_b	*β*	*b*	SE_b	*β*	*b*	SE_b	*β*
CA	.01	.00	.39***	.01	.00	.35**	.01	.00	.36***
MTE-A				.42	.11	.37***	.44	.12	.40***
MTE-CI				.00	.00	–.20*	.00	.00	–.18°
CA×MTE-A							.02	.01	.14
CA×MTE-CI							.00	.00	–.08
F (*df*)	13.36(1)			12.68***(3)			8.22***(5)		
Δ*F*	13.36***			10.61***			1.35		
R^2	.15			.35			.37		
ΔR^2	.15			.19			.02		

Note. Independent variables were centred at their means. ToM = Theory of Mind. CA = Child Age. MTE-A = accuracy of maternal ToM estimates. MTE-CI = certainty of inaccurate maternal ToM estimates.

$N = 83$; °$p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Discussion

PRF has been hypothesized to be an important factor contributing to intraindividual variation in ToM development. In this study, we examined a domain-specific measure of PRF, which we referred to as MTE (i.e., the accuracy and degree of certainty of the mother's estimations of her child's ToM performances), and its associations with preschool children's abilities to pass affective, belief-desire, and cognitive ToM tasks. Results showed that the general accuracy of MTE in mothers of preschool children was strongly related to ToM in their children. This finding is congruent with earlier research showing that poor maternal accuracy regarding the responses of their children on a socio-cognitive reasoning task is associated with child ineffective social-cognitive reasoning (Sharp et al., 2006). In addition, we found that relationships were especially strong between dimension-specific accuracy (i.e., accuracy in estimating affective, belief-desire, or cognitive ToM performance) and ToM performance on these respective (but not other) dimensions. For example, the mother's ability to make more accurate estimations of her child's capacity to recognize and attribute emotions (i.e., affective ToM) was related to better affective ToM performance of the child, but not to higher performance on cognitive features of ToM such as the ability to reason

about beliefs. These task-specific associations provide further evidence for the specificity of both PRF and ToM, and emphasize the importance of PRF in the development of ToM understanding in their children. From this perspective, one could indeed expect that the mother's ability to accurately hold her child's mind in mind would help the child to better understand their own mind as well as the mind of others, which should be reflected in better ToM performance. On the other hand, as the child's ToM understanding becomes more developed, this might also help the mother to better understand the child's mind, leading to more accurate estimations thereof. Hence, longitudinal research is needed to investigate and clarify the nature and reciprocity of these relationships. In this regard, meta-analyses have reported only small effects of PRF on the development of ToM (Devine & Hughes, 2018). Yet, in this study, we found medium to large effects of domain-specific PRF on ToM development. More research, using different measures of PRF and ToM, is therefore needed to further investigate the precise role of general and domain-specific PRF on ToM development.

While accuracy of MTE was considered a proxy of adequate PRF, high levels of certainty—especially with regard to inaccurate estimations—were considered a proxy of distorted PRF. As expected, higher degrees of certainty while making incorrect estimations about the child's mind were associated with lower child ToM performance. Interestingly, high certainty of inaccurate MTE was associated with impairments in affective and belief-desire ToM, but not with cognitive ToM. This is consistent with theoretical assumptions that distorted PRF may lead to problems in affective ToM (e.g., accurate emotion understanding and attribution) (e.g., Ensink & Mayes, 2010; Fonagy et al., 2002; Fonagy & Target, 2005; Sharp & Fonagy, 2008; Slade, 2005) but does not necessarily impede the development of cognitive components of ToM, such as visual perspective taking and false-belief understanding (Luyten, Nijssens, et al., 2017). A possible explanation for these differential results may be that the development of cognitive ToM capacities is mainly part of a biological maturation process, whereas affective ToM capacities are primarily developed within a mentalizing environment, in which the child learns to understand and attribute emotional mental states through interactions with their parents that are characterized by marked affect mirroring, joint perspective taking, and affect regulation. Yet, the parent's tendency to misread the child's mind and to make inaccurate assumptions about the child's behavior may interfere with experiences of co-regulation, which in turn increases the risk for emotional problems in the child (Luyten et al., 2020). This is in line

with recent studies showing associations among low levels of PRF and child emotional problems (Burkhart et al., 2017; Krink et al., 2018; Luyten, Mayes, et al., 2017; Nijssens et al., 2020; Pazzagli et al., 2018; Rostad & Whitaker, 2016; Rutherford et al., 2015). Yet, again one should be careful in drawing causal conclusions from these findings, as bidirectional relationships between PRF and ToM may exist. It may well be that distorted PRF, for example, is driven by child factors (e.g., behavioural difficulties or emotion-regulation problems).

The degree of certainty of accurate MTE was relatively unrelated to ToM development, and might thus be considered to be less maladaptive and therefore not to impede ToM acquisition. Although recognizing the opacity of mental states is one of the hallmarks of adaptive PRF, it seems that the parent's tendency to be overly certain about the child's mind does not necessarily hamper ToM in the case of accurate attributions, that is, when mothers seem to know the mind of their child relatively well.

Taken together, these findings suggest that the children of mothers who are highly certain while making inaccurate assumptions about their child's inner world have lower ToM capacities, especially with regard to emotion understanding. These findings are further supported by the regression analyses that showed large effects of MTE in predicting affective, belief-desire, and cognitive ToM. Interestingly however, cognitive ToM was best predicted by the combination of accuracy of MTE, certainty of inaccurate MTE, and child age, while affective and belief-desire ToM were best predicted by the combination of accuracy of MTE and certainty of inaccurate MTE only (and not child age). One possible explanation may be that cognitive ToM development reflects a biologically determined maturation effect (i.e., main effect of child age), which requires an adequate social learning environment (i.e., adequate PRF operationalized as MTE) to fully develop (Blijd-Hoogewys & van Geert, 2016; Devine & Hughes, 2018; Ensink & Mayes, 2010; Kim, 2015; Wellman, 2012; Wellman et al., 2001). ToM development with regard to emotion understanding (i.e., affective and belief-desire ToM), on the other hand, seems to be driven less by biological maturation and more by environmental factors, in the sense that inadequate PRF delays these ToM capacities, independent of child age. An alternative, but related, explanation may be that PRF particularly influences ToM development after the average threshold for ToM acquisition. Indeed, affective and belief-desire ToM understanding typically emerge first in development, between the ages of 3 and 4 years, followed by cognitive ToM, when the child is 5 years old (Kim, 2015; Wellman, 2012). Therefore, in this sample of preschoolers, the

role of MTE may be more pronounced with regard to basic ToM capacities (i.e., understanding and attributing emotions) that are expected to be fully acquired in the majority of the children, and less pronounced with regard to more advanced ToM capacities (i.e., false-belief reasoning) that are still developing. Hence, it may well be that negative associations among MTE and cognitive ToM arise when children are older (5 years old and above).

In line with this hypothesis, interaction effects between MTE and child age were found in predicting general ToM capacities (i.e., affective, belief-desire, and cognitive ToM combined), showing that general ToM development is hampered by maternal inaccuracy. At younger child age, when ToM acquisition is still in progress, levels of general ToM were similar in children of mothers who were highly accurate versus those of mothers who were less accurate. When children grow older, particularly when children grow beyond the threshold for average ToM development, levels of general ToM were higher in children whose mothers were highly accurate compared with those whose mothers were highly inaccurate. With regard to certainty of inaccurate MTE, slopes in both younger and older children were nonsignificant. These interaction effects were not found for the ToM dimensions separately.

These findings may have important clinical implications with regard to parent–child intervention programmes. Overall, the results of this study suggest that child mentalizing capacities may be fostered by promoting parents' PRF. More specifically, it seems important to promote parents' interest and curiosity in their child's mind and to help parents read the mind of their child accurately. Yet, at the same time, clinicians must be alert to a lack of flexibility and consideration of alternative perspectives in parents while reasoning about their child's mind, as high levels of certainty with regard to inaccurate assumptions are considered maladaptive and hamper the child in developing a ToM of their own. Hence, if this is the case, interventions must focus on the opacity of mental states, and parents must be helped to realize that they actually do not know the mind of their child as well as they think they do. To date, several interventions that may foster PRF have been developed (for an overview, see Barlow et al., 2021; Camoirano, 2017; Luyten, Nijssens, et al., 2017). Core ingredients that have been identified in those intervention programmes are psychoeducation, role plays, and group discussions with other parents (Lo & Wong, 2022). In addition, the use of video feedback is thought to be particularly effective in promoting PRF, as it allows the parent to take a meta-perspective and to focus on the internal mental states of themselves

and their child from a third-person perspective (Nijssens et al., 2012). All the above-mentioned ingredients have in common that they promote the parent's capacity for perspective taking and joint attention, and help the parent to maintain a more mentalizing stance of curiosity and inquiry while envisioning the child's mind. In turn, the child has repeated experiences of being mentalized, which is of key importance in social learning and the development of mentalizing (Luyten et al., 2022). Finally, interventions should be tailored to the child's age and developmental phase. More specifically, children's ToM might be fostered by focusing on emotion recognition and attribution in younger children, while from age 5 onward the focus should shift to self–other differentiation, perspective taking, and cognitive reasoning about beliefs.

Finally, limitations of this study should be acknowledged. First, we focused only on MTE as a proxy of PRF in relation to ToM development. As noted, different operationalizations of PRF may show differential relationships with ToM understanding. Therefore, future research should investigate relationships between broad measures of PRF (i.e., representational PRF or MMM) and more domain-specific measures of PRF (i.e., PRFQ dimensions or MTE) and ToM development. Second, the nature of this sample was limited to a homogeneous group of mainly well-educated and well-functioning mothers. Therefore, these findings cannot be generalized to higher-risk samples (i.e., clinical populations). In addition, the sample size was relatively small, which may have resulted in limited statistical power for some of the associations that were investigated. Also, internal consistency values of some of the subscales were somewhat lower than the general threshold for acceptability. Further, the cross-sectional design of this study precluded drawing conclusions about the nature of the relationships found. Therefore, results should be interpreted with caution and further longitudinal research in larger samples in both normally developing and in at-risk children is needed to specify potential evocative person–environment interactions and to identify the unique contribution of (different operationalizations of) PRF with regard to the development of child ToM understanding, and vice versa.

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CHAPTER 6

Parental Reflective Functioning, Maternal Mind-Mindedness, and Emotional Availability in Infancy[5]

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[5] Nijssens, L., Vliegen, N., & Luyten, P. (2024). Parental reflective functioning, maternal mind-mindedness, and emotional availability in infancy. *Manuscript submitted for publication in Development and Psychopathology.*

Abstract

Parental mentalizing, referring to the capacity of parents to envision themselves and their child in terms of internal mental states, and to understand their child's behavior as motivated by underlying mental states, is considered an umbrella concept. Different measures of the concept have been developed and empirically evaluated, but relatively little is known about the associations between these different assessment methods. This study reports findings from a prospective study investigating associations between self-reported parental reflective functioning (PRF) as assessed with the Parental Reflective Functioning Questionnaire (PRFQ), and Maternal Mind-Mindedness (MMM) as assessed based on play observations, in a sample of 72 mothers and their child aged between 0 and 36 months. We also examined associations with emotional availability measured with the Emotional Availability – Self-Report questionnaire (EA-SR) as an index of parental sensitivity. Results indicated significant associations among PRFQ dimensions and EA-SR scales, but not between EA-SR and MMM. Further, indices of maladaptive PRF as assessed with the PRFQ were prospectively associated with non-attuned MMM, and this relationship was moderated by child use of language. Implications of these findings for the conceptualization and assessment of parental mentalizing are discussed in the context of considerations concerning "online" and "offline" parental mentalizing.

Keywords: Parental reflective functioning, mind-mindedness, emotional availability, mentalizing.

Introduction

Parental mentalizing is an umbrella concept referring to the capacity of parents to envision their child in terms of internal mental states, to reflect upon their own and their child's internal mental experiences, and to understand the child's behavior in the context of underlying mental states and intentions (Camoirano, 2017; Medrea & Benga, 2021; Slade, 2005, 2023; Zeegers et al., 2017). This capacity is thought to enable caregivers to respond to their child's physical and emotional needs in consistent and sensitive ways, and is considered an important factor in the development of children's socio-emotional skills (Turner et al., 2008). To date, more than 15 assessment methods of parental mentalizing have been identified, ranging from more global to specific measures, with each of the measures tapping into somewhat different features of parental mentalizing—that is, affective versus cognitive, self- versus other-focused, or "online" (e.g., measured during an interaction with their child) versus "offline" (e.g., when reflecting about their child outside specific interactional contexts) parental mentalizing (for a review, see Schiborr et al., 2013). In addition, these assessment tools vary from more time-consuming and cumbersome interviews and observations to more quick and simple screening questionnaires.

A common thread across these different approaches is the conceptualization of adaptive parental mentalizing as characterized by (1) the parent's capacity to *accurately* reflect on their own and their child's internal experiences as well as the relationship between them, (2) *interest and curiosity* in mental states, alongside the understanding that these mental states are *connected to behavior*, (3) the *recognition* that their child has own feelings or thoughts that may be different from their own parenting experiences, and (4) the capacity to use this understanding to guide their *interactions* with their child (e.g., by anticipating their child's needs and emotions, or by responding appropriately to their child's emotions and behaviors in a sensitive and supportive manner). Offline measures mainly focus on the first three characteristics, tapping into relatively stable dispositions, whereas online measures predominantly focus on the fourth feature, observing situational manifestations (Brophy-Herb et al., 2023; Camoirano, 2017). This distinction is important given the context- and relationship-specific nature of parental mentalizing, which is influenced by stress and varying circumstances (Luyten et al., 2020). Consequently, substantial stability in parental mentalizing may coexist with significant fluctuations across time and situations.

Hence, an important empirical question is whether offline and online measures tap into parental mentalizing as an overarching construct, and whether they are related to each

other. In this regard, a competence-performance gap has been hypothesized between offline and online measures of parental mentalizing (Barreto et al., 2016). Although some concordance might be expected, the capacity for parental mentalizing itself and the capacity to actively use this capacity when interacting with the child are not necessarily highly correlated (e.g., in many contexts parents probably do not actively rely on this capacity when interacting with their child). By contrast, impairments in offline parental mentalizing can be expected to predict impairments in online parental mentalizing, as it is difficult to imagine that parents whose mentalizing is poor would be able to effectively reflect on their child's mind in specific situations. Notably, although offline and online measures of parental mentalizing are embedded in rich research traditions exploring associations with developmental outcomes, these research traditions remain somewhat isolated.

This study aims to investigate the relationships among measures that have originated within two key research traditions in this area, namely considerations concerning the role of parental reflective functioning (PRF; Luyten et al., 2017) on the one hand, and maternal mind-mindedness (MMM; Meins et al., 2003) on the other. Specifically, we focus on PRF as measured with the Parental Reflective Functioning Questionnaire (PRFQ; Luyten et al., 2009; Luyten et al., 2017) and MMM as assessed based on play observations in a sample of 72 mothers and their child aged between 0 and 36 months. Whereas the PRFQ is considered an offline measure of parental mentalizing, MMM is often assessed online, that is, based on an actual parent–child play interaction (Brophy-Herb et al., 2023; Camoirano, 2017; Medrea & Benga, 2021). In addition, we investigated the associations between these two measures of parental mentalizing and emotional availability (EA) as an index of maternal sensitivity. First, we review the concept of parental mentalizing, including the different measurement methods that have been developed over the past two decades. Next, we summarize the available empirical evidence concerning associations among parental mentalizing and parental sensitivity. Finally, we summarize the present study's hypotheses.

Parental Mentalizing as an Umbrella Concept

As noted above, parental mentalizing may be best considered as an umbrella concept. Meins and colleagues coined the concept of *maternal mind-mindedness* (MMM; Meins & Fernyhough, 2010; Meins et al., 2003), which refers to the proclivity of mothers to treat their infant as an individual with a mind, rather than merely as an infant with needs that must be satisfied. Mothers with high levels of MMM are proposed to recognize that

their child has feelings, thoughts, and intentions of their own and are able to connect mental states to behavior in the child and in themselves (Meins et al., 1998), both of which are considered crucial features of parental mentalizing. MMM can be measured both offline, based on the proportion of mental-state words used by parents when describing their child in an interview (Meins et al., 1998), and online, as observed during free-play interactions (Meins et al., 2001). The observer-rated online assessment is the best-known measure of MMM, and was originally designed for infants aged between 6 and 12 months. Specifically, it is operationalized in terms of the mother's tendency to comment on the infant's putative internal states during free-play interactions. In this context, Meins and colleagues have introduced an important distinction between so-called *appropriate* and *non-attuned* mind-mindedness (Arnott & Meins, 2007). Mothers' mind-related comments are coded appropriate if they seem to read the infant's emotion or state of mind accurately (i.e., appropriate mind-related comments; AMRCs), or non-attuned if they tend to misread the infant's internal mental states (i.e., non-attuned mind-related comments; NAMRCs).

Research focusing on the concept of *parental reflective functioning* (PRF) originated in a slightly different research tradition. PRF refers to the capacity of parents to understand their own and their child's behavior in terms of underlying thoughts, feelings, and desires (Slade, 2005, 2023), and is rooted in attachment research (Fonagy et al., 1991) and research concerning the intergenerational transmission of attachment specifically (for a meta-analysis, see Zeegers et al., 2017). Various assessment methods have been developed within this research tradition, including offline representational measures, such as interviews and questionnaires. In interviews, PRF is often scored using the Reflective Functioning Scale (RFS; Fonagy et al., 1998) to categorize the quality of a parent's capacity for PRF. The Parental Reflective Functioning Questionnaire (PRFQ; Luyten et al., 2009; Luyten et al., 2017) is a well-validated questionnaire-based measure of PRF. The PRFQ comprises three subscales that assess three key dimensions of PRF, namely (1) prementalizing modes (PM), referring to the parent's capacity to accurately envision their child in terms of internal mental states and to understand the child's behavior in terms of underlying mental states and intentions; (2) certainty of mental states (CMS), referring to the importance of a not-knowing stance in understanding their child's mind and the recognition that mental states are opaque; and (3) interest and curiosity in the child's mental states (IC), referring to the parent's tendency to show genuine interest in the mental states of their child.

