Theory of mind during preschool years: Associations with parental mentalizing skills and mental state talk, and links with later social outcomes
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Theory of mind during preschool years: Associations with parental mentalizing skills and mental state talk, and links with later social outcomes

Tese de Doutoramento em Psicologia Básica

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outubro de 2015
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I hereby declare having conducted my thesis with integrity. I confirm that I have not used plagiarism or any form of falsification of results in the process of the thesis elaboration. I further declare that I have fully acknowledged the Code of Ethical Conduct of the University of Minho.

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To my grandfather, Lino Barreto.

Always, always with us.
Acknowledgements

There are not enough words to express my gratitude to the many people that have accompanied me during this long journey. I am that lucky. Nonetheless, I will try my best to do it. And because I will not have enough pages to acknowledge all of those who have somehow helped, I will start by saying a big thank you to all of you, for these past four years. Now, some particular “thank yous” I could not leave unsaid.

First, to my teacher and supervisor Dr Carla Martins, for encouraging me to continue to study and to do research. For all the lessons and challenges. Thank you for being there. To my co-supervisor, Dr Pasco Fearon, for welcoming me to London, for the support, understanding and shared knowledge.

To all the families that made this study possible, by agreeing to spend and share some hours of their lives with us.

To our research team, Professor Eva Martins, Paula Castiajo, Vera Mateus, Eduarda Costa, Carla Antunes, Sara Martins, Mónica Freire, Lília Pinto, Joana Ribeiro and Joana Baptista, without whom all of this would not be possible. More than sharing the many stages of this project, from data collection to coding, thank you for the companionship, for the “emotional ventilation” and for the support.

To Dr. Ana Osório, for all the feedback, encouragement, for sharing ideas and knowledge. To Dr. Elizabeth Meins, for accepting to be part of this project, and for all the relevant feedback.

To my family, my inspiration, always. Again, there are really not enough words. To my mother and father, for believing in me, for helping me stand when I needed, for listening, and always, always, always being there. To my sister, for so many hours listening to me, for the understanding, for the patience, for reading so many versions of this. To my grandparents, for always being with me, for all the encouragement, for all the love. To my husband, for his endless dedication, for sharing everything, for listening to me think, even when not understanding. With you, nothing is ever too heavy.

To my friends Lúcia, Tatiana, Margarida, Patrícia. For everything. For being there, for believing, for supporting. Thank you. A special thanks to Tatiana Magro, friend and colleague, for understanding, for all the hugs and for listening.

To Adrian and Victoria Hull, for welcoming me in their home, and making everything that much easier.
To God, Who was and is always with me, every step of the way.

This is not my project. This is our project, our dissertation. So, here is to us. Thank you.
THEORY OF MIND DURING PRESCHOOL YEARS: ASSOCIATIONS WITH PARENTAL MENTALIZING SKILLS AND MENTAL STATE TALK, AND LINKS WITH LATER SOCIAL OUTCOMES

Abstract

Aims: This PhD aimed to answer three main research questions: 1) to investigate whether adult mentalizing abilities were associated to parental mind-mindedness; 2) to examine the associations between parents’ mentalizing, mental state discourse and their preschool children’s theory of mind (ToM), and 3) to investigate the associations between preschoolers’ ToM and mental state talk and their social competence and behavior, around one year later, while exploring possible gender-specific effects.

Method: Seventy-six families, mother, father and child participated in this study. Children were assessed at two time-points: at 4 ½ years and four months before entering school. At 4 ½ years, participants came to the laboratory. Mothers and fathers were first videotaped during a picture-book reading task with their children, during which both parents’ and children’s mental state talk was coded. Children’s ToM was assessed, using a set of six standardized tasks, as well as their verbal ability. In the meantime, mothers’ and fathers’ mentalizing skills and mind-mindedness were also assessed. Additionally, a set of questionnaires was included, in order to assess the presence of parents’ psychopathological symptomatology, their perceptions regarding their children’s temperament, and gathering relevant socio-demographic information. Around one year later, children were reassessed at their preschools, and data was gathered regarding their teacher-rated social competence and behavior. Results: At 4 ½ years, the association between parents’ mentalizing and mind-mindedness was non-significant, after controlling for their correlates. Moreover, parents’ mentalizing and children’s ToM were not significantly related. Conversely, only mothers’ (and not fathers’) references to mental states, specifically cognitions, were associated with better ToM abilities evidenced by their children. Finally, preschoolers’ ToM and use of mental references, specifically cognitions, were significantly associated. Furthermore, both children’s ToM and references to mental states were longitudinally related to children’s social competence and behavior, at T2, but only for girls. Conclusions: Our findings suggest that mothers and fathers can have different ways of thinking about their children
as mental agents, and contribute differently to their children’s ToM abilities, thus highlighting the importance of considering both parents when investigating their role in the development of their children’s understanding of the mind. It also seems important to continue to study how parents’ mentalizing abilities can contribute to children’s ToM development. Finally, our results suggest the importance of considering gender-specific effects when investigating children’s social cognition.
TEORIA DA MENTE EM IDADE PRÉ-ESCOLAR: ASSOCIAÇÕES COM MENTALIZAÇÃO E DISCURSO ACERCA DE ESTADOS MENTAIS PARENTAIS, E RELAÇÕES COM POSTERIOR COMPETÊNCIA SOCIAL

Resumo

Objetivos: Este projeto de doutoramento teve como objetivo responder a três questões de investigação centrais: 1) investigar se a mentalização em adultos estaríaria associada com as suas percepções parentais dos seus filhos como agentes mentais; 2) examinar as associações entre a mentalização e o discurso acerca de estados mentais parentais e a teoria da mente (ToM) dos seus filhos em idade pré-escolar, e 3) investigar as associações entre a ToM e o discurso acerca de estados mentais das crianças em idade pré-escolar, e a sua competência e comportamentos sociais, cerca de um ano mais tarde, explorando também possíveis efeitos específicos de género. Método: Setenta e seis famílias, mãe, pai e criança, participaram neste estudo. As crianças foram avaliadas em dois momentos temporais: aos 4 ½ anos e cerca de quatro meses antes de entrarem na escola. Aos 4 ½ anos, os participantes visitaram o laboratório. Mães e pais foram primeiros filmados durante uma tarefa de leitura de um livro de imagens com os seus filhos, durante a qual o discurso acerca de estados mentais de pais e crianças foi cotado. A ToM das crianças foi avaliada, usando um conjunto de 6 tarefas estandardizadas, assim como a competência verbal. Entretanto, foram também avaliadas a mentalização e mind-mindedness de mães e pais. Foi igualmente incluído um conjunto de questionários, visando avaliar a presença de sintomatologia psicopatológica dos pais, as suas percepções relativamente ao temperamento dos seus filhos, e obter informações sociodemográficas relevantes. Cerca de um ano mais tarde, as crianças foram reavaliadas nos seus infantários, e foram recolhidos dados acerca das suas competências e comportamentos sociais, na perspetiva dos seus professores. Resultados: Aos 4 ½ anos, a associação entre mentalização e mind-mindedness parentais revelou ser não significativa, depois de controlados os seus correlatos. Também, não foi encontrada uma associação significativa entre a mentalização parental e a ToM das crianças. Por outro lado, só as referências maternas (e não paternas) a estados mentais, especificamente referências a cognições, mostraram estar relacionadas com uma melhor ToM evidenciada pelos seus filhos. Por fim, verificou-se a existência de uma associação significativa entre ToM e as referências a estados mentais, especificamente cognições,
das crianças, em idade pré-escolar. Além disso, a ToM e o discurso acerca de estados mentais das crianças mostraram estar longitudinalmente relacionadas com as suas competências e comportamentos sociais, um ano depois, só no que diz respeito às meninas. **Conclusões:** Os nossos resultados sugerem que mães e pais podem ter formas distintas de pensar acerca dos seus filhos como agentes mentais, e contribuir de forma diferente para o desenvolvimento das suas competências de ToM, salientando por isso a importância de considerar ambos os pais na investigação do seu papel no desenvolvimento da compreensão da mente por parte dos seus filhos. Parece também importante continuar a estudar de que forma é que as competências de mentalização dos pais podem contribuir para o desenvolvimento da ToM das crianças. Por fim, os nossos resultados sugerem também a importância de considerar efeitos específicos de género, na investigação da cognição social das crianças.
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CHAPTER 1

GENERAL INTRODUCTION
Chapter 1
Parents’ mentalizing and children’s theory of mind.

Parents’ mentalizing skills.

Theory of mind (ToM), a term first coined by Premack and Woodruff (1978) in a study with chimpanzees, refers to the ability to impute mental states (e.g., desires, beliefs, emotions) to oneself and to others, and to explain and anticipate behavior based on those same mental states (Astington & Barriault, 2001). It has been a relevant topic in the developmental literature over the past 30 years, with a special focus on the breakthrough occurring in the preschool years, when children become aware of false beliefs (Carpendale & Chandler, 1996).

Contrasting with the many studies investigating ToM in preschool children, very few have looked at this competence in adults. However, in the last few years, the interest of the scientific community in adults’ ToM has been increasing (Apperly et al., 2009). Indeed, recent studies have suggested that ToM continues to undergo significant changes in the transition between late adolescence and adulthood. Dumontheil, Apperly and Blakemore (2010), for instance, carried out what seems to have been the first study to investigate ToM, specifically visual perspective taking, beyond early childhood and found that the participants’ accuracy in a visual perspective taking task continued to improve between adolescence and adulthood. These results suggest that despite the fact that ToM is typically acquired early in development, there is much to say about it, beyond the preschool years.