Notwithstanding the theoretical overlap between MMM and PRF, only a few studies have investigated associations between these constructs and measures. AMRCs have been positively related to parental embodied mentalizing (Gagné et al., 2021) and representational PRF as measured by the RFS on the Working Model of the Child Interview (RFS-WMCI; Benoit et al., 1997; Rosenblum et al., 2008; Zeanah et al., 1996). Similarly, Brophy-Herb et al. (2023) investigated both concurrent and longitudinal associations between representational PRF as measured by the RFS on the Parent Development Interview (RFS-PDI; Aber et al., 1985; Slade, Aber, et al., 2004; Slade, Bernbach, et al., 2004; Slade et al., 2007) and online MMM. Concurrent associations were found only when the infant was 12 months old, not when they were 3 or 6 months old. Longitudinal cross-lagged associations indicated that RFS-PDI at baseline predicted both AMRCs and NAMRCs 3 months later, but not 6 months later. However, another study (Dollberg, 2022) reported no significant relationship between online MMM and PRF as measured by the RFS-PDI. Only two studies have investigated associations between PRFQ dimensions and MMM; one study reported no significant association between PM and MMM in mothers of infants (Krink & Ramsauer, 2021), whereas the other study found a significant positive association between IC and mental-state language in mothers of toddlers (Smith-Nielsen et al., 2024). However, these studies included different subscales of the PRFQ, used different coding schemes to assess MMM, and were conducted in different samples concerning child age and risk status, making it difficult to compare their findings. Hence, more research is needed in this area.

Parental Mentalizing and Parental Sensitivity

Maternal sensitivity refers to the ability to accurately perceive and interpret one's child's behavioral cues, and to respond to them promptly and appropriately (Ainsworth & Bell, 1970; Ainsworth et al., 1972). *Emotional availability* (EA), as an index of parental sensitivity, similarly refers to the parent's receptiveness to their infant's mental states and the capacity to adequately interpret and respond to the communicative cues of the infant, shown as sensitivity, structuring, non-intrusiveness, and non-hostility. Further, EA also refers to child features, such as the infant's ability to express their feelings, needs, and desires (Vliegen et al., 2009).

Theoretically, it can be assumed that both MMM and PRF are associated with higher levels of EA. For example, maternal sensitivity has been explored extensively in relation to

the intergenerational transmission of attachment. However, studies estimate that it accounts for only 23% of the variance in the association between maternal attachment representations and infant attachment (van Ijzendoorn, 1995; Zeegers et al., 2017). Similarly, EA is associated in theoretically predicted ways with maternal attachment representations, infant attachment, and aspects of child development (Vliegen et al., 2009) but, again, these relationships are not very strong. Therefore, the notion of MMM was developed in an attempt to better capture the psychological processes involved in the development of attachment security (McMahon & Bernier, 2017). Similarly, PRF has also been hypothesized to play an important role in the intergenerational transmission of attachment. To date, the contributions of both PRF and MMM to this so-called transmission gap have been well established (Arnott & Meins, 2007; Fonagy et al., 1991; Grienenberger et al., 2005; Meins et al., 2012; Meins et al., 2001; Meins et al., 2002; Riva Crugnola et al., 2018; Sharp et al., 2006; Slade, 2005; Slade et al., 2005; van Ijzendoorn, 1995; Verhage et al., 2016; Zeegers et al., 2017). Yet, as noted, associations are typically small, and few studies have investigated associations between PRF and MMM.

Similarly, there have been only a few studies on the relationship between different operationalizations of parental mentalizing and parental sensitivity, with findings in this area typically being somewhat inconsistent. For instance, in one study that used the PRFQ, PM was negatively related to self-reported parent (i.e., non-hostility), dyad (i.e., mutual attunement and affect quality), and child (i.e., child involvement) EA. In addition, CMS was positively related to parent (i.e., non-hostility and intrusiveness) and dyad (i.e., mutual attunement and affect quality) EA, whereas IC was found to be positively associated with child EA (i.e., child involvement) and slightly negatively with parent EA (i.e., non-intrusiveness) (Luyten et al., 2017). In another study, PRF was also positively related to self-reported EA (parent and dyad EA combined) in mothers, but not in fathers (Salo et al., 2021). With regard to MMM, studies have shown that observer-rated EA scales were negatively related to NAMRCs but not to AMRCs, and only in adult (and not adolescent) mothers (McMahon & Newey, 2018; Riva Crugnola et al., 2018). However, another study did find significant associations between AMRCs and both maternal sensitivity (Dollberg, 2022; Gagné et al., 2021) and dyadic reciprocity (Dollberg, 2022). Furthermore, offline MMM has been shown to be positively related to observer-rated EA (i.e., non-hostility and sensitivity) (Lok & McMahon, 2006; McMahon & Meins, 2012; Meins et al., 2012), although further analysis showed that the relationship between offline MMM and “non-

hostility" was mediated through reported parenting stress (McMahon & Meins, 2012). MMM was thus not directly related to "non-hostility", suggesting a loose coupling between offline MMM and observer-rated EA. Finally, associations between online MMM and self-reported EA have not yet been investigated.

In the context of these mixed findings, some researchers have questioned the validity of MMM for predicting developmental trajectories, arguing that other factors might better account for the observed associations between MMM and developmental outcomes (Aldrich et al., 2021). In this regard, a recent meta-analysis suggested that exploring the potential moderating role of confounding variables such as parent characteristics (i.e., parental age and socioeconomic status [SES]) and child factors (i.e., child age, executive function, language abilities, and social cognition) is crucial for understanding the relationship between MMM and developmental outcomes, as these variables could influence these associations (Aldrich et al., 2021). Although studies investigating the links between MMM and developmental outcomes often control for the above-mentioned factors, their potential role as moderators in these relationships have rarely been examined (Aldrich et al., 2021). Moreover, studies that did include these variables (i.e., SES) as moderators have yielded mixed results (Silletti et al., 2022).

The Present Study

This study investigated relationships among PRF, MMM, and EA in a sample of 72 mothers and their infants. Based on the literature reviewed above, we first expected to find significant cross-sectional associations among PRFQ dimensions and EA-SR scales. Specifically, we expected PM to be negatively related to indices of EA. In contrast, we expected CMS and IC to be positively related to EA scales.

Second, we expected both IC and CMS assessed at Time 1 (T1; when children were on average 17.65 months old) to be prospectively related to higher levels of AMRCs assessed at Time 2 (T2; on average 6.46 months later), whereas PM at T1 was expected to be prospectively related to higher levels of NAMRCs and lower levels of AMRCs at T2. Indeed, if parents can understand their child's behavior in terms of mental states—that is, show interest in the child's mind (IC) and have some degree of certainty about what they think the child wants or needs (CMS)—they can also be expected to be more likely to make appropriate mind-related comments. Similarly, high levels of PM can be expected to be associated with higher levels of NAMRCs and lower levels of AMRCs. We expected

associations to be stronger for PM than for IC and CMS, consistent with other studies reporting that the influence of PM on developmental outcomes is typically greater than that of CMS and IC (e.g., Krink et al., 2018; Luyten et al., 2017; Rostad & Whitaker, 2016; Rutherford et al., 2015; Salo et al., 2021).

Furthermore, EA-SR scales at T1 were expected to be significantly associated with NAMRCs but not AMRCs at T2. This would be congruent with current studies investigating associations between online MMM and observer-rated EA (McMahon & Newey, 2018; Riva Crugnola et al., 2018) and the assumption that there is a loose coupling between MMM and EA. Moreover, and in line with the above hypotheses, we expected EA to be a mediating or intervening variable in the relationship between PM and NAMRCs.

Finally, potential moderation effects of variables that have been shown to be related to MMM in other studies (i.e., maternal age, maternal SES, child age, child sex, and child language abilities) were tested when investigating associations with NAMRCs and AMRCs, as appropriate (Aldrich et al., 2021).

Method

Participants and Procedures

The sample consisted of 72 Dutch-speaking mothers of a biological child aged 0 to 36 months. Eligible mother–child pairs were recruited through several daycare centers across Belgium and invited to participate in a study on parenting. Participation was entirely voluntary, and confidentiality was guaranteed. Mothers who agreed to participate provided written informed consent, and were then asked to complete a booklet of questionnaires. Next, the mother–child pairs were invited to participate in the second part of the study. During this part of the study, MMM was measured through observation of a 20-minute free-play session. The study was approved by the Ethics Committee of the university.

At T1, the mean age of the mothers was 31.03 years (*SD* = 4.91; range 19–42). The majority of mothers had Belgian nationality (98.6%), had attained higher education (81.9%), and were employed (79.2%). On average, the mothers with a job worked 35.06 hours (*SD* = 9.85) and 4.72 days (*SD* = 0.68) per week. Sixty-five mothers (90.28%) indicated that they had a partner relationship, of whom 89.23% were married to or living with their partner. The average relationship duration for those with a partner was 102.47 months (*SD* = 52.61). The children were a mean 17.65 months of age (*SD* = 7.77; range 2–33) and comprised 37 girls (51.4%) and 35 boys (48.6%). The majority of the infants had

Belgian nationality (98.6%). Mothers of boys and girls did not differ significantly in terms of maternal age, educational level, or working status. In addition, there were no significant differences between boys and girls in terms of mean age.

At T2, the children were a mean 24.11 months of age (*SD* = 7.34; range 7–36). The duration between questionnaire assessments and the free-play observation was on average 6.46 months (*SD* = 4.64; range 1–23). Further, in terms of their use of language, 35 children were coded as non-verbal and 37 as verbal. The mean age of pre-verbal and verbal children during the free-play observation was 18.40 months (*SD* = 5.12; range 7–32) and 29.51 months (*SD* = 4.45; range 21–36), respectively.

Measures

Parental reflective functioning (PRF) was assessed with the Parental Reflective Functioning Questionnaire (PRFQ; Luyten et al., 2009; Luyten et al., 2017), an 18-item self-report questionnaire scored on a 7-point Likert scale. The PRFQ includes three subscales: *prementalizing modes* (PM), with six items that assess modes of thinking that reflect the repudiation of or defense against mentalizing, characterized by the parent's tendency to make malevolent attributions about his/her child (e.g., "My child sometimes gets sick to keep me from doing what I want to do"); *certainty about mental states* (CMS), with six items that refer to the parent's (in)ability to recognize that mental states are inherently opaque, ranging from being overly uncertain to overly certain about the mental states of the child (e.g., "I always know what my child wants"); and *interest and curiosity in mental states* (IC), with six items reflecting genuine interest and curiosity in the mental states of the child (e.g., "I am often curious to find out how my child feels"). Adequate PRF is indicated by low PM and medium to high CMS and IC. Distorted PRF is indicated by high PM and extremely low (i.e., scores 1 and 2) or extremely high (i.e., scores 6 and 7) CMS and IC. Several studies have supported the reliability and validity of the PRFQ (e.g., Luyten et al., 2017; Roo et al., 2019; Wendelboe et al., 2021). In the present study, Cronbach's alphas for PM, CMS, and IC were .64, .86, and .69, respectively.

Maternal mind-mindedness (MMM) was measured by coding a 20-minute free-play observation, using the Mind-Mindedness Coding Manual (Meins & Fernyhough, 2010). MMM is operationalized in terms of the mother's tendency to make appropriate versus non-attuned comments on the infant's putative internal states during the online interactions during the free-play session. A mother's mind-related comment is coded as appropriate if

she seems to read the infant's emotion or state of mind correctly (i.e., an AMRC) or non-attuned if the mother appears to misread the infant's internal states (i.e., an NAMRC). To control for differences in mothers' verbosity, the scores for appropriate and non-attuned mind-related comments are expressed as a proportion of the total number of comments made by the mother. This online measure of MMM was originally developed for infants aged between 6 and 12 months. In the current study we extended the age range to 36 months. To control for child verbosity, children were coded on linguistic development (0 = pre-verbal; 1 = child uses language (words) to communicate).

The quality of the mother–child relationship with regard to *emotional availability* (EA) was measured using the Emotional Availability – Self-Report questionnaire (EA-SR; Biringen et al., 2002) as an index of parental sensitivity. In this 32-item self-report questionnaire, parents are asked to indicate, on a 5-point Likert scale ranging from 1 ("I totally disagree") to 5 ("I totally agree"), to what extent the items describe their relationship with their child. The 32 items pertain to three scales and five domains or subscales. The first scale is dyadic EA, which refers to mutual emotional availability between parent and child, and consists of two subscales: *mutual attunement* (10 items; e.g., "I succeed in adjusting to my child's behaviors and actions when necessary") and *affect quality* (five items; e.g., "My child clearly enjoys being with me"). The second scale is child EA and refers to the child's capacity to involve the parent, termed *involvement* (nine items; e.g., "My child is able to get my attention for his/her play"). The third scale is parent EA, referring to parental emotional availability based on *non-intrusiveness* (six reverse-scored items; e.g., "I find it hard to see my child playing on his own") and *non-hostility* (six reverse-scored items; e.g., "It happens that I shout at my child to make something clear"). In our analyses, we used the dyadic, child, and parent EA scales, as well as the EA subscales. Higher scores on these scales reflect higher emotional availability in the respective domains. The reliability and validity of this questionnaire have been supported, and the EA-SR scales have been shown to correlate substantially with corresponding observer-rated emotional availability scales, except for the intrusiveness subscale (Vliegen et al., 2009). In the present study, the Cronbach's alphas for dyadic, child, and parent EA were .76, .82, and .73, respectively.

Data Analyses

All analyses were conducted using JASP version 17. Descriptive statistics were calculated to describe the sample and to identify confounding variables (i.e., maternal age,

child age, maternal educational levels, child sex, child verbosity, and length of time between T1 and T2). Second, we computed partial correlations between PRF and EA, controlling for covariates, followed by a series of hierarchical multiple regression analyses (HMRAs). Next, we calculated partial correlations between PRF and MMM, and between EA and MMM, controlling for covariates. Significant correlations were followed-up by a series of HMRAs to determine the unique proportion of variance explained by the predictor variables (i.e., PRF dimensions or EA, and confounders) on the dependent variable (i.e., MMM), including potential interaction effects.

For the moderation analyses, all variables were mean-centered and entered sequentially as follows: (1) covariates (e.g., child age and sex); (2) independent and moderating variables (e.g., PM and language); (3) the interaction term between independent and moderating variables. Significant moderation effects were indicated by significant standardized regression coefficients and significant changes in R^2 for the interaction term (Aiken & West, 1991). We plotted a simple slope for the association between low and high (one standard deviation below and above the mean, respectively) levels of the predictor variable (e.g., PM) and the dependent variable (e.g., non-attuned MMM) for low and high levels of the moderator (e.g., pre-verbal or verbal language development) (see www.jeremydawson.co.uk/slopes.htm). For each regression model, we calculated Cohen's f^2 as a measure of the effect size (Cohen, 1992).

To further explore the relationships among PRF, EA, and MMM we used (conditional) process modeling to test for (moderated) mediation (Hayes, 2015; Preacher et al., 2007) using the corresponding PROCESS macro in JASP. To facilitate interpretation of the results, variables were centered around the sample grand mean. The bootstrapping procedure (5000 samples) that provides delta method standard errors and bias-corrected percentile bootstrap confidence intervals (95 % CIs) was used. To determine whether there was a significant (moderated) mediation effect, we examined whether the CI of the indirect effect for mediation and/or the moderated mediation index included zero. In case of moderated mediation, the significance of conditional indirect effects for high and low levels of the moderator were examined. Only significant and final models are presented in the Results.

Results

Descriptive Statistics

Pearson's correlations between the mothers' demographic features (working hours, working days, and duration of relationship, living together, and marriage) on the one hand, and PRF dimensions, EA, and MMM on the other, showed no significant associations except for a significantly negative association between duration of living together and IC ($r = –.321$, $p < .05$). Maternal age was significantly negatively associated with PM ($r = –.284$, $p < .05$), and positively associated with child EA ($r = .253$, $p < .05$) and dyadic EA ($r = .270$, $p < .05$). Furthermore, at T1, child age was significantly negatively associated with and IC ($r = –.275$, $p < .05$) and parent EA ($r = –.331$, $p < .01$), and positively associated with child EA ($r = .501$, $p < .001$). At T2, there was a significant negative relationship between child age and both AMRCs ($r = –.318$, $p < .01$) and NAMRCs ($r = –.314$, $p < .01$).

Further, independent-samples *t*-tests showed that PM was significantly higher in mothers with lower levels of education (only primary and secondary education; $M = 2.087$, $SD = 0.913$) compared with mothers who had completed higher education (graduate school and university; $M = 1.447$, $SD = 0.438$) ($t(70) = 3.805$, $p < .001$), but did not reveal significant differences between lower and higher maternal educational levels in maternal EA, MMM, or the other PRF dimensions (i.e., CMS and IC). In addition, a series of one-way analyses of variance showed no significant differences in maternal working status (classified as unemployed, laborer, white-collar worker, self-employed, or other) with regard to maternal PRF dimensions, EA scales, or MMM.

Next, we conducted independent-samples *t*-tests, which showed that NAMRCs were significantly more frequent in mothers of boys ($M = .006$, $SD = .008$) compared with mothers of girls ($M = .003$, $SD = .005$) ($t(70) = 2.217$, $p < .05$). There were no significant child sex differences in PRF dimensions, EA scales, and AMRCs. Finally, independent-samples *t*-tests revealed significant differences in AMRCs ($t(70) = 2.869$, $p < .01$) and NAMRCs ($t(70) = 4.156$, $p < .001$) depending on the level of language development of the child. More specifically, mothers produced more AMRCs ($M = 0.113$, $SD = 0.052$) and NAMRCs ($M = 0.007$, $SD = 0.008$) when the child's communication was primarily pre-verbal compared with primarily verbal ($M = 0.079$, $SD = 0.046$ for AMRCs; $M = 0.001$, $SD = 0.003$ for NAMRCs).

Based on these results, cross-sectional analyses among PRF and EA were controlled for maternal age, child age, and maternal level of education, whereas prospective analyses

with MMM were controlled for child age, child sex, child verbosity, and length of time between T1 and T2 assessments of PRF and MMM.

Cross-Sectional Associations Among PRF and EA

First, partial correlations among PRF and EA (Table 1) were largely in line with our expectations, but there were also some unexpected findings. PM was negatively associated with child EA (r = –.279, p < .05) and dyad EA (r = –.487, p < .001), but not with parent EA. CMS was significantly positively associated with parent EA (r = .293, p < .05) and dyad EA (r = .470, p < .001), but not with child EA. No significant associations were found between IC and EA.