Considering that the mental concepts (e.g., desires, emotions, beliefs, intentions) that would be necessary for ToM development are typically acquired in the preschool years, if not before (Wellman, Cross, & Watson, 2001), it is evident that this ability has long been acquired, developed and put into practice by the time an individual reaches adulthood. Thus, studying ToM in adults implies a shift in perspective, both in theoretical and methodologic terms. First, several constructs arise more frequently in the literature: in addition to ToM, researchers use broader terms such as mentalizing (e.g., Fernyhough, 2008) or mindreading (e.g., Apperly, 2011), as well as terms entailing ToM abilities, such as perspective taking (e.g., Samson, Apperly, Braithwaite, Andrews, & Scott, 2010). For the purpose of this dissertation, we will from now on use the term mentalizing when referring to adults’ ToM. Second, there is a change in the methodologies used to assess mentalizing abilities. While some researchers have
adapted the typical false belief tasks used with children (Wellman & Liu, 2004; Wimmer & Perner, 1983) to be used with adults (e.g., Bernstein, Thornton, & Sommerville, 2011; Birch & Bloom, 2007; Sommerville, Bernstein, & Meltzoff, 2013), others have used tasks that go beyond false belief understanding, requiring adults to use their mentalizing skills in order to follow instructions during online communication (Communication game, Keysar, Barr, Balin, & Brauner, 2000), to take into account others’ visual perspective (Samson et al., 2010) or to decode others’ mental states based on eye expressions (Eyes task, Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001). In addition, there is a change in the type of research questions to be answered. According to Apperly (2011, p. 109), “trying to study adults shifts the kind of questions we want to ask away from whether an individual is a mindreader (and therefore whether she has mindreading concepts) to how she solves the cognitive challenges of mindreading.” In fact, several researchers have now pointed out that despite the fact that adults typically have a mature mentalizing system, they continue to make errors when dealing with first-order and second-order false belief reasoning (e.g., Apperly, Warren, Andrews, Grant, & Todd, 2011; Birch & Bloom, 2007; Friedman & Leslie, 2004) and perspective-taking tasks (e.g., Apperly et al., 2009; Epley, Morewedge, & Keysar, 2004).

Therefore, adults evidence individual differences in their use of their mentalizing abilities, and there are now several studies regarding adult mentalizing which have been showing links between those individual differences and adults’ cognitive competences, such as executive function abilities (e.g., Apperly et al., 2009, 2011; Bull, Phillips, & Conway, 2008).

**Parents’ mind-mindedness.**

Another line of investigation on adult mentalizing has sought to examine this competence within the framework of parenthood (Sharp & Fonagy, 2008). As a result, researchers coming from distinct backgrounds, and guided by different purposes, have come up with other constructs which are conceptualized by some authors as operationalizing parental mentalizing skills (Sharp & Fonagy, 2008). One such construct, based on a cognitive-developmental perspective, and attempting to explain the intergenerational transmission of attachment security, is mind-mindedness, defined as a parents’ tendency to represent and describe their child in terms of mental characteristics (Meins, Fernyhough, Russell, & Clark-Carter, 1998) – *offline* mind-
mindedness – and/or to appropriately comment on their infants’ mental states, during interactions (Meins, Fernyhough, Fradley, & Tuckey, 2001) – online mind-mindedness.

Since the construct was first introduced, research has been consistently showing that parents who are more mind-minded, both when describing and interacting with their children, have children who evidence better ToM skills (e.g., de Rosnay, Pons, Harris, & Morrell, 2004; Kirk, Pine, Wheatley, Howlett, Schulz, & Fletcher, 2015; Laranjo, Bernier, Meins, & Carlson, 2010, 2014; Lundy, 2013; Meins & Fernyhough, 1999; Meins et al., 2002, 2003; Meins, Fernyhough, Arnott, Leekam, & de Rosnay, 2013).

Theory of mind in preschool years.

Since it was first introduced, the construct of ToM has lured the scientific community, particularly the developmental area, with several researchers being interested in studying how children come to develop their understanding of the mind, and what outcomes are linked to children’s ToM development. Accordingly, previous findings have been documenting the importance of children’s ToM, for instance, in the development of social competence and behavior, with children who evidence a better ToM than their peers showing more adjusted, prosocial, and social competent behaviors (e.g., Capage & Watson, 2001; Lalonde & Chandler, 1995; Razza & Blair, 2009; Weimer & Guajardo, 2005).

Furthermore, researchers have also been interested in the when and the how of the acquisition of this important socio-cognitive milestone. As to the question of when it is acquired, despite recent findings suggesting that infants already display an understanding of the mind (e.g., Onishi & Baillargeon, 2005; Träuble, Marinovic, & Pauen, 2011), most of the investigation in the area seems to agree that typically there is a period of conceptual change between the ages of 3 and 5 years, during which children become capable of understanding the representational nature of beliefs (Wellman et al., 2001). As representations of reality, two different persons can have different beliefs about the same situation; moreover, those beliefs can also be misrepresentations of reality, and therefore can be false beliefs. Thus, false belief understanding has been taken as a marker of ToM acquisition, and so children are said to have developed a ToM when they are able to pass false belief tasks, typically during the preschool years (Wellman et al., 2001). However, while several studies have been looking at
preschoolers’ understanding of false belief as an index of their underlying ToM abilities, others have been focusing on children’s tendency to spontaneously refer to mental states, proposing this as an also important marker of children’s understanding of the mind (e.g., Bartsch & Wellman, 1995; Bretherton & Beeghly, 1982). Moreover, these studies have found evidences suggesting that even before children are typically able to understand false beliefs, they understand other, simpler, mental states (Bretherton & Beeghly, 1982; Peterson & Slaughter, 2006). For instance, children seem to start by understanding behavior according to its underlying desires and only later on understand that their own and others’ beliefs and cognitions also affect behavior (Wellman & Wooley, 1990). Accordingly, this same pattern appears to translate into children’s discourse, as it seems that typically children start by making references to desires before they refer to cognitions (Bretherton & Beeghly, 1982; Peterson & Slaughter, 2006; Tardiff & Wellman, 2000). Building up on these findings, Wellman and Liu (2004) proposed to develop a scaled set of ToM tasks, following a developmental progression that would assess children’s understanding of a series of mental constructs that compose ToM. These would start with children’s understanding that two people can have distinct desires (Diverse desires) and beliefs (Diverse beliefs), going through their ability to recognize that someone can not know something, despite it being true (Knowledge access), followed by their understanding of false beliefs (Contents false belief and Explicit false belief) and ending with higher-order tasks, assessing children’s more sophisticated comprehension of the links between beliefs and emotions (Belief emotion and Real-Apparent emotion).

However, even during this critical stage for ToM development, there seems yet to be some variability as to how developed children’s ToM is, and so investigation has consistently found individual differences in preschoolers’ performance in ToM tasks, with some children showing a better understanding of the mind earlier than others. Numerous researchers have tried to explain these differences, thus focusing on the question of how is ToM developed. Accordingly, several theories have been proposed in an attempt to answer this question. On the one hand, some authors view the understanding of the mind as having an innate component (e.g., Baron-Cohen, 1997; Leslie, 1987), these constituting the modular accounts of ToM development. According to these theories, there would be a specific part of the brain that would be specialized in theory of mind processing – a theory of mind module, that would start to function, for
instance, after the appropriate neural maturation (Doherty, 2009). Conversely, other theories have been put forward, privileging the role of the context children grow up in, of their experiences and interactions with others. Following this line, advocates of the theory-of-mind (e.g., Gopnik & Wellman, 1992; Perner, 1995) suggest that children progressively construct their understanding of the mind, as a theory, by observing others’ behavior. Children would then rely on domain-general mechanisms, in order to gradually construct mental state concepts (e.g., beliefs) and form their theories (Blair, 2003). Other authors support the simulation theory (e.g., Harris, 1992), which proposes that children understand the mind via a simulation process, by imagining themselves in others’ position. Thus, here theory of mind would not be as much based on a theorising process, as it would on children’s ability to think about their own mental states in the first place (Doherty, 2009). Also emphasizing the relevance of the social world children live and grow in, an important contribution regarding this question was made by Vygotsky’s (1978) socio-cultural perspective, which highlighted the significance of interpersonal relationships in children’s development. Hence, research has found evidence pointing out the crucial role played by social relationships, particularly within the family context, in children’s ToM development (Carpendale & Lewis, 2004). Thus, children’s ToM has been shown to be linked to family characteristics, such as socio-economic status (e.g., Cole & Mitchell, 1998; Weimer & Guajardo, 2005), the presence of siblings (e.g., McAllister & Peterson, 2007; Ruffman, Perner, & Parkin, 1999), parental discipline styles (e.g., Guajardo, Snyder, & Peterson, 2009; Hughes, Deater-Deckard, & Cutting, 1999; Ruffman et al., 1999), security of attachment (e.g., Repacholi & Trapolini, 2004; Symons & Clark, 2000) and family conversation patterns, namely regarding mental states (e.g., Dunn, Brown, Slomskoski, Tesla, & Youngblade, 1991; Jenkins, Turrell, Kogushi, Lollis, & Ross, 2003; LaBounty, Wellman, Olson, Lagattuta, Liu, & Liu, 2008; Meins et al., 2013; Ruffman, Slade, & Crowe, 2002; Ruffman, Slade, Devitt, & Crowe, 2006; Symons, Peterson, Slaughter, Roche, & Doyle, 2005). Also documenting the role of environmental influences in ToM development, some twin studies have been carried out, comparing both genetic and environmental influences in ToM development. For instance, Hughes and colleagues (Hughes et al., 2005) carried out a study examining individual differences in children’s performance on a battery of ToM tasks, in a sample of 1,116 60-month-old twin pairs. Findings from this study showed that environmental factors predicted the majority of the variance in
children’s ToM scores, whereas the little influence that genetic factors had in explaining ToM performance was shared with verbal ability.

Parents’ mentalizing, mind-mindedness and mental state talk.