Table 1

Partial Correlations Among Dimensions of PRF and EA Scales (N = 72)

	1	2	3	4	5	6
1. PM	–					
2. CMS	–.178	–				
3. IC	.096	–.129	–			
4. Parent EA	–.100	.293*	–.182	–		
5. Child EA	–.279*	.178	.210	.022	–	
6. Dyad EA	–.487***	.470***	.005	.528***	.325**	–

Note: Controlled for child age, maternal age, and maternal educational level. PRF = parental reflective functioning. PM = prementalizing modes. CMS = certainty about mental states. IC = interest and curiosity about mental states. EA = emotional availability.
*p < .05, **p < .01, ***p < .001.

Looking at the EA subscales in detail (Table 2), PM was, as expected, negatively correlated with mutual attunement (r = –.393, p < .001), child involvement (r = –.279, p < .05), and affect quality (r = –.443, p < .001). Against our expectations, PM was not significantly associated with intrusiveness and hostility. CMS was highly positively correlated with mutual attunement (r = .533, p < .001), and highly negatively correlated with hostility (r = –.435, p < .001). However, we did not find significant associations with child involvement, affect quality, or intrusiveness. Finally, results showed that IC was

significantly positively correlated with intrusiveness (r = .269, p < .05) but showed no association with the other EA subscales.

Table 2

Partial Correlations Among Dimensions of PRF and EA Subscales (N = 72)

	1	2	3	4	5	6	7	8
1. PM	–							
2. CMS	–.178	–						
3. IC	.096	–.129	–					
4. Mut. Att.	–.393***	.533***	–.047	–				
5. Child Inv.	–.279*	.178	.210	.229	–			
6. Aff. Quality	–.443***	.113	.107	.336**	.362**	–		
7. Intrusiveness	.013	.186	.269	.026	.237	–.022	–	
8. Hostility	.105	–.435***	.046	–.681	–.169	–.145	–.079	–

Note: Controlled for child age, maternal age, and maternal educational level. PRF = parental reflective functioning. EA = emotional availability. PM = prementalizing modes. CMS = certainty about mental states. IC = interest and curiosity about mental states. Mut. Att. = Mutual Attunement. Child Inv. = Child Involvement. Aff. Quality = Affect Quality.
*p < .05, **p < .01, ***p < .001.

Subsequent HMRAs (see Tables S1–S5 in Supplementary Materials) confirmed these associations. Mutual attunement (see Table S1) was best predicted by the combination of maternal age (β = .216, p = .032), PM (β = –.328, p = .001), and CMS (β = .451, p < .001), which explained 48% of the variance and represented a very large effect (Model 2: R^2 = .475, $F(5,65)$ = 11.763, p < .001, Cohen's f^2 = .905). Affect quality (see Table S2) was best predicted by PM (β = –.460, p < .001), which explained 29% of the variance and represented a large effect (Model 2: R^2 = .287, $F(5,65)$ = 5.228, p < .001, Cohen's f^2 = .403). Child involvement (see Table S3) was best predicted by the combination of child age (β = .529, p < .001), PM (β = –.224, p = .043), and IC (β = .220, p = .039), which explained 34% of the variance and represented a very large effect (Model 2: R^2 = .343, $F(5,65)$ = 6.774, p < .001, Cohen's f^2 = .522). Intrusiveness (see Table S4) was best predicted by the combination of CMS (β = .231, p = .049) and IC (β = .301, p = .012), which explained 17% of the variance and represented a medium effect (Model 2: R^2 = .174, $F(5,65)$ = 2.730, p <

.05, Cohen's f^2 = .210). Finally, hostility was best predicted by the combination of maternal age (β = –.258, p = .014), child age (β = .508, p < .001), and CMS (β = –.369, p < .001), which explained 44% of the variance and represented a very large effect (Model 2: R^2 = .436, $F(5,65)$ = 10.052, p < .001, Cohen's f^2 = .773). Post-hoc analyses showed non-significant interaction effects of maternal age and child age, excluding maternal age and child age as potential moderators in the association between PRF dimensions and EA subscales.

Prospective Associations Among EA and MMM

Partial correlations among EA scales and MMM (see Table 3) and among EA subscales and MMM (see Table 4) were computed. Against our expectations, there were no significant correlations between EA (sub)scales and MMM.

Table 3

Partial Correlations Among EA Scales and MMM (N = 72)

	1	2	3	4	5
1. AMRCs	–				
2. NAMRCs	.198	–			
3. Parent EA	.180	–.038	–		
4. Child EA	.029	–.006	.031	–	
5. Dyad EA	.189	.018	.496***	.367**	–

Note: Controlled for child age, child sex, child verbosity, and length of time between T1 and T2. EA = emotional availability. MMM = maternal mind-mindedness. AMRCs = Appropriate mind-related comments. NAMRCs = Non-attuned mind-related comments.
*p < .05, **p < .01, ***p < .001.

Table 4

Partial Correlations Among EA Subscales and MMM (N = 72)

	1	2	3	4	5	6	7
1. AMRCs	–						
2. NAMRCs	.198	–					
3. Mut. Att.	.150	–.018	–				
4. Child Inv.	.029	–.006	.255*	–			
5. Aff. Quality	.175	.083	.328**	.415***	–		
6. Intrusiveness	-.200	.012	.045	.204	–.026	–	
7. Hostility	-.079	.032	–.663***	–.156	–.089	–.105	–

Note: Controlled for child age, child sex, child verbosity, and length of time between T1 and T2. EA = emotional availability. MMM = maternal mind-mindedness. AMRCs = Appropriate mind-related comments. NAMRCs = Non-attuned mind-related comments. Mut. Att. = Mutual Attunement. Child Inv. = Child Involvement. Aff. Quality = Affect Quality.

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

Prospective Associations Among PRF and MMM

The partial correlations among offline PRF and online MMM are displayed in Table 5. In line with expectations, results showed that PM was significantly positively associated with NAMRCs ($r = .266$, $p < .05$), whereas, in contrast to expectations, we did not find significant associations among IC, CMS, and AMRCs.

Furthermore, we found a significant moderation effect for child use of language in the relationship between PM and NAMRCs in the HMRA (see Table 6), indicating that NAMRCs were best predicted by PM ($\beta = .333$, $p = .002$), child verbosity ($\beta = –.445$, $p = .004$), and the interaction between PM and child verbosity ($\beta = –.299$, $p = .005$), which explained 41% of the variance and represented a very large effect (Model 3: $R^2 = .408$, $F(6,65) = 7.473$, $p < .001$, Cohen's $f^2 = .689$). The significant two-way interaction is plotted in Figure 1, showing that high levels of PM are associated with higher levels of non-attuned MMM, but only in pre-verbal children ($t(72) = 2.568$, $p < .05$).

Table 5

Partial Correlations Among Dimensions of PRF and MMM (N = 72)

	1	2	3	4	5
1. PM	–				
2. CMS	–.133	–			
3. IC	.080	–.113	–		
4. AMRCs	.033	–.057	.041	–	
5. NAMRCs	.266*	.133	–.048	.198	–

Note: Controlled for child age, child sex, child verbosity, and length of time between T1 and T2. PRF = parental reflective functioning. PM = prementalizing modes. CMS = certainty about mental states. IC = interest and curiosity about mental states. MMM = maternal mind-mindedness. AMRCs = Appropriate mind-related comments. NAMRCs = Non-attuned mind-related comments.

*p < .05, **p < .01, ***p < .001.

Table 6

Hierarchical Multiple Regression Analysis for the Interaction of Language and PM in Predicting Non-Attuned MMM

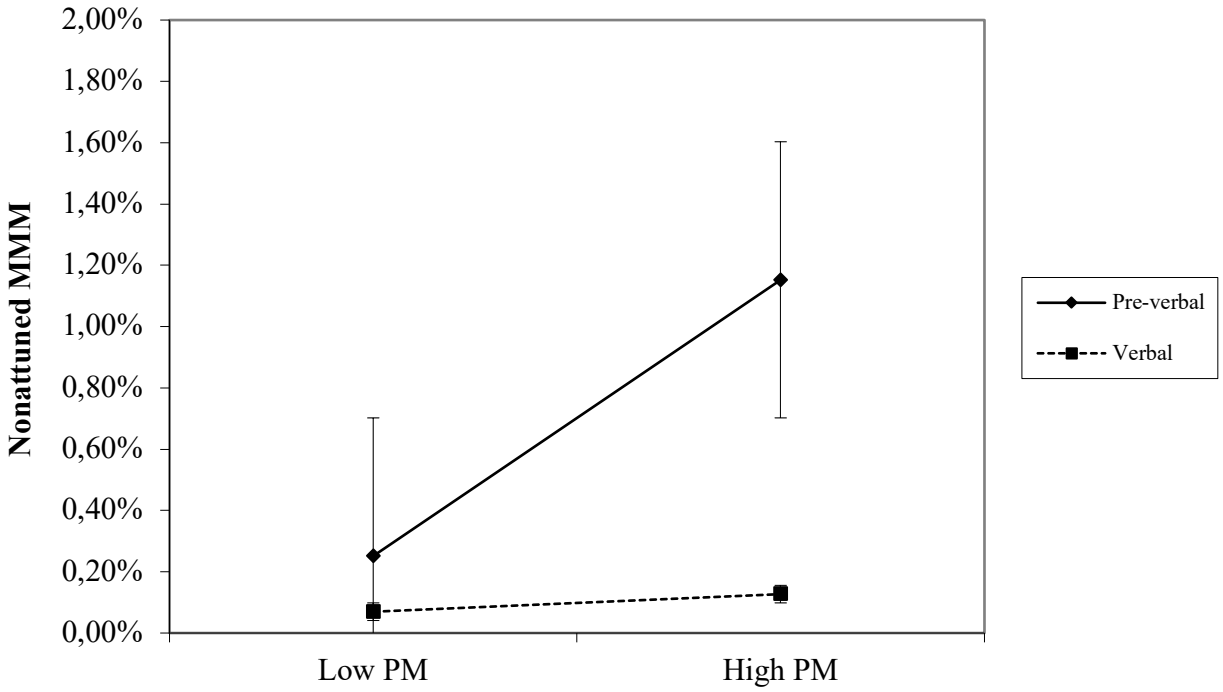
	Model 1			Model 2			Model 3		
	b	SE_b	β	*b*	SE_b	β	*b*	SE_b	β
Child Age	.000	.000	–.343**	.000	.000	–.024	.000	.000	–.040
Child Sex	–.003	.001	–.266*	–.003	.001	–.231*	–.002	.001	–.153
Length of time T1-T2	.000	.000	.083	.000	.000	.080	.000	.000	.066
Child Language				–.006	.002	–.452**	–.006	.002	–.445**
PM				.003	.001	.259*	.004	.001	.333**
Language × PM							–.007	.002	–.299**
F (*df*)	4.888** (3,68)			6.491*** (5,66)			7.473*** (6,65)		
Δ*F*	4.888**			7.495**			8.632**		
R^2	.177			.330			.408		
ΔR^2	.177			.152			.079		

Note. All variables were centered at their means. MMM = Mind-mindedness; PM = pre-mentalizing modes.

N = 72; * *p*< .05, ** *p* < .01, *** *p* < .001.

Figure 1

Moderation Effect of Child's Use of Language in the Relationship Between PM and Non-Attuned MMM



Note. MMM = Mind-mindedness; PM = pre-mentalizing modes. The low and high values reflect 1 *SD* below and above the mean. Bars indicate 95% confidence interval.

Mediation Analyses

The correlational results rejected the hypothesis of EA as a potential mediator in the relationship between PRF and MMM.

Discussion

In this study, we examined the relationship between different conceptualizations of parental mentalizing by investigating associations among PRF as assessed by a self-report measure (the PRFQ dimensions as an "offline" measure of parental mentalizing) and MMM, an "online" measure of parental mentalizing that aims to capture a mother's tendency to reflect on their child's mind during a free-play interaction. In addition, we examined associations between these two measures of parental mentalizing and self-reported EA as an index of parental sensitivity.

First, we investigated cross-sectional associations among PRFQ dimensions and EA-SR scales. In line with expectations, we found the strongest relationships between pre-mentalizing modes (i.e., PM) and the EA-SR subscales, showing that making more maladaptive attributions about the child's mind (i.e., high PM) was associated with less child involvement, mutual attunement, and affect quality. Furthermore, mothers who were more certain about their child's mind (i.e., had higher levels of CMS) tended to be more attuned to the child's (difficult) behavior (i.e., mutual attunement) and reported less hostility towards the child. Yet, there were also some unexpected results. For instance, CMS was unrelated to affect quality, non-intrusiveness, or child involvement. Similarly, IC was unrelated to EA, with one exception: mothers who showed higher interest and curiosity in their child's mind tended to be more intrusive towards the child. Hence, these findings indicate that there is no one-to-one relationship between features of more effective PRF and EA. Moreover, our findings indicate that high levels of IC might be associated with intrusive mentalizing or hypermentalizing, in line with findings from other studies (Luyten et al., 2017; Nijssens et al., 2021). Furthermore, and against expectations, we found no significant associations between PM and self-reported hostility and intrusiveness, although this might also be due to reporting bias of mothers with high levels of PM. More research using observer-rated EA is needed to further explore these findings.

Second, we investigated associations between EA-SR and MMM. To the best of our knowledge, associations between self-reported EA and online MMM have not yet been investigated. In this study, EA-SR and MMM were unrelated. The non-significant associations between self-reported EA and appropriate mind-related comments (i.e., AMRCs) align with previous studies reporting no association between online measures of EA and appropriate MMM (McMahon & Newey, 2018; Riva Crugnola et al., 2018). Against our theoretical expectations, however, associations between EA and non-attuned mind-related comments (i.e., NAMRCs) were also non-significant. In line with these findings, a recent meta-analysis suggested that non-attuned MMM may be unrelated to children's developmental capacities, and might not be negatively related, as is often hypothesized (Aldrich et al., 2021). Hence, non-attuned MMM might not necessarily impede developmental or psychological outcomes. These findings regarding the conceptualization of MMM, and parental mentalizing more generally, are important. Yet, further replication of these findings in at-risk samples is needed before more substantial conclusions can be drawn, as the number of NAMRCs was relatively low in this sample. Moreover, these

findings could also provide further support to the hypothesis of a competence–performance gap (Barreto et al., 2016). More research is needed in this context.

The hypothesis of a loose coupling between different operationalizations of parental mentalizing and related constructs is further strengthened by our findings on the prospective associations between PRF and MMM, which showed a strong association between PM and NAMRCs (both of which are considered indices of maladaptive parental mentalizing), but no significant associations between more adaptative features of parental mentalizing (i.e., IC, CMS, and AMRCs). MMM specifically captures the extent to which the mother spontaneously refers to mental states while interacting with their child (Rosenblum et al., 2008), and is therefore substantially different from the mother's cognitive capacity to recognize and attribute mental states (McMahon & Bernier, 2017). In other words, the capacity of mothers to understand their child's behavior in terms of mental states does not necessarily translate into a tendency to invoke these mental states when interacting with their child. Hence, mothers may have robust mentalizing capacities (i.e., medium to high levels of IC and CMS) but they might vary substantially in their spontaneous and appropriate use of explicit mentalizing within a relational context. Furthermore, these findings are congruent with other studies showing a more prominent role for ineffective and maladaptive parental mentalizing in children's developmental outcomes. The predictive value of maladaptive parental mentalizing in particular has been previously found for PM (e.g., Krink et al., 2018; Luyten et al., 2017; Rostad & Whitaker, 2016; Rutherford et al., 2015; Salo et al., 2021) and for NAMRCs (e.g., Colonnesi et al., 2017; McMahon & Newey, 2018; McMahon & Bernier, 2017; Meins, 2013; Meins et al., 2018; Meins et al., 2013; Meins et al., 2012). Hence, these results provide further evidence for the view that both PM and non-attuned MMM reflect a parental stance of misattunement and inaccuracy in estimating what the child thinks, feels, or desires.

Furthermore, results of this study showed that children's language capacity was an important moderator in the relationship between PM and NAMRCs, whereas there was no evidence for moderation effects of other sample characteristics (i.e., maternal age, SES, child age, and child sex). Specifically, the tendency of mothers to attribute malevolent mental states to their child was highly associated with their making NAMRCs, but only with children who were pre-verbal (i.e., those who did not use verbal language to express themselves during the free-play session). In line with these findings, several other studies have found associations between MMM and children's language development (for an

overview, see McMahon & Bernier, 2017; Medrea & Benga, 2021). For example, AMRCs have been found to prospectively promote children's expressive (Costantini et al., 2017; Laranjo & Bernier, 2012; Longobardi et al., 2018) and receptive (Meins et al., 2013) language skills, as well as their reading performance (Meins et al., 2019). Lundy and Fyfe (2016) found positive concurrent associations between both online and offline MMM and the child's use of mind-related comments. In contrast, Nyberg et al. (2021) found no significant associations among AMRCs and concurrent and subsequent language development. However, the majority of these studies investigated only appropriate MMM and subsequent language capacities, and none of them examined the opposite influence of children's language skills on the tendency of mothers to be more or less attuned in their mind-related comments.

Hence, these findings help us understand the mixed findings regarding associations with non-attuned MMM. McMahon and Bernier (2017) emphasized, for example, that non-attuned MMM is rarely discussed in published research, most likely because most parents infrequently make NAMRCs. Average proportional scores of NAMRCs were estimated at around 1.5% (McMahon & Bernier, 2017; Meins et al., 2012) in community samples and around 2.5% in clinical samples or samples otherwise at risk for emotional, developmental, or social difficulties (Marcoux et al., 2017; McMahon & Bernier, 2017; Meins et al., 2012). It was suggested that, especially in the latter groups, even a small number of NAMRCs might be meaningful. In our study, the average proportion of NAMRCs was 0.4% (versus 9.5% for AMRCs). Nevertheless, despite this extremely small frequency of NAMRCs, the clinical significance of non-attuned MMM in relation to PM was clearly illustrated in this non-clinical community sample, at least for children who were not yet using words to express themselves. Moreover, this finding may suggest that non-attuned MMM may be a good indicator of maladaptive parental mentalizing, but only in the early and pre-verbal developmental stages of childhood. Indeed, online MMM was originally designed for children aged 6–12 months (Meins & Fernyhough, 2010). Yet, several studies have used this online measure of MMM in older children when investigating child outcomes (for an overview, see McMahon & Bernier, 2017; Zeegers et al., 2017), and this could have produced biased results. It has been suggested that online MMM might be a less appropriate measure to assess MMM with older children due to changes in the child's developmental capacities that affect the relationship between MMM and other outcomes (Meins & Fernyhough, 2010). However, the upper child age limit at which the assessment of online

MMM is valid has not yet been established (McMahon & Bernier, 2017). Our study adds to the suggestion that it might not be child age per se, but the development of language abilities that influences non-attuned MMM. Hence, there is a need for future research investigating the predictive validity of online MMM with verbally expressive children.