An important question that seems in need of additional research is whether adults’ mentalizing skills translate into parental competences. Is mentalizing important, in the context of parent-child relationships? Thus, for instance, the relation between parents’ mentalizing abilities and their mind-mindedness seems to need further clarification. While some authors understand mind-mindedness as an operationalization of adults’ mentalizing skills, in the context of parenthood (Sharp & Fonagy, 2008), others have been suggesting that these are two distinct competences, supporting the idea that there is a competence-performance gap between having the ability to mentalize and using this ability spontaneously, in the everyday life (Meins, Fernyhough, Johnson, & Lidstone, 2006; Meins, Fernyhough, & Harris-Waller, 2014). To our knowledge, no study has yet looked at the links between these two competences in adults.

Also following this line, evidence seems to be lacking as to the relation between adults’ mentalizing abilities and mental state talk during interactions with their children. It could be that parents who show better mentalizing make more references to mental states when interacting and talking with their children. On the other hand, as mentioned above, previous findings have been showing that adults, who are expected to have fully developed mentalizing skills, do not always use these abilities spontaneously (e.g., Keysar, Lin, & Barr, 2003; Meins et al., 2014).

Parental mentalizing and mental state discourse in relation to preschoolers’ ToM.

Thus far, the literature on ToM has supported the crucial role that the family context, particularly aspects concerning parent-child relationships, have in children’s ToM development (Carpendale & Lewis, 2004). A consistent line of research has been documenting that mothers’ and fathers’ who talk and discuss more mental states when interacting with their children are scaffolding children’s understanding of the mind, and therefore have children who perform better in ToM tasks (e.g., Dunn et al., 1991; LaBounty et al., 2008; Meins et al., 2013; Ruffman, et al., 2002, 2006). However, evidence seems to be scarce as to the possible link between other parents’ competences, such as their own mentalizing abilities, and children’s ToM. Only one recent study has
examined and found that parents who performed better on a mentalizing task had children who also evidenced better ToM (Sabbagh & Seamans, 2008). Curiously, given the amount of research devoted to the study of parents’ role in promoting children’s understanding of the mind, to our knowledge no other studies have further examined this association.

Children’s social understanding and its relation to later social competence and behavior.

It seems clear by now that a great amount of research has been devoted to the study of children’s individual differences in understanding their own and others’ minds, and how these individual differences come to exist, with a special focus on the importance of family variables. Furthermore, another important line of research has been concerned with how these individual differences are related to other children’s competences, namely social outcomes.

As mentioned earlier, while some authors have been focusing on children’s ToM abilities by looking mainly at their performance on standardized false belief tasks (e.g., LaBounty et al., 2008; Ruffman et al., 2002, 2006), others have been directed instead to more naturalistic manifestations of children’s understanding of the mind, namely their tendency to refer and talk about mental states spontaneously, during interactions with others (e.g., Bartsch & Wellman, 1995; Bretherton & Beeghly, 1982; Osório, Meins, Martins, Martins, & Soares, 2012). Following this line, children’s mental state talk has been proposed as an additional index of children’s social understanding, along with children’s performance on standardized false belief tasks (e.g., Hughes, Lecce, & Wilson, 2007). Accordingly, prior research has been showing that children who perform better on ToM tasks also refer more to mental states during interactions, with their parents (e.g., Ensor & Hughes, 2008; Nielsen & Dissanayake, 2000), siblings and friends (e.g., Brown, Donelan-McCall, & Dunn, 1996; Hughes et al., 2007). However, while preschoolers’ ToM abilities have been shown to be related to their social competence and behavior (e.g., Capage & Watson, 2001; Lalonde & Chandler, 1995; Razza & Blair, 2009; Weimer & Guajardo, 2005), no study seems to have so far looked at the relations between children’s mental state talk, and their social competence and behavior.
Also, the link between children’s ToM and social competence and behavior seems to need some further clarification, as some studies have not found this association (e.g., Garner, Curenton, & Taylor, 2005). Furthermore, findings from other studies suggested that the associations between preschoolers’ ToM and their social competence were dependent on children’s gender (Razza & Blair, 2003; Walker, 2005). More precisely, their findings suggested this relation to be specific to girls, advancing the idea that boys and girls may differ in how they use their socio-cognitive abilities in their real-life interactions.

Concerning the Aims of the Present Work

Based on the great amount of research on children’s ToM documenting the important role that the parent-child relationships have in children’s development of their understanding of the mind, in this PhD project we aimed at investigating the relation between mothers’ and fathers’ characteristics, and aspects of parent-child relationships, and children’s understanding of the mind. More specifically, our main aim was to investigate the associations between parents’ mentalizing abilities, mental state discourse and their preschool children’s ToM capabilities.

Three main questions guided our work:

1. Are mothers’ and fathers’ mentalizing abilities associated to the way they think about their children as mental agents?

2. Is there a relation between mothers’ and fathers’ mentalizing and their children’s ToM?

3. How do preschool children’s social understanding relate to their later social competence and behavior?

This dissertation is composed of three papers:

Paper 1 was titled Are adult mentalizing abilities associated with mind-mindedness? and aimed to investigate whether (a) mentalizing abilities and mind-mindedness were related in mothers and fathers and (b) maternal and paternal mind-mindedness were related to parents’ psychopathological symptomatology and children’s reported temperament. All variables were assessed concurrently and the main research questions were:
1) Is there a relation between mothers’ and fathers’ mentalizing and mind-mindedness?