Current evidence in this regard has suggested temporal stability for appropriate MMM (Colonnesi et al., 2019; Illingworth et al., 2016; Kirk et al., 2015; McMahon et al., 2016; Silletti et al., 2022) but indicated little evidence for temporal stability of non-attuned MMM after the child's first birthday (Brophy-Herb et al., 2023; Colonnesi et al., 2019; McMahon & Bernier, 2017; Silletti et al., 2022), reflected by near-zero correlations between assessments of NAMRCs at different time points (Kirk et al., 2015; McMahon et al., 2016). In addition, results showed that, during the child's first year of life, there seemed to be a strong and significant increase in the mother's tendency to make both AMRCs and NAMRCs during interactions with their child (Meins et al., 2011). After the first year of life, findings were more differentiated. For example, some studies indicated that both AMRCs and NAMRCs started to decrease after the first year of life (Colonnesi et al., 2019; Silletti et al., 2022), whereas another study reported further increases in NAMRCs (McMahon et al., 2016). Additionally, some studies found no significant changes in the number or proportion of mind-related comments from infancy to middle childhood (Easterbrooks et al., 2017; Fishburn et al., 2017; Illingworth et al., 2016; Kirk et al., 2015). In the present study, older child age was significantly associated with fewer AMRCs and NAMRCs. Similarly, we found significantly lower numbers of both AMRCs and NAMRCs with verbal children compared with pre-verbal children. So it might be the case that mothers tend to become less mind-minded when their children grow older and become able to communicate their needs verbally. This would also be in line with the suggestion of Meins et al. (2003) and Silletti et al. (2022) that the parent's proclivity to make mind-related comments might be influenced by changes in the developmental (particularly communicative) capacities of the child. Hence, online MMM might reflect a parental stance of verbalizing the child's mind that is particularly dominant in infancy, when it is more difficult to read the child's mind, but becomes less needed when children grow older and develop verbal communicative skills of their own. This might be particularly true for normally developing children, similar to the sample in this study. In children with developmental delays or those who are more difficult to "read" even though they are verbally expressive, MMM might still be significantly associated developmental outcomes.

For instance, one study found that representational (offline) MMM was lower in adoptive parents compared with biological and foster parents, and that this effect was driven (although not fully) by more behavioral difficulties in the child, independent of parental mental health (Fishburn et al., 2017). Similarly, MMM has been hypothesized to show substantial variability across contexts (Illingworth et al., 2016), and this is also supported by studies indicating a lack of contextual stability for appropriate MMM (Calabrò et al., 2022) and non-attuned MMM (Helmerhorst et al., 2019).

To conclude, many questions regarding the role of online MMM in relation to other operationalizations of parental mentalizing remain unanswered, particularly because of current mixed findings. In our study, appropriate MMM was consistently unrelated to earlier assessments of conceptually related constructs, such as PRF and EA. Although this finding was in line with our theoretical expectations and, at least for PRF, consistent with one other study (Krink & Ramsauer, 2021), it was incongruent with other studies that did show positive associations between appropriate MMM and conceptually related aspects of effective parental mentalizing (Gagné et al., 2021; Rosenblum et al., 2008) and parental sensitivity (Dollberg, 2022; Gagné et al., 2021). Similarly, we found a positive association between PM and non-attuned MMM, whereas other studies did not find associations between PRF and non-attuned MMM (Dollberg, 2022; Krink & Ramsauer, 2021). Likewise, EA in our study was prospectively unrelated to non-attuned MMM.

Limitations of this study should be acknowledged. First, we explored concurrent associations among PRF and EA, and prospective associations among PRF, EA, and MMM. However, this study is limited in the extent to which conclusions can be drawn regarding the causal direction of associations between PRF, EA, and MMM. Therefore, results should be interpreted with caution, and future studies using a repeated-measures design are needed to investigate bidirectional associations between MMM and different outcomes (including other measures of parental mentalizing), and to identify differential relations, therefore expanding our knowledge on the discriminant and predictive validity of PRF and MMM. Moreover, this would allow examination of the temporal stability of online MMM throughout childhood, a period that is characterized by rapid developmental changes that might affect the relationship between MMM and developmental outcomes. Second, this study was conducted with mothers only. It might be the case that associations among different operationalizations of parental mentalizing show a different pattern in fathers. Therefore, future research should include fathers to identify potential differential

developmental paths and to examine the unique role of paternal mentalizing versus maternal mentalizing regarding child psychological functioning. Third, we did not include a validated measure to assess the children's language development. Instead, we dummy-coded child language development based on whether the children used words to express themselves. Because of the prominent role of child language in relation to MMM, future research investigating associations among MMM and child outcomes should also include validated measures of the child's language capacities. It might also be the case that there is a bidirectional relationship between the child's use of language and parental mentalizing, and this could be explored in future studies.

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Supplementary Materials

Table S1

Prediction of Mutual Attunement Based on PRF Dimensions

	Model 1			Model 2		
	b	SE_b	β	*b*	SE_b	β
Maternal Age	.037	.013	.330**	.024	.011	.216*
Child Age	–.019	.009	–.263*	–.013	.007	–.170
PM				–.295	.087	–.328***
CMS				.205	.042	.451***
IC				.032	.071	.043
F (*df*)	5.218** (2,68)			11.763*** (5,65)		
Δ*F*	5.218**			14.113***		
R^2	.133			.475		
ΔR^2	.133			.342		

Note. PM = pre-mentalizing modes. CMS = Certainty about mental states. IC = Interest and curiosity in mental states.

N = 72; * *p*< .05, ** *p* < .01, *** *p* < .001.

Table S2

Prediction of Affect Quality Based on PRF Dimensions

	Model 1			Model 2		
	b	SE_b	β	*b*	SE_b	β
Maternal Age	.012	.006	.227	.004	.006	.080
Child Age	–.008	.004	–.225	–.004	.004	–.106
PM				–.196	.048	–.460***
CMS				.010	.023	.046
IC				.049	.039	.136
F (*df*)	2.774 (2,68)			5.228*** (5,65)		
Δ*F*	2.774			6.422***		
R^2	.075			.287		
ΔR^2	.075			.211		

Note. PM = pre-mentalizing modes. CMS = Certainty about mental states. IC = Interest and curiosity in mental states.

N = 72; * *p*< .05, ** *p* < .01, *** *p* < .001.

Table S3

Prediction of Child Involvement Based on PRF Dimensions

	Model 1			Model 2		
	b	SE_b	β	*b*	SE_b	β
Maternal Age	.015	.011	.140	.008	.012	.075
Child Age	.003	.008	.432***	.037	.008	.529***
PM				–.190	.092	–.224*
CMS				.049	.044	.115
IC				.157	.075	.220*
F (*df*)		10.623*** (2,68)			6.774*** (5,65)	
Δ*F*		10.623***			3.445*	
R^2		.238			.343	
ΔR^2		.238			.105	

Note. PM = pre-mentalizing modes. CMS = Certainty about mental states. IC = Interest and curiosity in mental states.

N = 72; * *p*< .05, ** *p* < .01, *** *p* < .001.

Table S4

Prediction of Intrusiveness Based on PRF Dimensions

	Model 1			Model 2		
	b	SE_b	β	*b*	SE_b	β
Maternal Age	–.013	.013	–.125	–.011	.013	–.104
Child Age	–.011	.009	–.163	–.006	.008	–.090
PM				.021	.104	.024
CMS				.100	.050	.231*
IC				.216	.084	.301*
F (*df*)		1.899 (2,68)			2.730* (5,65)	
Δ*F*		1.899			3.163*	
R^2		.053			.174	
ΔR^2		.053			.121	

Note. PM = pre-mentalizing modes. CMS = Certainty about mental states. IC = Interest and curiosity in mental states.

N = 72; * *p*< .05, ** *p* < .01, *** *p* < .001.

Table S5

Prediction of Hostility Based on PRF Dimensions

	Model 1			Model 2		
	b	SE_b	β	*b*	SE_b	β
Maternal Age	–.058	.022	–.282*	–.053	.021	–.258*
Child Age	.074	.015	.541***	.070	.014	.508***
PM				.095	.169	.056
CMS				–.315	.081	–.369***
IC				–.026	.137	–.019
F (*df*)	14.028*** (2,68)			10.052*** (5,65)		
Δ*F*	14.028***			5.532**		
R^2	.292			.436		
ΔR^2	.292			.144		

Note. PM = pre-mentalizing modes. CMS = Certainty about mental states. IC = Interest and curiosity in mental states.

N = 72; * *p*< .05, ** *p* < .01, *** *p* < .001.

CHAPTER 7
General Discussion

This doctoral dissertation focused on the role of parental mentalizing in the psychological development of parents and their children in both infancy and early childhood. Parental mentalizing is considered an umbrella concept that is used to refer to various research traditions that focus on the purported role of the capacity of parents to envision their child as motivated by inner mental states (Camoirano, 2017; Medrea & Benga, 2021; Zeegers et al., 2017). One of these research traditions emphasizes the capacity for parental reflective functioning (PRF) in child development. PRF refers to the capacity of parents to envision their child in terms of internal mental states, to reflect upon their own and their child's internal mental experiences, and to understand the child's behaviour in the context of underlying mental states and intentions (Slade, 2005, 2023).

Specifically, this dissertation focused on parental mentalizing, and PRF in particular, as a multidimensional construct. The aims of this doctoral thesis were to (1) to enhance insights into the multidimensional assessment of parental mentalizing, (2) to identify potential gender differences in parental PRF, and (3) to broaden our knowledge regarding potential adaptive and maladaptive developmental trajectories related to different dimensions of parental mentalizing by investigating the relationship between specific PRF dimensions and developmental outcomes in both parents and their children. These objectives were addressed in five different studies (Chapters 2-6), using data from three different community samples. Each of these studies varied in design, study sample and measurement method of parental mentalizing.

This chapter focuses on the integration of key findings from the studies reported in Chapters 2-6, alongside a more extensive exploration of the broader implications of these findings. First, a brief summary of the principal findings from each chapter is presented, followed by a discussion of these findings within the broader scope and objectives of this doctoral dissertation. Next, clinical implications, general limitations, and directions for future research are discussed. This chapter is closed with a number of general reflections regarding the role of parental mentalizing in parent and child psychological functioning.

Summary of Main Findings

Chapter 1 provided a comprehensive overview of the theoretical framework and primary research objectives guiding the studies presented in this dissertation. First, the various assessment methods of parental mentalizing were discussed, followed by a summary of the literature on associations among parental mentalizing and psychological functioning. Next, the current evidence supporting the multidimensional nature of parental mentalizing, including gender differences in parental PRF, was explored. This chapter concluded with an overview of the different studies included in this doctoral dissertation, and how they each addressed key issues concerning the relationship between parental mentalizing and psychological functioning. Moreover, the diversity in study designs (i.e., cross-sectional and prospective), study samples (i.e., both parents versus mothers only, and infants, toddlers, versus pre-schoolers), and measurement methods employed for parental mentalizing (i.e., offline and online) was underscored.

Chapter 2 focused on the potential mediating role of PRF dimensions in the relationship between parental attachment dimensions and parenting stress in a two-wave, prospective Parent-Child Study from infancy (i.e., children aged between 8 and 13 months) to toddlerhood (i.e., children aged between 20 and 25 months), including 106 first-time parents (i.e., mothers and fathers) and their biological child. Results indicated that pre-mentalizing modes (PM) mediated the relationship between attachment anxiety and parenting stress related to the marital relationship, role restriction, and social isolation. Attachment avoidance was indirectly related to these parenting stress dimensions through PM. Further, PM partially mediated the relationship between parental attachment anxiety and avoidance and lack of trust in parental competence. In addition, differences between mothers and fathers were found, showing that higher levels of attachment avoidance in mothers were associated with higher levels of parenting stress via PM, whereas in fathers this was the case for higher levels of attachment anxiety. Finally, results indicated that maternal IC was significantly higher than paternal IC, yet no significant mean-level differences were found between mothers and fathers for PM and CMS.

Chapter 3 prospectively investigated the role of both parental attachment dimensions and PRF in children's social-emotional development, using data from the Parent-Child Study (N = 106 first-time parents and their children aged between 8 and 13 months). Results indicated that parental attachment anxiety and avoidance were prospectively related to PM one year later. In turn, PM was negatively associated with child

competences and positively with problems. Direct associations from attachment anxiety and avoidance to child social-emotional development were only found for competences (negative), and only in mothers (not in fathers). Further mediation analyses showed differential relationships between mothers and fathers, indicating that higher levels of paternal attachment anxiety and maternal attachment avoidance in infancy were indirectly related to fewer competences and more problems in the toddlers' social-emotional development, through high levels of PM.

Chapter 4 examined cross-sectional associations among PRF and Theory of Mind (ToM) development in 83 mothers and their pre-school children (i.e., child aged between three and six years). Results showed that ToM dimensions (i.e., affective, belief-desire, and cognitive) gradually increased with age, and that children displayed higher levels of affective and belief-desire ToM compared to cognitive ToM. All the PRF dimensions were associated with ToM dimensions, with different dimensions being differentially related to ToM, including age-related effects. More specifically, PM appeared to hinder the development of children's general, affective, and belief-desire ToM throughout the pre-school years. Maternal Interest and Curiosity (IC) impacted the child's development of general, affective, and belief-desire ToM both positively (in the case of high IC) and negatively (in the case of low IC), but this effect was observed only in three-year olds, not in older children. Conversely, higher levels of maternal Certainty about Mental States (CMS) were related to increased levels of affective ToM, but this association was only evident in older children.

Chapter 5 investigated cross-sectional relationships between parental mentalizing, operationalized as mothers' estimates of the ToM capacities of their children (referred to as Mother's ToM Estimates or MTE), and ToM acquisition in 83 preschool-aged children and their mothers. Accuracy of MTE increased with child age, while the degree of certainty increased with maternal age. Furthermore, results indicated significant domain-specific associations among MTE and child ToM performance. Both accuracy of MTE and the degree of certainty regarding inaccurate estimations contributed to the development of affective, belief-desire and cognitive ToM. In addition, only cognitive ToM was also predicted by child age. Finally, child age moderated the relationship between maternal accuracy and general ToM (i.e., affective, belief-desire and cognitive ToM combined), showing that in older children only, the more accurate mothers were in their estimations of

ToM, the better these children performed on general ToM compared to children of mothers with lower MTE accuracy.

Chapter 6, finally, investigated cross-sectional associations among offline and online measures of parental mentalizing in a sample of 72 mothers and their child aged between 0 and 36 months. Results indicated significant associations among PRF dimensions (i.e., offline parental mentalizing) and self-reported emotional availability (EA), but not between maternal mind-mindedness (MMM) (i.e., online parental mentalizing) and EA. Further, there was a strong relationship between PM and non-attuned MMM, that was moderated by child use of language.

Implications for the Role of Parental Mentalizing in Parent and Child Psychological Functioning

In this section, I will discuss the key findings across the different studies within the context of the main objectives of this doctoral dissertation. This discussion will specifically focus on the implications of the reported findings regarding (1) the construct validity of the PRFQ and the multidimensional nature of parental mentalizing, (2) age-dependent effects of parental mentalizing, and (3) gender differences in parental PRF.

1. Construct Validity of the PRFQ and the Multidimensional Nature of Parental Mentalizing

The studies in this doctoral dissertation provide further support for the construct validity and multidimensional nature of the PRFQ by examining associations between the PRFQ subscales and (a) another operationalization of parental mentalizing (i.e., online MMM), and (b) variables of parent psychological functioning and child developmental outcomes that are theoretically expected to be related with parental mentalizing. The findings are largely consistent with findings of recent studies which have investigated the validity of the PRFQ across different countries, within both clinical and non-clinical populations, and among parents of children of varying ages ranging from pre-borns to children aged 12 years (e.g., De Roo et al., 2019; Goudarzi et al., 2022; Lee et al., 2020; Moreira & Fonseca, 2022; Pajulo et al., 2015; Pajulo et al., 2018; Pazzagli et al., 2018; Vahidi et al., 2021; Wendelboe et al., 2022; Wendelboe et al., 2021; Ye et al., 2022). Yet, there were also some unexpected results, which necessitate further discussion and research.

a. The Multidimensional Nature of Parental Mentalizing

Overall, the findings in this dissertation consistently support and strengthen the idea that PRF is a multidimensional construct, with each dimension tapping into different features of parental or child psychological functioning (Luyten, Mayes, et al., 2017; Luyten, Nijssens, et al., 2017). Results across the different studies indicated that the dimension '*Pre-mentalizing Modes*' (PM) was positively related to non-attuned MMM (Chapter 6), parental attachment anxiety and avoidance (Chapter 2 and 3), parenting stress (Chapter 2), and child social-emotional problems (Chapter 3), and negatively to dyad (i.e., mutual attunement and affect quality) and child (i.e., child involvement) EA (Chapter 6), child social-emotional competences (Chapter 3), and the acquisition of affective and belief-desire ToM (Chapter 4). Yet, no significant associations were found between PM and appropriate MMM, parent EA (i.e., hostility and intrusiveness), or cognitive ToM.

For the dimension '*Interest and Curiosity*' (IC), results showed that high maternal IC (compared to low IC) was related to higher levels of affective, belief-desire, and general ToM, but only in three-year-old children (Chapter 4). Furthermore, a positive association was found between IC and one of the EA subscales, namely 'intrusiveness'. No significant associations were found between IC and MMM (appropriate and non-attuned), other EA subscales, parental attachment, parenting stress, child social-emotional development, or cognitive ToM.

Finally, the dimension '*Certainty about Mental States*' (CMS) was positively associated with parent (i.e., mutual attunement) and dyad (i.e., non-hostility) EA (Chapter 6), and high CMS (compared to low CMS) was found to be associated with higher levels of affective ToM in five-year olds, but not in younger children (Chapter 4). No significant associations were found between CMS and MMM (appropriate and non-attuned), parental attachment, parenting stress, other EA subscales (i.e., child involvement, affect quality, and intrusiveness), child social-emotional development, or belief-desire and cognitive ToM.