2) Are mentalizing and mind-mindedness related to parental (education qualifications and psychopathological symptoms) and/or children’s characteristics (temperament)?

Paper 2 was titled **Associations between mothers’ and fathers’ mentalizing abilities and mental state talk and their children’s theory of mind** and aimed at investigating the concurrent relations between mothers’ and fathers’ mentalizing abilities and propensity to refer to mental states during parent-child interactions and their preschool children’s ToM. Additionally, we examined the relations between mothers’ and fathers’ mentalizing abilities and their mental state references. With this paper, we aimed at answering the following research questions:

1) Is there an association between mothers’ and fathers’ mentalizing abilities and their children’s ToM?

2) Are mothers’ and fathers’ use of mental references when interacting with their children related to the latter’s ToM abilities?

3) Do mothers’ and fathers’ who evidence better mentalizing abilities also use more mental references during interactions with their children?

Paper 3 was titled **The relation between preschool children’s theory of mind and mental state talk and their links with later social competence**. In this paper we aimed a) to investigate the concurrent links between children’s theory of mind and mental state talk, and b) to examine the longitudinal relations between preschool children’s social understanding - theory of mind and use of mental references - and their later social competence. Children’s ToM and mental references were assessed when children were aged around 4 ½ years, whereas children’s social competence and behavior was assessed around one year later, four months before children entering school. This paper’s main research questions were:

1) Do children who evidence a more developed ToM, performing better on false belief tasks, also make more references to mental states during shared book-reading interactions with their mothers?
2) Are preschoolers’ ToM and mental state references, as two indices of social understanding, related to children’s social competence and behavior, around one year later?
References


Chapter 1


Chapter 1

British Journal of Developmental Psychology, 23(1), 81-102. doi: 10.1348/026151004X21080


CHAPTER 2

EMPIRICAL STUDY 1
Are adult mentalizing abilities associated with mind-mindedness?

Abstract

The precise nature of the relation between adult mentalizing abilities and parental representations of the child as a mental agent (mind-mindedness) is under current debate. While some authors state that it is the same competence expressed in different contexts, others assert that they are different constructs. This study examined the relation between mentalizing and mind-mindedness, in mothers and fathers, while investigating their potential links to socio-demographic, parental, and child variables. Participants were 74 families comprising of mother, father, and their preschool-aged child. Controlling for educational level, psychopathological symptoms, and children’s reported temperament, the relation between mentalizing and mind-mindedness was non-significant. Moreover, mentalizing and mind-mindedness were shown to have distinct correlates, supporting the proposal that they are two distinct constructs.
Adult mentalizing concerns the capacity to think about agents, taking their mental states (e.g., desires, beliefs, feelings, intentions) into consideration (Apperly et al., 2009), and its use in everyday life. It can be assessed in terms of adults’ ability to use their mentalizing skills in communicating with others (Epley, Morewedge, & Keysar, 2004), considering others’ visual perspectives (Samson, Apperly, Braithwaite, Andrews, & Scott, 2010), and decoding others’ mental states based on eye expressions (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001).

Adult mentalizing abilities have also been assessed in the context of the parent–child relationship (Sharp & Fonagy, 2008). Notably, the construct of mind-mindedness focuses on the extent to which parents represent and describe their children as individuals with a mind (Meins, Fernyhough, Russell, & Clark-Carter, 1998). Parents vary widely in their focus on mental characteristics when describing their children, as do adults when describing a best friend or romantic partner (Meins, Fernyhough, & Harris-Waller, 2014).

The precise origins of individual differences in mind-mindedness remain open to debate. Some authors conceptualize mind-mindedness as an operationalization of parental mentalizing within the parent–child relationship/interaction (Sharp & Fonagy, 2008), which would lead one to expect a positive association between parents’ mind-mindedness and their more general mentalizing abilities. In contrast, Meins et al. (2014) propose that mind-mindedness is a quality of close relationships rather than a trait. Meins et al. reported that adults tended to use more mental attributes when describing individuals with whom they had a close relationship than when describing famous figures or works of art, although some individuals failed to mention a mental characteristic when describing a significant other. Meins et al. thus argued that mind-mindedness is distinct from mentalizing because it indexes an individual’s tendency spontaneously to use their mentalizing to describe and understand people, rather than their basic capacity to understand other minds.

In line with this argument, Meins, Fernyhough, Johnson, and Lidstone (2006) reported that children’s mental descriptions of a best friend and their tendency to describe the behavior of a story protagonist with reference to their internal states were unrelated to children’s performance on a theory of mind task. However, the relation between mind-mindedness and mentalizing has not been investigated in adults; this was the main aim of this study. If mind-mindedness is a relational construct that indexes an
individual’s spontaneous use of internal state understanding to represent others, one would predict that mind-mindedness will not be strongly associated with more basic mentalizing abilities that require only the recognition of or reasoning about others’ mental states.