Additional support for the specificity and dimensional nature of parental mentalizing was found in Chapter 5, showing strong task-specific associations among dimensions of MTE accuracy and respective ToM dimensions. For example, high maternal accuracy in estimating their child's capacity to recognize and attribute emotions (i.e., affective ToM) was related to better affective ToM performance of the child, but not to higher performance on cognitive features of ToM such as the ability to reason about beliefs.

b. The Pivotal and Unique Role of Maladaptive Parental Mentalizing

In line with theoretical assumptions on the multidimensional nature of PRF and other studies in this area (Burkhart et al., 2017; Krink et al., 2018; Luyten, Mayes, et al., 2017; Pazzagli et al., 2018; Rostad & Whitaker, 2016; Rutherford et al., 2015; Salo et al., 2021), 'Pre-mentalizing Modes' (PM) seemed to be most strongly and most robustly associated with distortions in parental mentalizing and a broad array of negative developmental outcomes. This pivotal and often unique role of maladaptive PRF in relation to parent and child psychological functioning underscores the critical role of an absence thereof in shaping healthy developmental outcomes in both parent and child. Yet, one should be careful in drawing causal conclusions from the above findings, as bidirectional relationships between parental mentalizing and child development may exist. It may well be that distorted PRF, for example, is driven by child factors, such as behavioural difficulties or emotion-regulation problems (e.g., Malcorps, Vliegen, Fonagy, et al., 2022).

To complement the findings of PRF regarding ToM development, a quasi-online measure of parental mentalizing was included in Chapter 5. Similar to the associations found between PRF dimensions and ToM acquisition in Chapter 4, results in Chapter 5 further underscored the pivotal role of maladaptive parental mentalizing in child developmental outcomes, indicating that higher degrees of certainty while making inaccurate estimations about the child's mind (another index of maladaptive parental mentalizing) hampered the child's ToM acquisition, particularly regarding emotion understanding (i.e., recognizing and attributing emotions). In addition to these findings, Chapter 5 also extended our knowledge on the nature of parental certainty regarding potential adaptive or maladaptive trajectories, showing that high certainty was only maladaptive for the child's ToM development when MTE was inaccurate, while being unrelated to child ToM if maternal estimations were accurate.

Notably, the associations between parental mentalizing (i.e., PM, IC, CMS, and certainty of inaccurate MTE) and child ToM were observed specifically for ToM capacities related to emotion understanding, rather than cognitive ToM involving visual perspective taking and false belief understanding. Hence, these findings suggest that cognitive ToM may develop more independently of the quality of parental mentalizing. This distinction aligns with the notion that distorted parental mentalizing may lead to problems in child social-emotional development (Ensink & Mayes, 2010; Fonagy et al., 2002; Fonagy & Target, 2005; Sharp & Fonagy, 2008; Slade, 2005), but does not necessarily impede the

cognitive features implicated in ToM (Luyten, Nijssens, et al., 2017). Furthermore, this pattern of findings supports the suggestion that the development of cognitive ToM could be primarily attributed to a biological maturation process, influenced by socio-cultural factors such as engaging in joint attention and linguistic interactions with others (Tomasello, 2018). In contrast, affective ToM may be more intricately linked to the quality of the direct mentalizing environment.

c. The More Adaptive Dimensions of Parental Mentalizing

The dimensions 'Interest and Curiosity' (IC), 'Certainty about Mental States' (CMS), and accuracy of 'Mother's ToM Estimates' (MTE) seemed to reflect more adaptive dimensions of parental mentalizing, with evidence for task-specific and age-dependent effects. For instance, both IC and CMS were related to the child's capacity for other-oriented emotion understanding and attribution, but only during specific time periods in the pre-school years (Chapter 4), while these dimensions were not related to children's social-emotional regulation capacities in toddlerhood (Chapter 3) or to the parent's capacity for arousal regulation within their parenting role (Chapter 2). Accuracy of MTE was associated with affective, belief-desire and cognitive ToM (Chapter 5). Moreover, higher MTE accuracy was related to higher general ToM performance (affective, belief-desire and cognitive ToM combined) in the child, but only in older children (e.g., 5-year-olds) and not in younger ones (e.g., 3-year-olds).

These findings are in line with research on the role of parental mentalizing in developmental trajectories. First, current research (e.g., Álvarez et al., 2022; Gordo et al., 2020; Goudarzi et al., 2022; Luyten, Mayes, et al., 2017; Rostad & Whitaker, 2016; Rutherford et al., 2018; Rutherford et al., 2013) indicates that adaptive features of parental mentalizing (i.e., IC and CMS) are mainly associated with positive developmental outcomes (such as ToM development) and to a lesser extent with negative developmental outcomes that are associated with psychopathology (such as parenting stress and child symptoms). Second, recent research developments suggest that the positive effect of adaptive parental mentalizing may be most important and pronounced in context of vulnerability and adversity (Borelli et al., 2017; Gershy & Gray, 2020; Malcorps, Vliegen, Nijssens, et al., 2022; Meins et al., 2013; Schultheis et al., 2019; Tarullo et al., 2016). The studies reported in this dissertation were conducted in community samples that were relatively homogeneous, primarily comprising middle-class, well-educated parents, that mainly

reported subclinical levels of child social-emotional maladjustment. Future research is needed to further test these assumptions.

d. A Loose Coupling Among Attachment, Sensitivity, and Parental Mentalizing

Finally, the findings in this dissertation support the assumption of a loose coupling among attachment, (conceptualizations of) parental mentalizing, and maternal sensitivity (Luyten, Nijssens, et al., 2017). As noted, Chapter 2 and 3 showed that insecure attachment, characterized by high levels of attachment anxiety and/or avoidance, was associated with maladaptive and inaccurate PRF (i.e., PM), but not necessarily with other, more adaptive features of PRF (i.e., IC and CMS). These findings are consistent with other studies suggesting that indices of more adaptive PRF vary in the degree to which they are related to parental attachment dimensions, whereas maladaptive PRF is strongly related to parental attachment anxiety and avoidance (Burkhart et al., 2017; Luyten, Mayes, et al., 2017; Pazzagli et al., 2018; Rostad & Whitaker, 2016).

Similarly, results in Chapter 6 indicated a loose coupling between offline and online measures of parental mentalizing by showing a strong association between PM and non-attuned MMM (another index of maladaptive parental mentalizing), but not between more adaptative features of PRF (i.e., IC, CMS) and non-attuned MMM. Moreover, none of the PRF dimensions were related to appropriate MMM. These findings align with the suggestion that mothers with robust mentalizing capacities (i.e., optimal levels of IC and CMS) may vary substantially in their spontaneous use of mind-related comments (both appropriate and non-attuned) within a direct relational context with their child (McMahon & Bernier, 2017). Similarly, high PM does not necessarily affect the proportion of appropriate mind-related comments of mothers in interaction with their child, whereas it does significantly increase the probability to make more non-attuned mind-related comments towards their infant. Hence, these findings are coherent with the theoretical conceptualization of PM and non-attuned MMM, both reflecting a parental stance of mis-attunement and inaccuracy in estimating what the child thinks, feels, or desires. Moreover, these findings underscore that the offline capacity of parents to understand the child's behaviour in terms of mental states is not necessarily translated into the tendency to invoke these mental states when interacting with their child, thereby supporting the suggestion that PRF and MMM are related yet distinct conceptualizations of the overarching construct of parental mentalizing (Camoirano, 2017; Medrea & Benga, 2021).

Results in Chapter 6 additionally indicated a loose coupling among PRF and EA (an index of parental sensitivity), with strong associations between PM and EA, whereas IC and CMS were more differentially related to EA subscales. Interestingly however, PM was unrelated to hostility and intrusiveness which might indicate a reporting bias in mothers with high levels of PM.

Finally, EA was found to be unrelated to MMM (Chapter 6). Although this finding is consistent with the hypothesis of a competence-performance gap (Barreto et al., 2016) and the conceptualization of MMM as an online measure of parental mentalizing that is not necessarily related with offline measures of a related construct, this finding also raises questions on whether MMM is such a good index of parental mentalizing as is assumed.

2. Age-Dependent Effects of Parental Mentalizing

Another important thread in this dissertation is the question about age-related effects of parental mentalizing, with different features of parental mentalizing exerting distinct influences depending on the developmental stage of the child. Results in Chapter 4 and 5 suggested that the influence of IC, CMS, and MTE accuracy on the child's ToM performance varied between younger and older children. Similarly, associations among PM and non-attuned MMM seemed to be only apparent in mothers of pre-verbal children (Chapter 6).

a. Theory of Mind: Biological Maturation Supported by Parental Mentalizing?

Overall, the findings in Chapter 4 and 5 support the hypothesis that ToM development is intrinsically tied to biological maturation as children progress in age (Scholl & Leslie, 2001), with parental mentalizing as an environmental factor playing an important role before and after the average threshold for ToM acquisition (Devine & Hughes, 2018; Wellman, 2012). The results in Chapter 4 suggested that young children (3-year-olds) exhibited significant advantages in affective and belief-desire ToM performance when their mothers displayed high levels of IC as compared to children who had mothers with low levels of IC. However, among older children (5-year-olds), results showed similar levels of affective ToM regardless of their mothers' IC levels, and even a slight disadvantage in belief-desire ToM among children whose mothers had high IC compared to those with low maternal IC. This shift in the impact of IC between 3-year-olds and 5-year-olds probably mirrors the evolving social and cognitive landscape of developing children. Younger

children are still in the process of comprehending fundamental aspects of social cognition, such as recognizing and understanding emotions and intentions. Within this developmental stage, a parent's inquisitive and not-knowing stance, as reflected in high maternal IC, might provide valuable support, as it aligns with the child's inherent curiosity and need for exploration and learning. Hence, high maternal IC can be perceived as an adaptive response to the early developmental needs of young children, thereby facilitating the early development of affective and belief-desire ToM capacities. As children grow older, they attain a more nuanced understanding of emotions and begin to grasp the complexities of social interactions, which is accompanied by an increased drive for autonomy that necessitates a recognition of separate minds. Consequently, maternal curiosity and interest in mental states might be beneficial for 3-year-olds who were just beginning to explore basic ToM concepts, whereas high maternal IC may become intrusive and potentially maladaptive in older children. The assumption that high levels of maternal IC may become intrusive and maladaptive is further strengthened by our findings in Chapter 6, showing a positive association between IC and maternal intrusiveness.

Furthermore, as children mature, the parent's capacity to appropriately estimate what's going on in the child's mind seems to become increasingly important, as was reflected by the moderating role of child age in the relationship between CMS and affective ToM (Chapter 4), and between MTE accuracy and general ToM (Chapter 5). Younger children equally performed on affective ToM tasks independent of maternal levels of CMS, while older children displayed a significantly higher development of affective ToM when their mothers scored high on CMS as opposed to those with low maternal CMS scores. Similarly, maternal accuracy in estimating their child's ToM performance did not differentiate in general ToM acquisition within younger children, while there was a clear advantage in general ToM understanding in older children whose mothers were highly accurate in MTE compared to those with low maternal accuracy. A possible explanation for these findings is that the parent's enhanced knowledge and accurate understanding of their child's mind and developmental stage further promote epistemic trust in the child as they recognize their own mind within the parent's mind. In turn, this mutual recognition fosters advanced social learning and further enhances their ToM abilities.

b. Indicators of Maladaptive Parental Mentalizing in Mothers of Pre-Verbal and Verbal Children

Whereas PM was detrimental for ToM development throughout the pre-school years (Chapter 4), the negative effect of PM in relation to non-attuned MMM varied between mothers of verbal and preverbal children (Chapter 6). More specifically, the tendency of mothers to attribute malevolent mental states to their child was highly associated with making non-attuned mind-related comments, but only in mothers of pre-verbal children. When children did use verbal language abilities to express themselves during the free-play episode, similar levels of non-attuned MMM were found in both low and high PM mothers. These findings are in line with the suggestion of Meins et al. (2003) that the parent's proclivity to make mind-related comments might be influenced by changes in the developmental (particularly communicative) capacities of the child. Hence, online MMM might reflect a parental stance of verbalizing the child's mind that is particularly dominant in infancy when it is more difficult to read the child's mind, but becomes less needed when children grew older and develop verbal communicative skills of their own. This hypothesis is further strengthened by the finding that mothers tend to become less non-attuned when children grow older and are able to communicate their needs verbally.

c. Parental Mentalizing: A Trait of Adaptive Value?

The abovementioned findings can be understood through the lens of environment-dependent or context-dependent selection. This concept, rooted in evolutionary biology and psychology, acknowledges that the fitness or adaptive value of a particular trait – in this case parental mentalizing – can vary depending on the specific environment or context in which it is expressed – in this case differences in child age or developmental phase (Buss, 2019; Luyten et al., 2020). Hence, traits that are advantageous in one situation may be less influential or even detrimental in a different context. Examples thereof in this dissertation included the facilitating versus impeding role of high maternal IC on belief-desire ToM before and after the average threshold for ToM acquisition (Chapter 4) and the finding that high CMS and highly accurate MTE positively impacted ToM performance in older children, while being unrelated in younger children (Chapter 4 and 5). Similarly, traits that are vital to specific developmental outcomes, may be less crucial for other developmental outcomes. In the studies reported in this doctoral dissertation, this assumption was supported by findings that high maternal IC and CMS fostered the acquisition of affective ToM

capacities, whereas similar benefits were not found for the children's cognitive ToM (Chapter 4) or social-emotional development (Chapter 3). Likewise, while PM was found to have a negative effect on child affective and belief-desire ToM development throughout the pre-school years (Chapter 4), the negative effect of high PM on the mother's proclivity to make more non-attuned mind-related comments was only present in mothers with infants that were not yet verbally expressive (Chapter 6).

In summary, these findings highlight the dynamic nature and evolving interplay of parent and child mentalizing as children progress in age. Moreover, the (mal)adaptive value of certain aspects of parental mentalizing varies depending on the child's developmental stage and the specific social and cognitive demands they face. Therefore, parental mentalizing is considered most effective and adaptive when it aligns with the specific challenges and opportunities unique to a particular ecological or social context.

d. The Importance of Acknowledging Evocative Child Effects

Alternatively, although the design of the studies reported in this dissertation did not allow to draw such conclusions, the child's evolving ToM abilities may also elicit specific features of parental mentalizing, pointing in the direction of evocative person- and gene-environment correlations. As children progress in their biological maturation of ToM, the role parental mentalizing might adapt to meet their evolving cognitive and social needs. Consequently, these interactions can significantly impact the child's ToM development. Hence, various child factors may either diminish or amplify the associations among parental mentalizing and ToM, yielding diverse outcomes across age groups. For example, it's conceivable that ToM development during the early stages of biological maturation evokes maternal curiosity and engagement (i.e., high IC), aiding the young child to understand basic emotional and intentional aspects of ToM. As children grow older and biological maturation has reached a level where children need to explore more sophisticated aspects of ToM, the influence of maternal IC may become less pronounced and less needed, particularly in children with well-developed ToM capacities. However, in cases where older children exhibit lower belief-desire ToM, there might be an increased need for parental interest and curiosity in the child's internal world, as was evident in the negative associations between maternal IC and belief-desire ToM within this age group. Additionally, as communication in older children becomes more verbal and their understanding of emotional mental states more explicit, parents experience more ease in comprehending their child, which is

accompanied with higher maternal accuracy (i.e., higher levels of MTE accuracy), more certainty about the child's mental states (i.e., higher CMS), and less non-attuned mind-related comments (Chapter 6). This is also in line with research suggesting that child-to-parent effects become more prominent when children grow older while in infants and toddlers developmental trajectories are mainly driven by parent-to child effects (Luyten et al., 2020).

Furthermore, this might also suggest that parental mentalizing is not as stable as is often assumed. Currently, only a limited number of studies have explored longitudinal correlations between successive measurements of the PRFQ. In the Parent-Child Study, encompassing a community sample of both mothers and fathers and their infants (Chapter 2 and 3), robust relationships were found between PM, CMS, and IC and their corresponding measurements one year later, representing medium to large effects. Similarly, other studies (Salo et al., 2022; Salo et al., 2021) showed substantial associations (with very large effect sizes) between concordant measurements of maternal and paternal PRFQ subscales at three, 12 and 24 months post-childbirth, although it is noteworthy that they utilized a 5-item version of IC, a 3-item version of PM, and excluded the CMS subscale in their analyses. Finally, Carlone et al. (2023) reported high correlations that represented very large effects between measures of PM, IC, and CMS and their respective measurements at six weeks, three months, and 12 months later. This was observed in mothers of children aged three to 18 years, both within a community and an at-risk sample. Nevertheless, while the abovementioned findings provide some evidence for the temporal stability of PRF dimensions, a recent adoption study suggested significant child-to-parent effects on the development of PRF over time (Malcorps, Vliegen, Fonagy, et al., 2022). Specifically, results indicated that the levels of both maternal and paternal CMS over time were moderated by age at adoption, revealing a less steep increase in CMS over time for parents of late adoptees compared to early adoptees. Regarding PM, this moderation effect was only evident in fathers, showing significant increases in PM over time, particularly in fathers of late adoptees with the highest levels of socio-emotional problems. In contrast, maternal PM levels remained stable over time. Finally, IC was unaffected by child age at adoption, but exhibited a significant decrease in both mothers and fathers over time. Hence, these findings underscore the dynamic and nuanced nature of PRF over time, challenging the traditional notion of its stability.

3. Gender Differences in Parental Mentalizing

In Chapter 2 and 3, potential gender-specific dynamics in the effect of PRF on parenting stress (Chapter 2) and child social-emotional development (Chapter 3) were investigated between mothers and fathers. Results indicated that maternal IC was significantly higher than paternal IC, yet no significant mean-level differences were found between mothers and fathers for PM and CMS. These findings are consistent with other studies suggesting small gender differences between maternal and paternal PRF, with mothers typically scoring slightly higher on IC compared to fathers (Cooke et al., 2017; Gordo et al., 2020; Kungl et al., 2024; Luyten, Mayes, et al., 2017; Madsen et al., 2023; Malcorps, Vliegen, Fonagy, et al., 2022; Malcorps, Vliegen, Nijssens, et al., 2022; Pajulo et al., 2018; Pazzagli et al., 2018). For PM and CMS, results in the literature are a bit more differentiated, with the majority of studies reporting lower levels of PM in mothers compared to fathers (Cooke et al., 2017; Gordo et al., 2020; Madsen et al., 2023; Malcorps, Vliegen, Fonagy, et al., 2022; Malcorps, Vliegen, Nijssens, et al., 2022; Pajulo et al., 2018; Pazzagli et al., 2018), whereas others did not found mean-level differences between maternal and paternal PM (Kungl et al., 2024; Luyten, Mayes, et al., 2017). Similarly, the majority of studies reported similar levels of maternal and paternal CMS (Cooke et al., 2017; Gordo et al., 2020; Kungl et al., 2024; Malcorps, Vliegen, Fonagy, et al., 2022; Malcorps, Vliegen, Nijssens, et al., 2022; Pajulo et al., 2018; Pazzagli et al., 2018), whereas some studies suggested higher levels of CMS in mothers compared to fathers (Luyten, Mayes, et al., 2017; Madsen et al., 2023).