A further aim was to explore how parents’ mind-mindedness and mentalizing related to parent and child characteristics. Previous research has shown that mentalizing abilities are positively associated with age (e.g., Duval, Piolino, Bejanin, Eustache, & Desgranges, 2011) and education level (Li, Wang, Wang, Tao, Xie, & Cheng, 2012), and negatively related to depression (e.g., Lee, Harkness, Sabbagh, & Jacobson, 2005). In contrast, maternal mind-mindedness is unrelated to education level, socioeconomic status (SES), and depression (McMahon & Meins, 2012; Meins et al., 1998; Walker, Wheatcroft, & Camic, 2012), although a negative association with parenting stress has been reported (McMahon & Meins, 2012; Walker et al., 2012). The different associations seen with these parent-centered factors provide further support for the notion that mentalizing and mind-mindedness are separate constructs. The present study investigated relations between parent-centered factors and both mentalizing and mind-mindedness, including a measure of diverse psychopathological symptoms to explore relations with psychological wellbeing in greater depth.

Just as mind-mindedness appears unrelated to parent-centered factors, previous research has reported that parents’ tendency to describe their children with reference to mental characteristics is unrelated to child-centered factors such as gender and general cognitive ability (McMahon & Meins, 2012; Meins et al., 1998). However, relations between mind-mindedness and other child characteristics have not been explored. Previous research using observational assessments of mind-mindedness in the first year of life (Meins, Fernyhough, Fradley, & Tuckey, 2001; Meins et al., 2012) found that mothers’ use of mind-related comments when interacting with their infants was unrelated to reported child temperament (Meins, Fernyhough, Arnott, Turner, & Leekam, 2011). The present study was the first to investigate whether parents’ mind-minded descriptions related to perceptions of their children’s temperament.

Finally, we included both mothers and fathers to explore whether the pattern of effects differed as a function of parent gender. Lundy’s (2013) study is unique in investigating mind-mindedness in both mothers’ and fathers’ descriptions of their children. She reported that mothers and fathers did not differ in mind-mindedness, and
that there was concordance in mind-minded descriptions within mother–father couples. However, whereas maternal mind-mindedness was unrelated to socioeconomic status (SES), fathers’ SES was positively correlated with their mind-mindedness. The present study sought to replicate these findings and also explore whether maternal and paternal mind-mindedness was similarly related to child-centered characteristics.

In summary, the present study investigated whether (a) mentalizing abilities and mind-mindedness were related in mothers and fathers, (b) maternal and paternal mind-mindedness related to parents’ psychopathological symptomatology and children’s reported temperament, and (c) there was concordance in mind-mindedness within couples.

Method

Participants

Participants were 76 families, recruited in child-care centers in Oporto’s Metropolitan area, Portugal. One mother and two fathers could not participate in the respective assessment sessions, and one mother did not have Portuguese as her first language, and were excluded from the analyses. Thus, 74 mothers and 74 fathers participated in this study. Mothers were aged between 26 and 46 years ($M = 36.88, SD = 3.62$), and fathers between 25 and 69 years ($M = 38.64, SD = 6.23$). The majority of the couples (82.9%; $n = 63$) were married. Most of the mothers (68.9%; $n = 51$) had a degree, 11 mothers (14.9%) had a masters or doctoral degree, while the remaining 16.2% ($n = 12$) had up to 12 years of formal education. Similarly, the majority of fathers (42.5%; $n = 31$) had a degree, 12 had a masters or doctoral degree (16.4%) and 30 (41.1%) had up to 12 years of formal education. Children were aged between 53 and 60 months ($M = 55.08, SD = 1.59$). Parents gave informed consent for participation in the study.

Procedure

Mothers and fathers visited the laboratory separately, with their children. In each session, adults’ mentalizing and parental mind-mindedness were first assessed. Participants then provided socio-demographic information and completed questionnaires to assess their psychopathological symptomatology and their perceptions regarding children’s temperament.
Measures

Mentalizing Abilities. Mothers’ and fathers’ mentalizing abilities were assessed using the Visual Jokes Task (Corcoran, Cahill, & Frith, 1997). This measure has been mainly used with clinical populations. It has been shown to be sensitive to distinct levels of mentalizing, distinguishing individuals with schizophrenia from healthy controls (Corcoran et al., 1997; Marjoram et al., 2005).

Mothers and fathers were presented with 10 black and white pictures, five physical jokes (requiring only an interpretation of the characters’ behavior) and five mental jokes (requiring attribution of mental states such as ignorance, false belief, or deception to the characters). The order of presentation of the pictures was counterbalanced for each participant, as was the set of ten visual jokes presented to mothers and fathers in the same family, so that each partner always saw different pictures. Mothers and fathers were told that they were going to be presented with a set of pictures which were somehow funny; they were then asked to explain what they thought was funny about each picture. Maternal and paternal interpretations were audiotaped and subsequently transcribed verbatim.