Moreover, and congruent with other studies (e.g., Cooke et al., 2017), maternal and paternal PRFQ scores were unrelated in the Parent-Child Study (Chapter 2 and 3), supporting the hypothesis that parental levels of PRF towards a particular child are independent and relationship-specific (Luyten, Nijssens, et al., 2017).

Furthermore, there was no indication for differential contributions of maternal and paternal mentalizing. Congruent with other research on PRF dimensions in both parents (Cooke et al., 2017; Gordo et al., 2020; Kungl et al., 2024; Luyten, Mayes, et al., 2017; Madsen et al., 2023; Malcorps, Vliegen, Fonagy, et al., 2022; Malcorps, Vliegen, Nijssens, et al., 2022; Pazzagli et al., 2018), results in Chapter 2 and 3 showed a similar pattern of correlational results for mothers and fathers, emphasizing the role of both fathers' and mothers' PM in parental and child psychological functioning. In both mothers and fathers, attachment anxiety and avoidance were related to PM, although associations were slightly

weaker for fathers. In turn, both maternal and paternal PM were positively related to all domains of parenting stress (Chapter 2) and child social-emotional problems (Chapter 3), and negatively to child social-emotional competences (Chapter 3). However, mediation analyses did show differential results between mothers and fathers, driven by gender differences in attachment strategies. Consistent with research on gender differences in attachment (Blatt, 2004; Del Giudice, 2011; Luyten & Blatt, 2013; Zuroff & Fitzpatrick, 1995), results in Chapter 2 and 3 indicated that attachment avoidance was significantly higher in fathers compared to mothers, whereas attachment anxiety was slightly higher in mothers compared to fathers, although this latter difference was only marginally significant. In this context, gender incongruence (i.e., high levels of attachment anxiety in men and high levels of attachment avoidance in women) has been hypothesized to be associated with an increased risk for maladjustment and psychopathology in both parents and their children because of incongruent socio-cultural expectations (Luyten & Blatt, 2013). This may explain why high levels of attachment anxiety in fathers were associated with more parenting stress, more child social-emotional problems and fewer competences through a higher tendency for PM, whereas in mothers this was the case for high levels of attachment avoidance.

Yet, these findings should be considered preliminary given that parental attachment, PRF and developmental outcomes were assessed within parental couples, which suggests a possible interdependency of data. Although the analyses justified the use of Structural Equation Modelling (SEM) with nested data, future research in sufficiently powered samples should adopt a multilevel SEM framework using actor-partner interdependency models that allow the examination of potentially interactive effects between mothers' and fathers' PRF in relation to developmental outcomes.

Clinical Implications

The findings in this doctoral dissertation may have several important implications for parent-child interventions, highlighting the crucial role of addressing parental mentalizing in prevention and treatment initiatives. The reported studies provide consistent support for the significance of parental mentalizing, even in community samples, in relation to various aspects of psychological functioning, including parent well-being (Chapter 2), attuned and sensitive parenting (Chapter 6), child social-emotional development (Chapter 3) and child mentalizing capacities (Chapter 4 and 5). These findings align with studies

demonstrating the important role of parental mentalizing in child development in clinical samples and among parents at risk for psychopathology (Ahrnberg et al., 2020; Arnott & Meins, 2007; Berthelot et al., 2015; Bigelow et al., 2018; Carlone et al., 2023; Chasson & Taubman - Ben-Ari, 2023; Ensink et al., 2015; Feingold & Zerach, 2021; Gershy & Gray, 2020; Hestbaek et al.; Krink et al., 2018; Moreira & Fonseca, 2022; Nobre-Trindade et al., 2021; Steele et al., 2020; Wendelboe et al., 2021). In the following sections, the implications for the clinical assessment of parental mentalizing will be discussed, followed by a summary of the current evidence on mentalization-based parenting interventions, and the suggestion of a two-pronged intervention approach.

Assessment: The Potential Value of a Parental Mentalizing Profile

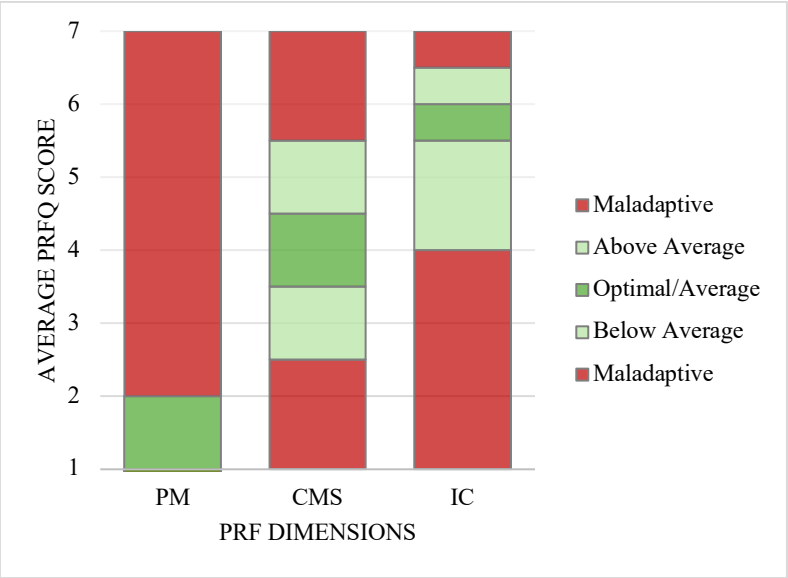
Parental mentalizing is considered a multifaceted and broad concept, encompassing different layers of mental and physical attunement to the child (Zeegers et al., 2017). An important hallmark of parental mentalizing involves having the child in mind and adopting a not-knowing stance. As such, adaptive parental mentalizing is characterized by (1) interest and curiosity in the child's mind and the understanding that mental states are connected to behaviour, (2) recognizing the opacity of mental states and acknowledging that the child has its own feelings or thoughts that may be different from the parent's parenting experiences, and (3) the absence of a non-mentalizing stance that is characterized by either making maladaptive and malevolent assumptions about their child or the inability to enter the child's internal subjective world. The PRFQ includes three subscales (i.e., IC, CMS and PM), encapsulating these three key features of parental mentalizing, and serves as a quick screening tool to easily assess levels of PRF (Luyten et al., 2009; Luyten, Mayes, et al., 2017). Although developed for research purposes, the PRFQ may also have value in qualitatively assessing a parent's mentalizing profile in clinical practice.

Conducting an early assessment of parental mentalizing and the identification of a mentalizing profile, including strengths and weaknesses, can provide valuable insights. This information, in turn, might guide the tailoring of therapeutic interventions and strategies to the unique characteristics of families, thereby facilitating clinicians to optimize the effectiveness of their interventions. However, several key points should be considered when interpreting results. First, cut-off scores are not available. Nevertheless, a decade of empirical research in community samples (e.g., Borelli et al., 2021; Carlone et al., 2023; Cooke et al., 2017; Gordo et al., 2020; Luyten, Mayes, et al., 2017; Madsen et al., 2023;

Malcorps, Vliegen, Fonagy, et al., 2022; Malcorps, Vliegen, Nijssens, et al., 2022; Pazzagli et al., 2018; Rostad & Whitaker, 2016; Rutherford et al., 2015; Rutherford et al., 2017; Schultheis et al., 2019), including the papers reported in this dissertation, showed normative PM levels with mean scores below 2. Mean scores for IC typically range from 5.5 to 6.0, with scores above the middle probably reflecting average scores in normally developing caregivers. For CMS, scores that are slightly above the middle are considered normative, with mean scores usually between 3.5 and 4.5. Hence, parental PRFQ scores that deviate from these normative levels may indicate maladaptive parental mentalizing and can guide clinicians. Specifically, high levels of PM (i.e., scores above 2) and extremely low or high levels of IC and CMS (i.e., scores below 3 or above 6) may be indicative of distorted parental mentalizing (See Figure 1 for a visual presentation).

Figure 1

Quality of PRF



Second, the context- and age-dependent nature of parental mentalizing should be considered when interpreting results, as the adaptiveness of normative IC and CMS levels may vary based on child characteristics and child age. Consistent with other research (Borelli et al., 2021; Luyten, Mayes, et al., 2017; Pazzagli et al., 2019; Rutherford et al., 2013), the findings in Chapter 4 supported the hypothesis that normative levels of both IC and CMS can relate to both adaptive and maladaptive child outcomes. Hence, while both IC and CMS may contribute to positive child outcomes (e.g., because parents are genuinely

interested in their child's mind and also tend to be able to 'read' and thus predict their children's responses), normative levels of IC and CMS may also be perceived as intrusive or controlling by children, particularly in children that are sensitive to environmental input. Additionally, a growing body of research indicates that the positive effect of adaptive features of parental mentalizing is specifically apparent in the face of early adversity (Malcorps, Vliegen, Nijssens, et al., 2022; Meins et al., 2013; Tarullo et al., 2016) and stressful situations (Borelli et al., 2017; Gershy & Gray, 2020; Schultheis et al., 2019). Hence, parental levels of IC and CMS and interpretations in terms of adaptivity should always be considered in the context of contextual and developmental needs.

Table 1.

Parental Mentalizing Profile of Two Mothers

PRFQ Scale/Items	Mother 1	Mother 2
PM (mean)	2	3,8
1. The only time I'm certain my child loves me is when he or she is smiling at me.	7	6
4. My child cries around strangers to embarrass me.	1	2
7. I find it hard to actively participate in make believe play with my child.	1	4
10. My child sometimes gets sick to keep me from doing what I want to do.	1	4
13. When my child is fussy, he or she does that just to annoy me.	1	5
16. Often, my child's behaviour is too confusing to bother figuring out.	1	2
CMS (mean)	6,8	5,6
2. I always know what my child wants.	7	7
5. I can completely read my child's mind.	7	7
8. I can always predict what my child will do.	7	6
11. I can sometimes misunderstand the reactions of my child. (reverse coded)	7	5
14. I always know why I do what I do to my child.	6	3
17. I always know why my child acts the way he or she does.	7	6
IC (mean)	7	5,8
3. I like to think about the reasons behind the way my child behaves and feels.	7	7
6. I wonder a lot about what my child is thinking and feeling.	7	6
9. I am often curious to find out how my child feels.	7	7
12. I try to see situations through the eyes of my child.	7	6
15. I try to understand the reasons why my child misbehaves.	7	2
18. I believe there is no point in trying to guess what my child feels. (reverse coded)	7	7

Finally, looking at scores on an item-level may also be meaningful in the clinical assessment and evaluation of PRF dimensions. This can be important because parents with similar scorings on PRF dimensions may differ substantially in their underlying mentalizing vulnerabilities. This notion is illustrated through case material involving two mothers participating in the Mentalizing Based Treatment for Parents (MBT-P) program at De Viersprong (see Table 1 for their PRFQ scores).

Mother 1: Samira and Lucie

Samira is a 32-year-old woman who tends to engage in a symbiotic relationship with her 18-month-old daughter, Lucie. She has been admitted to MBT-P through child services due to separation problems that impede the need for individual trauma therapy. Samira struggles with being separated from Lucie and does not allow anyone, including Lucie's father (her partner), to touch or care for Lucie besides herself.

The initial assessment of the PRFQ shows an interesting profile. While the overall level of PM can be considered normative, a closer look at the item-level reveals that the mean-score is entirely driven by one item (i.e., item 1), which received the maximum score. This high score is indicative of a teleological way of thinking (Luyten et al., 2020), where there is an exclusive focus on physical action or behaviour as a true expression of the child's intention – illustrated here by feeling certain about the child's love only when it is smiling. Notably, and contrary to the other items of PM, item 1 is the sole PM item portraying a positive mental state of the child. Samira gave minimum scores to the remaining PM items, suggesting that there are no indications of distorted PRF in terms of attributing hostile and malevolent mental states to the child (i.e., item 4, 10, and 13) or an inability to enter into the child's internal subjective world (i.e., item 7 and 16). This scoring profile aligned seamlessly with observations made during therapy sessions where Samira presented herself as highly sensitive and attuned to Lucie's needs, displaying remarkable accuracy. Similar to her scorings, negativity was conspicuously absent, suggesting a disconnection and a reluctance to acknowledge negative feelings towards parenthood or Lucie. This sentiment was supported by scores on the Child Behaviour Checklist (CBCL), all items receiving zero, painting Lucie as the perfect child with no behavioural issues in Samira's eyes. Samira's aversion to negative emotions towards Lucie stemmed from a fear of jeopardizing Lucie's love. This was also reflected in the active avoidance of fostering a nurturing context around Lucie, which was experienced as a threat to their relationship. Samira's attachment needs

and collusion tendencies were intrusive and controlling, generating extremely high dependency in the mother-child relationship.

Intrusive parental mentalizing was also evident in Samira's scores on the IC and CMS dimensions, which were highly elevated compared to the normative mean scores discussed earlier, with almost all items receiving the maximum score. The maximum score on IC reflected Samira's obsessive fixation on Lucie's mind, characteristic of intrusive hypermentalizing. This fixation was accompanied by extremely high scores on CMS, indicating her tendency to be overly certain about what Lucie feels, thinks, or needs, and her inability to recognize the opacity of mental states. Hence, the previously mentioned problems with physical self-other distinction were also highly evident on a mental level, illustrating Samira's inclination to confuse her own emotional experiences with those of Lucie, a typical feature of psychic equivalence functioning (Luyten et al., 2020).

Yet, while both psychic equivalence and intrusive hypermentalizing are often associated with making improbable and hostile assumptions while interpreting the child's behaviour (i.e., high PM), this was not the case for Samira. Congruent with her mentalizing profile on the PRFQ, observations during therapy showed that there was a clear fixation on child-oriented mentalizing, which was positive in nature. This was accompanied by a lack of self-mentalizing and an understanding of how the relationship with Lucie affected her own thoughts, feelings and needs (not captured in the items of the PRFQ). During therapy, this was reflected in frequent episodes of pretend mode (Luyten et al., 2020), which was characterized by feelings and thoughts becoming severed from reality. In turn, Samira's limited capacity to experience a sense of an internal world gave rise to a deep and extremely distressing sense of emptiness, accompanied by high levels of depressive and somatic symptoms.

Mother 2: Jennifer and Jordan

Jennifer, 28 years old, is mother to 10-month-old Jordan. The decision to seek support from MBT-P follows the recent separation of parents, marked by a history of aggression and alcohol abuse by the father. Jennifer's primary motivation is to enhance her bond with her son, driven by recurring intrusive thoughts about her own childhood and relationship with her mother. Concerned about preventing Jordan from enduring similar negative experiences, she grapples with the delicate balance between fostering independence and maintaining closeness, navigating the thin line between the two. In

therapy sessions, Jordan exhibits an avoidant attachment style, displaying limited interaction with both the therapist and his mother. Despite exploring his surroundings actively, Jordan tends to keep to himself, demonstrating frustration when faced with challenges and a reluctance to seek assistance. When he hurts himself, he shows less dysregulation than might be expected and does not respond to comfort.

Examining Jennifer's profile on the PRFQ, a notable elevation in the PM scale is observed. Jennifer tends to attribute hostile and malevolent mental states to Jordan while struggling to enter his internal subjective world. Interestingly, items 4 and 16 show less extreme scores. Further exploration reveals that Jordan's infrequent crying renders item 4 irrelevant for Jennifer. For item 16, she indicates that she does not find Jordan's behaviour confusing, it is always clear to her what is going on, indicating a high level of certainty about his internal experiences. This is further supported by high scores on the CMS scale. Although CMS initially appears slightly elevated but acceptable within the normative range, a closer look at the item-level exposes a lower mean score due to item 14 ('I always know why I do what I do to my child'), while other items are notably increased. Similarly, the IC scale displays a high overall score, but still falling within the normative range. However, at the item level, extremely high scores of 6 or above are prevalent, except for a strikingly low score on item 15 ('I try to understand the reasons why my child misbehaves'), significantly impacting the average score.

As with Samira, Jennifer's parental mentalizing profile hints at a tendency for hypermentalizing. However, while distortions in Samira's PRF were dominated by intrusive hypermentalizing, Jennifer exhibits clear hostility and seems to oscillate between hyper- and hypomentalization. For instance, the CMS scale reveals child-oriented hypermentalizing, manifested in high scores on items related to the child's mind, as well as self-oriented hypomentalizing, indicated by a low score on the only item assessing one's own actions in relation to the child. Likewise, the IC scale mirrors both hyper- and hypomentalizing, with the more neutral items scoring very high, whereas the item specifically assessing interest in misbehaving child behaviour scoring very low. This pattern is also observable in therapy sessions where Jennifer displays interest and care for Jordan, but this does not translate into sensitive and attuned parental behaviours. Instead, she appears preoccupied with her own concerns, quickly categorizing Jordan's behaviour as difficult without delving into the underlying feelings. Viewing Jordan as naughty and temperamental, Jennifer unwittingly mirrors her own mother's image of her. Her

interactions with Jordan seem impulsive, dictated by her mood, with limited insight into the potential impact on Jordan, thereby unconsciously repeating her own history.

Mentalization-Based Parenting Interventions

To date, several mentalization-based parenting interventions that specifically address parental attachment and parental mentalizing have been developed (for an overview, see Barlow et al., 2021; Byrne et al., 2020; Camoirano, 2017; Lo & Wong, 2022; Luyten, Nijssens, et al., 2017; Midgley et al., 2021; Sleed et al., 2023) for diverse populations (e.g., Baradon et al., 2008; Borelli et al., 2012; Goyette-Ewing et al., 2003; Kalland et al., 2015; Midgley et al., 2017; Nijssens et al., 2012; Pajulo et al., 2012; Sadler et al., 2013; Sadler et al., 2006; Slade, 2007; Slade et al., 2005; Suchman et al., 2010; Suchman et al., 2011; Suchman et al., 2012).

The common aim of these interventions is to foster parental mentalizing, to enhance the parent-infant relationship, and to reduce the risk of the intergenerational transmission of psychopathology. Specifically, these interventions help parents to maintain a more mentalizing stance by focusing on increasing the parent's interest and curiosity in their own and their infant's mental states rather than focusing solely on expressed behaviour (i.e., IC), by helping them to recognize the opacity of mental states (i.e., CMS) and by addressing pre-mentalizing modes (i.e., PM) (Luyten, Nijssens, et al., 2017).

Key components of these intervention programs include psychoeducation, role plays, and group discussions with other parents (Lo & Wong, 2022). Additionally, video feedback is considered particularly effective in promoting parental mentalizing by enabling parents to adopt a meta-perspective and to focus on the internal mental states of themselves and their child from a third-person perspective (Nijssens et al., 2012). These ingredients contribute to enhancing the parent's capacity for perspective taking and joint attention, fostering a more mentalizing stance of curiosity and inquiry while envisioning the child's mind. Consequently, the child undergoes repeated experiences of being mentalized, which is of key importance in social learning and the development of mentalizing (Luyten et al., 2022). In addition, there is an expanding body of literature emphasizing the need to consider parental, child and contextual characteristics in tailoring parenting interventions to the specific needs of parent-infant dyads (Menashe-Grinberg et al., 2023).

Both randomized trials and naturalistic studies support the positive effects of parenting interventions on both children and parents (Byrne et al., 2020; Kalland et al.,

2015; Lo & Wong, 2022; Milligan et al., 2021; Ordway et al., 2014; Sadler et al., 2013; Sleed et al., 2023; Suchman et al., 2011; Zayde et al., 2021). However, it remains to be determined whether these effects are primarily or specifically mediated through addressing parental mentalizing. In this context, systematic reviews and meta-analyses have presented mixed findings regarding improvements in parental mentalizing (Barlow et al., 2021; Byrne et al., 2020; Lavender et al., 2023; Lo & Wong, 2022; Midgley et al., 2021; Sleed et al., 2023). While some meta-analyses suggest an increase in parental mentalizing (Barlow et al., 2021; Lo & Wong, 2022; Sleed et al., 2023), particularly in intervention programs that specifically target the enhancement of parental mentalizing as a central element (Lavender et al., 2023), others indicate that the majority of studies reported null findings or limited effects of parental mentalizing, failing to provide strong evidence for the effectiveness of specific MBT approaches (Byrne et al., 2020; Lo & Wong, 2022; Midgley et al., 2021). Notably, interventions involving children in middle childhood demonstrated larger effect sizes of improvements in parental mentalizing than those involving children in infancy and early childhood (Lo & Wong, 2022).

Additionally, recent research indicates that the PRFQ could serve as an easily applicable screening tool to assess levels of PRF in efficacy studies. To date, several studies have included pre- and post-measures of the PRFQ in intervention studies and reported positive changes. For instance, the Family minds program demonstrated significant increases in IC and CMS (Adkins et al., 2018) and a significant decrease in PM (Adkins et al., 2022) for the intervention groups compared to the control group. Similarly, the ATTACHHTM program exhibited significant increases in IC and marginally significant decreases in PM (Letourneau et al., 2023). Other studies, such as the Nurturing Attachments Group Study (Lewis et al., 2022) and the Fathers for Change Study (Stover et al., 2022) reported significant pre- to post-treatment decreases in PM, while the Attachment Video-feedback Intervention Study (Eguren et al., 2023) showed increases in CMS. Finally, a follow-up study on mothers from the Minding the Baby intervention revealed lower PM and equal IC scores for mothers in the intervention group compared to control mothers (Londono Tobon et al., 2022).

In conclusion, the ongoing research and positive outcomes from these interventions underscore their potential in enhancing parental mentalizing. Nevertheless, the current best evidence still appears to be limited, highlighting the need for further research in larger samples to refine our understanding of their efficacy and application, and to identify

common factors in interventions associated with improvements in parental mentalizing. In this context, our research emphasizes the need for a nuanced, developmental, and personalized approach in therapeutic interventions. This involves recognizing the multidimensionality of parental mentalizing and understanding how its diverse facets impact the well-being of both parents and children. The pivotal role of maladaptive parental mentalizing, specifically high levels of PM, in relation to parent and child psychological functioning further emphasizes that PM should not be missed as one of the focal points in intervention programs. Hence, the findings in this dissertation suggest a two-pronged intervention approach. On the one hand, it is important to foster and strengthen appropriate parental mentalizing. On the other hand, the clinician should be prepared to address and repair mentalizing breakdowns as they occur. In the subsequent sections, the clinical implications for fostering appropriate parental mentalizing and addressing maladaptive parental mentalizing are discussed.

Fostering Appropriate Parental Mentalizing

The findings of this dissertation underscore the importance of adopting a multidimensional and developmental approach to strengthen parental mentalizing and comprehend child development. In this regard, the reported findings highlight the notion that no single set of traits is universally advantageous, and that the extent to which certain aspects of parental mentalizing are adaptive depends on the context in which it is expressed, such as the child's developmental stage and the specific social and cognitive demands that they face. Hence, parental mentalizing is considered most effective and adaptive when it aligns with the unique challenges and opportunities of a particular ecological or social context.

A comprehensive understanding and recognition of the age- and context-dependent effects of parental mentalizing can inform intervention strategies and help clinicians to tailor parenting and educational practices to meet the evolving needs of growing children and to better support children's social and emotional understanding as they progress through different developmental stages. For example, the observation that younger children benefit from maternal curiosity and interest in developing affective and belief-desire ToM capacities, whereas older children benefit more from maternal accuracy and certainty in understanding their emotions and mental states (Chapter 4), may have valuable implications for the focus in treatment. During infancy and toddlerhood, intervention programs should

prioritize fostering an inquisitive and not-knowing stance in the parent. Therefore, efforts should concentrate on increasing the parent's interest and curiosity in their own and their child's internal experiences (i.e., promoting IC). Additionally, parents should be supported in accurately reading their child's mind while acknowledging the opacity of mental states (i.e., promoting medium to high CMS). As their children grow older and engage in more complex social interactions (i.e., from age 5 onward), the focus should shift towards cultivating a more robust understanding of the child's mind (i.e., promoting high CMS). Hence, parents and caregivers may consider the importance of conveying a sense of assurance and understanding regarding emotions and mental states as children grow. Yet, at the same time, clinicians need to be vigilant about a lack of flexibility and consideration of alternative perspectives in parents when reasoning about their child's mind by addressing inappropriate parental IC, such as hypermentalizing or intrusive mentalizing. This aligns with the results in Chapter 5, showing that high levels of certainty regarding inaccurate estimations of the child's mind are considered maladaptive and can hinder the child's ToM development. In such cases, interventions should support parents by fostering 'appropriate' knowing. For instance, cognitive capacities in children may lead parents to believe that their children have good ToM capacities, and that they as parents seem to know the mind of their children quite well. While, in reality, the children may not perform so well in the domains of affective and belief-desire reasoning. If this is the case, the therapeutic task with these parents may be to help them realize that they do not know the mind of their child as well as they think they do. This tailored approach aligns treatment strategies with the evolving needs of both younger and older children, which might optimize the effectiveness of interventions.

Addressing and Repairing Mentalizing Breakdowns

Given the pivotal role of PM regarding parent and child psychological functioning, it is recommendable to prioritize the promotion of parental mentalizing, especially in cases where maladaptive parental mentalizing is identified. While the enhancement of adaptive parental mentalizing is undoubtedly valuable and contributes to positive parent-child interactions, focusing on the *absence* of distorted parental mentalizing may be even more critical in shaping healthy and resilient developmental trajectories. The findings in this dissertation clearly indicate that the well-being of both parents and children is intricately

linked to whether or not the parent tends to make manifest non-mentalizing statements about their child's behaviour and intentions.

This highlights the significance of recognizing maladaptive parental mentalizing as a potential "red flag", signaling the need for targeted interventions and support. Identifying families with a propensity for distorted mentalizing allows for early interventions that can prevent or mitigate the impact of developmental and emotional challenges. Furthermore, the emphasis on the absence of distorted parental mentalizing reinforces the idea that creating a nurturing and understanding environment, free from negative assumptions, is fundamental for fostering optimal parent-child relationships and overall family well-being. Hence, the clinician may want to address breakdowns in parental mentalizing during therapy sessions, specifically the re-emergence of pre-mentalizing modes.

These impairments in parental mentalizing, also prominently displayed in the cases of Samira and Jennifer, can be grouped into three distinctive modes of experiencing subjectivity, namely psychic equivalence, teleological and pretend mode (Baradon & Campbell, 2023; Luyten et al., 2020). In psychic equivalence mode, mental states are equated with reality to an extend that leaves no room for alternative perspectives. This often involves an inability to differentiate between one's own mental states and those of the infant, and a tendency to attribute their own state of mind to the child (i.e., 'I am a terrible mother, my child will never love me'). Elevated scores on PM and/or exceptionally high CMS scores may suggest routine functioning in psychic equivalence mode.

In teleological mode, mental states are interpreted solely based on their physical outcome, often accompanied by a demand for tangible proof to recognize or alter mental states (i.e., 'If she doesn't sleep until 6 am, she will be insufferable for the rest of the day' or 'My baby is not crying, therefore he must be ok'). High PM levels are often representative for frequent teleological functioning in the parent.

The pretend mode is characterized by a profound disconnection between reality and internal experiences, often manifested as 'psychobabble' or hypermentalizing, and/or an inability to enter the child's internal subjective world and engage in pretend play. Parents may construct theories about the child's behaviour disregarding reality, such as the child's age and associated developmental capacities. Or they become entangled in endless, cognitively or affectively overwhelming narratives unrelated to reality. Extremely high IC levels, often accompanied by either extremely high or low CMS and high PM, may indicate a parent's inclination to function in pretend mode.

When addressing psychic equivalence and teleological modes, it is crucial to align with the parent's perspective from a genuinely inquisitive stance, allowing authentic validation of parental experiences and needs, before introducing alternative perspectives. In contrast, when dealing with pretend mode, the focus shifts to challenging or disrupting the ongoing psychological process, achieved through techniques such as detailed elaboration and clarification of mental states, and addressing current and interpersonal affects (Bateman et al., 2023).

Additionally, given the associations between attachment dimensions and maladaptive parental mentalizing, clinical interventions should consider the role of attachment dynamics in parent and child well-being. Therapeutic strategies may involve exploring and addressing attachment-related anxieties and avoidance. Complimentary individual therapy may support parents in developing secure attachment strategies that in turn can contribute to healthier parent-child relationships. Similarly, recognizing the link between PM and parenting stress highlights the importance of stress reduction strategies in clinical interventions. Therapists can work with parents to develop coping mechanisms and stress management techniques. This is also in line with recent research on the role of attachment-hyperactivating and deactivating strategies in explaining relationships among stress and the re-emergence of pre-mentalizing modes (Luyten et al., 2020).

Finally, it is important to include both parents in early intervention programs, as mothers and fathers may provide unique contributions with regard to child development. Specifically, parental gender differences were observed in the relationship between attachment dimensions and PM. Therefore, clinicians should be attuned to gender-specific dynamics (i.e., attachment anxiety in fathers and attachment avoidance in mothers) and consider tailored strategies in therapeutic interventions.

General Limitations and Directions for Future Research

The specific limitations of each of the studies in this doctoral dissertation have been described in Chapter 2-6. In this section, the main limitations of the reported studies will be briefly reviewed and discussed in relation to the overall aims of this doctoral dissertation and directions for future research.

The Use of Self-Report Questionnaires

An important limitation pertains to the use of parental self-report measures for assessing PRF, emotional availability, parental attachment dimensions, parenting stress, and child social-emotional development, in several studies, introducing some methodological difficulties. First, self-report questionnaires are susceptible to response bias. This is particularly relevant for questionnaire-based measures of parental mentalizing (i.e., the PRFQ), where parents must rely on their mentalizing capacity to respond to questions about parental mentalizing. To some extent, this involves taking a meta-perspective to evaluate their own mental states based on pre-selected statements (Fonagy et al., 2016; Stuhrmann et al., 2022). This limitation was mitigated by including online and quasi-online measures of parental mentalizing, such as MMM (Chapter 6) and MTE (Chapter 5). These online measures provide less opportunity for parents to control or appraise their narrative or behaviours, potentially yielding different results when examining associations with developmental outcomes.

Studies exploring associations between self-reported PRF and interview-based or observer-rated measures of parental mentalizing have reported mixed results, ranging from non-significant to modest associations (Anis et al., 2020; Krink & Ramsauer, 2021; Malcorps, Vliegen, Nijssens, et al., 2022; Smith-Nielsen et al., 2024), reflecting substantial conceptual and methodological differences between these approaches. However, this does not imply that self-reported measures of PRF, such as the PRFQ, are less valid in examining associations with developmental outcomes. On the contrary, the reliability and validity of the PRFQ have been well-documented over the past years by several studies in different countries (i.e., Belgium, United Kingdom, Italy, Denmark, Portugal, Canada, Iran, Korea, and China), within clinical as well as non-clinical populations, and among parents of children of different ages ranging from pre-borns to children aged 12 years (De Roo et al., 2019; Goudarzi et al., 2022; Lee et al., 2020; Moreira & Fonseca, 2022; Pajulo et al., 2015; Pajulo et al., 2018; Pazzagli et al., 2018; Vahidi et al., 2021; Wendelboe et al., 2022; Wendelboe et al., 2021; Ye et al., 2022). Moreover, despite conceptual and methodological differences, the various operationalizations are rooted in similar underlying mental processes and are considered equally important in predicting parental and child developmental outcomes with unique and differential contributions. This was also supported by the findings in Chapter 4 and 5, in which different operationalizations of parental mentalizing (i.e., PRFQ and MTE) yielded similar relationships with ToM

development. Notably, in Chapter 5, medium to large effects of domain-specific parental mentalizing on ToM development were found, whereas meta-analyses have reported only small effects of parental mentalizing on the development of ToM (Devine & Hughes, 2018). In addition, Chapter 6 indicated that PM was associated with non-attuned MMM in mothers of pre-verbal children, providing further evidence for the relationship between maladaptive features of offline and online parental mentalizing, while adaptive features of online and offline appeared to be unrelated. Moreover, this study suggested differential relationships between PRF and MMM on the one hand, and EA on the other. Yet, more research using different measures of parental mentalizing is needed to explore the associations between these different operationalizations and to investigate the precise role of offline and online parental mentalizing on developmental outcomes.

Second, shared method variance might have influenced results, particularly in instances where the PRFQ was associated with the parent's self-reported attachment insecurities (Chapter 2 and 3), parenting stress (Chapter 2), emotional availability (Chapter 6) and parent-reported social-emotional child development (Chapter 3). Notably, multi-informant studies on child social-emotional development showed only modest associations between observer-rated and parental or child self-report measures thereof (e.g., Gartstein & Marmion, 2008; Karp et al., 2004; Van Roy et al., 2010). Therefore, it would also be interesting to investigate whether PRF accounts for differences in ratings of child development, given that informant discrepancies are thought to be related to the attributions that different informants have about the causes of the child's behaviours (De Los Reyes & Kazdin, 2005).

Hence, future studies adopting a multi-method and multi-informant design are needed to see whether our results can be replicated when other measurement methods are used, and to further investigate the unique and differential contributions of various operationalizations of parental mentalizing.

Sample Characteristics

Another important limitation is the sample size in the reported studies. Although statistical approaches were employed that are known for their robustness in relatively small samples, certain analyses may have been underpowered to detect the typically small effects in this area of research. Nonetheless, overall findings seemed quite robust and aligned with

theoretical expectations, although some relatively substantial correlations were significant only at the trend level.

Additionally, the study samples were relatively homogeneous, consisting mainly of middle-class, well-educated parents. Consequently, a higher prevalence of effective parental mentalizing (i.e., low PM and medium to high levels of IC and CMS) is reasonable to assume. Correspondingly, results indicated that most parents had PRF scores considered normative in community samples, with some reporting very high scores on IC or CMS (i.e., 7) or PM (i.e., above 2). Notably, none of the parents reported very low scores on IC or CMS (i.e., an indicator of hypomentalizing), a phenomenon more likely to occur in at-risk samples (Medrea & Benga, 2021). Yet, even within this relatively well-educated and well-functioning group, the effects of distortions in PRF were evident, with PM appearing as a sensitive indicator of vulnerabilities in psychological development, such as parental attachment insecurities (Chapter 2 and 3), parenting stress (Chapter 2), problematic child socio-emotional development (Chapter 3), lower child ToM capacities (Chapter 4), decreased dyadic emotional availability (Chapter 6), and higher non-attuned MMM (Chapter 6). Low levels of IC and CMS, on the other hand, did not necessarily seem associated with problematic developmental outcomes, although one can imagine that extremely low scores on these dimensions of PRF might also be quite maladaptive. Hence, different results may emerge in more at-risk samples, warranting future research. Investigations into whether these findings apply to more socio-economically and culturally diverse samples, as well as at-risk and clinical samples, are crucial before generalizations can be made to other samples.

Lastly, although mothers and fathers were included in the Parent-Child Study (Chapter 2 and 3), only maternal mentalizing was investigated in the ToM Study (Chapter 4 and 5) and MMM Study (Chapter 6). It might well be that the contribution of PRF dimensions has a different pattern in fathers. Similarly, associations among different operationalizations of parental mentalizing (i.e., PRF and MM) might present an alternative pattern of results in fathers. Therefore, future research should encompass fathers to identify potential differential developmental paths and examine the unique role of paternal mentalizing over and above maternal mentalizing concerning child psychological functioning.

In conclusion, further research in larger and more diverse groups, encompassing both mothers and fathers, and oversampling for at-risk parents, is necessary before

generalizations can be extended to other samples. This will aid in clarifying the role of the different PRF dimensions in understanding developmental outcomes in parents and their children.

Study Design

A third cluster of limitations is related to the theoretical and methodological design of our studies. The studies in this dissertation solely focused on parental mentalizing and its associations with developmental outcomes. However, it is important to acknowledge that parental mentalizing is unlikely to be the only and most influential factor shaping parent and child psychological functioning. A comprehensive understanding of developmental trajectories should involve consideration within the broader context of various factors, such as parental psychopathology, family structure, life events, early adversities, and genetic predisposition, along with child features like temperament (Deater-Deckard, 2004; Sharp & Fonagy, 2008). Recent theoretical advancements, particularly in the realms of epistemic trust and social learning, underscore the significance of assessing the broader caregiving environment in delineating children's social-emotional development (Luyten et al., 2020; Luyten, Nijssens, et al., 2017; Sharp & Fonagy, 2008). This conceptual framework perceives the causal processes involved in psychological development as multifactorial, challenging the validity of simplistic deterministic models of child development (Luyten et al., 2020). In the light of these considerations, it becomes imperative to recognize and integrate the complex interplay of various factors influencing the parent-child dynamic and, consequently, developmental outcomes.

Hence, while the relationships investigated in this dissertation might have suggested unidirectional paths from parental mentalizing to parent and child developmental outcomes, it is crucial to acknowledge bidirectional relationships. As noted, child developmental trajectories are thought to be influenced by evocative person–environment correlations (Klahr & Burt, 2013; Marceau et al., 2013), where child features increasingly influence the parent–child interaction, including parental mentalizing. However, the cross-sectional design of the ToM Study (Chapter 4 and 5) precluded drawing conclusions about the nature of the relationships found. Similarly, the Parent-Child Study (Chapter 2 and 3) and the MMM Study (Chapter 6), although designed as two-wave prospective studies, were limited in the extent to which conclusions can be drawn regarding the causal direction of the reported associations. Therefore, results should be interpreted with caution. Further

longitudinal research in larger samples, encompassing both normally developing and at-risk children, is needed to specify potential evocative person–environment correlations and to identify the unique contribution of (different operationalizations of) parental mentalizing concerning developmental outcomes, and vice versa.

It may well be, for example, that children with deficits in social-emotional competences (see Chapter 3) or lower affective ToM capacities (see Chapter 4) are more challenging for their parents, leading to higher levels of parental attachment insecurity and distorted parental mentalizing (i.e., PM), creating a vicious cycle of increasing impairments in social-emotional development in children and increasing PM in parents. In infancy, these evocative person–environment correlations may be weaker, with parental features being the most important factor driving effects on child development, whereas parent and child features may become progressively more interdependent. Alternatively, as the child's ToM understanding becomes more developed, this might also help the mother to better understand the child's mind, leading to more accurate estimations thereof (see Chapter 5). Furthermore, parenting stress (see Chapter 2) itself can also influence parental mentalizing, leading to even more parenting stress. Research on the impact of arousal on mentalizing capacities showed that distress activates the attachment system and the use of hyperactivating or deactivating attachment strategies (associated with attachment anxiety and avoidance, respectively), in turn causing impairments in mentalizing, which can be accompanied by the use of prementalizing modes (Fonagy & Luyten, 2009; Luyten & Fonagy, 2015; Schneider-Hassloff et al., 2015). Yet, to the best of our knowledge, no study to date investigated whether PRF dimensions are altered during stressful conditions.

Hence, sufficiently powered multi-wave longitudinal studies in different samples (e.g., at-risk, adoptive, fathers) are needed to specify potential evocative person–environment interactions and to identify the contributions of each of these parameters. These types of studies allow to run more complex statistical models that enable the disentanglement of bidirectional child and parent effects over time, clarifying the nature and reciprocity of these relationships. Such an approach would enhance our understanding of how both adaptive and maladaptive parental mentalizing impact psychological functioning in both parents and children. Furthermore, it would provide insights in how child factors contribute to either enhanced or distorted parental mentalizing. Including different measures of parental mentalizing also allows to investigate bi-directional associations between different operationalizations of parental mentalizing, and to identify differential

relationships, therefore expanding the knowledge on the discriminant and predictive validity of these constructs. Additionally, experimental designs in which PRF dimensions are measured during 'normal' versus stressful or affectively primed conditions could help us understand the impact of stress on changes in parental mentalizing.

Finally, it is important to consider potential age-related influences on the presumed associations between parental mentalizing and developmental outcomes. The findings in this dissertation clearly suggest that relationships between features of parental mentalizing (i.e., IC, CMS, and MTE) and ToM (Chapter 4 and 5), as well as between PRF (i.e., PM) and MMM (Chapter 6) may vary depending on the child's age or language development, respectively. It is evident that future longitudinal investigations and identification of crucial moderators are essential to explore whether the associations among (different operationalizations of) parental mentalizing and developmental outcomes shift from infancy to toddlerhood, from toddlerhood to childhood, from childhood to adolescence, and so forth. Moreover, there is a need for future research investigating the predictive validity of observer-rated MMM in parents of verbally expressive children (see Chapter 6), as this might be a less appropriate measure to assess MMM with older children, due to changes in the child's developmental capacities that affect the relationship between MMM and others outcomes (Meins & Fernyhough, 2010). However, the upper age at which the assessment of observer-rated MMM is valid has not yet been established (McMahon & Bernier, 2017).

Self- versus Other-Oriented Parental Mentalizing

The multidimensional nature of general mentalizing has been well-documented in neuroscientific and behavioural studies, indicating that mentalizing is underpinned by four dimensions: automatic-controlled, internal-external, self-other, and cognitive-affective. Furthermore, mental disorders have been consistently linked to distortions in mentalizing characterized by various imbalances in these dimensions (Luyten et al., 2020). While this dissertation predominantly focused on the multidimensional nature of PRF, with PM, IC and CMS as key dimensions of parental mentalizing, it is also important to acknowledge the broader framework of the four dimensions mentioned above. The following paragraph specifically elaborates on the self-other dimension of parental mentalizing and its implications for assessing parental mentalizing, including a discussion of the limitations related to the use of the PRFQ and directions for future research.

As reiterated throughout this dissertation, parental mentalizing refers to the parent's capacity to reflect upon his/her own internal experiences as well as those of the child (Luyten, Nijssens, et al., 2017; Sharp & Fonagy, 2008; Slade, 2005). Therefore, the self-other dimension of mentalizing is inherently linked to parental mentalizing, as the conceptualization of parental mentalizing encompasses a parent's capacity to mentalize not only the child but also themselves as parent. Additionally, this extends to an understanding of the interactive dynamics within the parent-child relationship and the reciprocal influence between themselves as a parent and the child. Distortions in parental mentalizing may manifest along various points on the self-other dimension, potentially affecting both ends of this spectrum. Typical examples of distortions in self-other parental mentalizing include the parent's tendency to conflate their own mental state with that of the child, failures to recognize the opacity of mental states, problems with perspective taking, or a disconnection from their own mental states or those of the child. Effective parental mentalizing is reflected in a delicate interplay between reflecting on the self (parental) state of mind and extending this reflective capacity to the child's state of mind. Balancing this capacity is also crucial in therapeutic work that aims at enhancing parental mentalizing (Redfern & Cooper, 2015).

The significance of (assessing) self-mentalizing is further reinforced by research in the field of trauma. Growing evidence suggests that the parent's capacity to reflect about their own traumatic experiences, known as trauma-RF (Ensink et al., 2017; Ensink et al., 2014), may serve as a protective factor in the intergenerational transmission of early adversities. This is indicated by a higher likelihood of developing secure attachment relationships with their children (Berthelot et al., 2015) and substantially lower risks of exposing their own children to abuse (Borelli et al., 2019).

A critical consideration for a thorough evaluation of parental mentalizing is whether the PRFQ effectively measures the self, other, and/or relational dimensions of parental mentalizing. The PM and IC subscale items primarily prompt parents to report their thoughts, feelings, and perceptions concerning their child's behaviours, emotions, and experiences, rendering it other-oriented. Similarly, the items in the CMS subscale primarily evaluate the parent's certainty about the child's mental state (i.e., 'I always know why my child acts the way he or she does'), but one item also evaluates certainty about their own mental state (i.e., 'I always know why I do what I do to my child'). Moreover, deviated scores on the PM, IC and CMS scales are indicative for problems in the realm of self-other distinction. For example, elevated scores on PM and CMS may suggest an inability to

differentiate between one's own mental states and those of the infant, and a tendency to attribute their own state of mind to the child. Extremely high scores on CMS may indicate failures to recognize the opacity of mental states. Problems with perspective taking may be reflected in high PM and/or extremely low or high IC or CMS. A lack of self-mentalizing and an understanding of how the relationship with the child affects the parent's own thoughts, feelings, and needs, however, is not captured in the items of the PRFQ.

Hence, a potential limitation of the PRFQ is its primary focus on child-oriented mentalizing, making it less suitable for assessing the parent's self-mentalizing. Measures that primarily focus on self-mentalizing would inquire more about a parent's thoughts and feelings related to their own experiences and emotions. Given that self-mentalizing is considered a prerequisite for other-mentalizing, investigations into developmental outcomes or clinical practice should ideally incorporate measures covering both self- and other-oriented parental mentalizing. In research, the PRFQ can be combined with the Reflective Functioning Scale for the Parent Development Interview (PDI-RFS) that can assess both self- and child-mentalizing (Borelli et al., 2016; Smaling et al., 2016). In clinical practice, assessment of the PRFQ can be combined with the 'Parenting Map' and the 'Parenting APP', two tools developed in the context of the Reflective Parenting Model (Bateman et al., 2023; Redfern & Cooper, 2015), designed for evaluating both the self and other dimension of parental mentalizing. The Parent Map operates on the premise that the ability to self-mentalize is crucial for effective affect regulation, especially in emotionally charged situations. This resource assists parents in discerning their current mental state, considering various factors such as immediate experiences, family history and personal early experiences. Its primary goal is to help parents recognize situations that might trigger intense emotions and jeopardize their mentalizing and affect regulation. By utilizing this tool, parents are guided to construct a map outlining their preferred parenting approach and identifying instances where they are at their parenting best. In tandem, the Parenting APP, is designed to enhance the parent's capacity to mentalize their child. It seeks to cultivate the parent's interest and curiosity in their child's mental states that underlie their behaviour, thereby fostering perspective-taking skills and promoting empathy (Bateman et al., 2023; Redfern & Cooper, 2015).

A possible intriguing avenue for future research may involve expanding the PRFQ by incorporating items that specifically assess the parent's self-mentalizing, contributing to a more nuanced understanding of the intricacies of parental mentalizing. Moreover, this

would allow us to investigate differences in self- and other-certainty, as imbalances between those two dimensions (i.e., other- over self-certainty) is associated with personality dysfunction and symptom distress (Müller et al., 2023), and thus might also be indicative of maladaptive parental mentalizing.

The Multifaceted Nature of PM and The Need for Profile Studies

A related issue is the multifaceted nature of the PM subscale, encompassing items related to psychic equivalence, teleological and pretend mode. The heterogeneity inherent in this scale might elucidate the different findings on the internal consistency of the PM scale, which have ranged from low to good across studies (Wendelboe et al., 2021). This variability may be attributed to the distinct ways a prementalizing stance manifests among parents with distorted parental mentalizing, particularly in community samples. For instance, a parent may engage more in a teleological mode while exhibiting less inclination towards a pretend mode. Consequently, elevated scores on specific PM items may coexist with others falling within the normative range. In larger and more heterogeneous samples, such as those oversampling for at-risk individuals and parental psychopathology, distortions in parental mentalizing may be more widespread, resulting in elevated scores across the entire PM scale. This, in turn, could contribute to higher internal consistency of PM in these samples. Alternatively, it may also well be that the lower internal consistency reflects a social desirability bias and/or defensive non-agreement. In this regard, the findings in Chapter 6 unexpectedly indicated that PM was unrelated to both hostility and intrusiveness, which could be indicative for defensive non-agreement of the parent.

Furthermore, each PM item can be attributed to multiple non-mentalizing modes, depending on how the item is interpreted (See Table 2 for an overview). For example, high scores on item 4, 10 or 13 (i.e., *'My child cries around strangers to embarrass me', 'My child sometimes gets sick to keep me from doing what I want to do',* and *'When my child is fussy he or she does that just to annoy me'*, respectively) can refer to pretend mode or hypermentalizing (i.e., pointing towards a disconnection from reality, especially in parents of infants), psychic equivalence mode (i.e., when the emphasis is on ascribing maladaptive attributions to the child, where several behaviours are seen as a confirmation of this assumption), or teleological mode (i.e., when emphasis is on the goal-directedness and intentionality of a specific behavior). Similarly, a high score on item 7 (*'I find it hard to actively participate in make believe play with my child'*) can refer to pretend mode (i.e.,

when the parent experiences emptiness, lack of playfulness, lack of connection, and hence, an inability to enter the child's world) or psychic equivalence mode (i.e., concrete thinking: a chair is a chair and cannot be a train). Hence, it is difficult to determine from a single (and written) statement what the underlying modes are. In clinical practice, the practitioner can ask the parent why they gave an increased score, providing clarity and a more comprehensive understanding about the underlying experiences of subjectivity.

Table 2

Classification of PM Items into Non-Mentalizing modes

PM (item)	Non-mentalizing mode
1. The only time I'm certain my child loves me is when he or she is smiling at me.	Teleological
4. My child cries around strangers to embarrass me.	Hypermentalizing Psychic Equivalence Teleological
7. I find it hard to actively participate in make believe play with my child.	Not applicable Pretend Psychic Equivalence
10. My child sometimes gets sick to keep me from doing what I want to do.	Hypermentalizing Psychic Equivalence
13. When my child is fussy, he or she does that just to annoy me.	Hypermentalizing Teleological
16. Often, my child's behaviour is too confusing to bother figuring out.	Psychic Equivalence (hypomentalizing with active disavowal / avoidance)

Moreover, and maybe even more importantly, it may well be that the PM scale captures different types of disturbed parental mentalizing, depending on the age of the child. In parents of infants, a high score on item 4 (*'My child cries around strangers to embarrass me'*) is more likely to refer to hypermentalizing, in which parents give meaning to the child's behaviour, but in a way that is disconnected from reality (i.e., the developmental phase of the child is not taken into account). For instance, in infants, crying is the primary means of communication to indicate that something is 'unpleasant', it is unlikely that the baby intends to shame the parent. In contrast, in parents of older children, high scores on this item are more likely to refer to psychic equivalence or teleological mode. Similarly, item 7 (*'I find*

it hard to actively participate in make believe play with my child') may receive meaningless low or high scores in parents of infants, given the fact that babies are not yet in the developmental phase of make-believe play. Hence, the parent can give a low score because they find the item is not applicable to their situation, or conversely, a high score because the parent thinks he/she is missing out in something that should be done, but they don't know how to do it.

Given these various expressions of maladaptive parental mentalizing, it is important to acknowledge the complexity of PM and its diverse manifestations. Additionally, it may well be that the PM scale is less suitable for parents of infants, a suggestion that has also been made in recent validation studies of a shortened version of the PRFQ for use with infants (Madsen et al., 2023; Wendelboe et al., 2022; Wendelboe et al., 2021). Hence, future research should focus on refining the PM subscale, exploring the nuances within each mode, and considering how different combinations may impact parent-child dynamics and child outcomes.

Finally, despite the presumed independence of PRF dimensions, they often exhibit overlap or co-occurrence (Luyten, Nijssens, et al., 2017), with different combinations revealing distinct manifestations of distortions in self-other mentalizing, hypermentalizing, or hypomentalizing. This intricate interplay among PRF dimensions suggest a need for further investigation into their dynamic relationships and potential synergies or conflicts. In this regard, profile studies could significantly contribute to a deeper understanding by identifying patterns of co-occurrence among different PRF dimensions. This will allow to investigate how specific combinations, such as hypermentalizing or hypomentalizing, impact parenting behaviours and child outcomes differently. In addition, longitudinal profile studies can provide valuable information about the developmental trajectories associated with different PRF profiles. To date, only one study has explored the presence of PRF profiles in a longitudinal community sample from pregnancy to toddlerhood, using a person-centered approach (Lindblom et al., 2022). However, they excluded the essential dimension PM. Results showed a decrease in the number of profiles and a progression towards high PRF over time. Interestingly, variations in profiles were mainly driven by variations in IC. Children of mothers with a stable high IC profile showed higher social-emotional competences than children of mothers with medium to low IC profiles. Low PRF with changes in maternal profile membership over time was associated with child internalizing and externalizing problems. Another study that investigated combinations of PRF

dimensions indicated that the combination of high levels of PM and CMS with low levels of IC have been found to predict infant anxious-resistant attachment (Luyten, Mayes, et al., 2017).

However, future research in sufficiently powered heterogeneous samples is needed to further clarify the existence of PRF profiles and associations with developmental outcomes. Furthermore, insight in the potential moderating or mediating factors underlying the co-occurrence of PRF dimensions can contribute to a more comprehensive and nuanced understanding of these complex dynamics. This knowledge may, in turn, inform the development of targeted and tailored interventions that address the unique challenges associated with each profile, thereby enhancing their effectiveness.

Conclusions

This doctoral dissertation aimed to broaden the knowledge on the role of parental mentalizing in the psychological development of both parent and child. In summary, the reported studies underscored and supported the multidimensional nature of parental mentalizing and its impact on the well-being of both parents and children. Specifically, the subscale 'Pre-mentalizing Modes' was found to be a sensitive indicator of maladaptive parental mentalizing that was strongly associated with negative developmental outcomes, emphasizing its predictive value in understanding social-emotional and regulatory problems in both parents and children. In contrast, the subscales 'Interest and Curiosity' and 'Certainty about Mental States' emerged as more adaptive and task-specific dimensions. Their age-dependent effects highlighted the dynamic nature of parental mentalizing and reinforced the understanding that the extent to which parental mentalizing is (mal)adaptive strongly depends on the context, influenced by factors such as the child's development stage and specific social and cognitive demands. As a result, parental mentalizing is considered most effective when aligned with the unique challenges and opportunities of a particular ecological or social context. Consequently, these findings called for a nuanced and personalized approach to parental mentalizing, acknowledging its various dimensions and considering developmental nuances. The importance of adopting such an approach may be particularly significant in therapeutic interventions. In this context, a two-pronged intervention approach was suggested, involving fostering and strengthening appropriate mentalizing, while also addressing and repairing mentalizing breakdown as they occur. The assessment of a PRF profile was identified as a potentially essential component of

therapeutic interventions, as this may enable clinicians to identify areas of strengths and weaknesses in parental mentalizing, thereby facilitating the development of tailored interventions to enhance the parent-child relationship and promote positive child developmental trajectories.

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