Transcripts were coded for the degree of mentalizing in a scale ranging from 0 to 3. A score of 0 was attributed when the participants did not get the joke, or simply mentioned the elements of the picture (e.g., “The mice and a snake”); when the participant made a purely physical/behavioural description of the picture, a score of 1 was attributed (e.g., “The snake is watching the mice”); when there were implicit references to the characters’ mental states, entailing some degree of inference by the coder, a score of 2 was given (e.g., “The snake has mouse ears so it can eat the mice”); when the characters’ mental and/or emotional states were considered and explicitly referred to in the interpretation of the picture, a score of 3 was attributed (e.g., “The snake wants to eat the mice, so it is disguised as one of them”). The rater was blind to all other data, and a randomly selected 31% (n = 24) of maternal and paternal transcripts was coded by a second blind coder. Inter-rater reliability assessed by intraclass correlation coefficients (r\text{ICC}): for the physical jokes, Mean $r_{\text{ICC}}$ = .88 (mothers) and Mean $r_{\text{ICC}}$ = .90 (fathers); for the mental jokes, Mean $r_{\text{ICC}}$ = .97 (mothers) and Mean $r_{\text{ICC}}$ = .92 (fathers). An average score for the mental jokes was used to index mentalizing abilities.
Furthermore, participants’ use of mental references, such as desires (e.g., like, dislike, want), cognitions (e.g., think, know, understand) and emotions (e.g., happy, sad, angry) when describing the visual jokes was also coded, and calculated as proportions of the total number of words used ($r_{ICC} = 1$ for mothers and $r_{ICC} = .98$ for fathers).

**Mind-mindedness.** Mothers’ and fathers’ mind-mindedness was assessed using the *Describe your Child Interview* (Meins et al., 1998). Parents were asked to describe their child. Responses were audiotaped and subsequently transcribed verbatim. Transcripts were coded by two independent raters, following an adaptation for the Portuguese language (Osório, Castiajo, Martins, & Meins, 2009) of the mind-mindedness coding system (Meins et al., 1998).

Each attribute used by the parent was coded into one of five mutually exclusive and exhaustive categories: mental, behavioral, physical, general, or self-referential attributes. *Mental attributes* included any reference to the child’s mental life, such as his/her will, mind, imagination, interests, memory, or intellect (e.g., “he is very curious”). *Behavioral attributes* included references to child’s behaviors, such as interactions with others and activities enjoyed by the child. (e.g., “he is friendly”). *Physical attributes* included references to child’s physical characteristics, such as age, or position in the family (e.g, “beautiful”). *General attributes* included parental comments that did not fit in any of the previous categories (e.g., “she’s lovely”). Finally, *self-referential attributes* regarded parental comments that were self-focused, describing the child referring to indirect effects on the mother/father (e.g., “she amuses me”). The mind-mindedness score was expressed as a proportion of the number of mental attributes divided by the total number of attributes the parent used during the interview.

A randomly selected 31% ($n = 24$) of maternal and paternal interviews was coded by two investigators, and inter-rater agreement was $\kappa = .92$ for mothers, and $\kappa = .80$ for fathers.

**Psychopathological Symptomatology.** Mothers and fathers completed the Portuguese version of the Brief Symptom Inventory (BSI; Derogatis, 1993; Portuguese version, Canavarro, 1999). This questionnaire comprises 53 items, rated on a 5-point likert scale of distress, ranging from “not-at-all” (0) to “extremely” (4), and assesses the
presence of the following symptoms: Somatization, Obsessive-Compulsive, Interpersonal Sensitivity, Depression, Anxiety, Hostility, Phobic Anxiety, Paranoid Ideation, and Psychoticism. These dimensions compose three Global Indices: Global Severity Index, Positive Symptom Total, and Positive Symptom Distress Index. Cronbach’s Alpha for the Portuguese version ranged between .62 and .80, for the nine scales.

**Reported Child Temperament.** Mothers and fathers completed the Portuguese short version of the Child Behavior Questionnaire (CBQ; Rothbart, Ahadi, Hershey, & Fisher, 2001; Portuguese version, Franklin, Soares, Sampaio, Santos, & Veríssimo, 2003), assessing parental perceptions of their children’s temperament and behavior. This version comprises 94 items, describing children’s reactions to diverse situations, which parents rate on a 7-point scale, ranging from 1 (“Extremely untrue”) to 7 (“Extremely true”). The items are arranged in 15 scales, which are then summed to give scores on three dimensions: Extroversion, Effortful Control, and Negative Affectivity. Cronbach’s Alphas for the Portuguese version were .68, .69 and .60 for each of these three dimensions, respectively.

**Results**

**Descriptive Statistics and Preliminary Analyses**

Table 1A shows the descriptive statistics for all variables. Mothers and fathers who obtained higher mentalizing scores when interpreting the mental jokes also did so when interpreting the physical jokes, \( r(70) = .59, p < .001 \) and \( r(72) = .64, p < .001 \), respectively. On the other hand, paired-sample t-tests showed that both mothers and fathers evidenced more mentalizing in interpreting the mental jokes, when compared to the physical ones, \( t(71) = 6.21, p < .001 \) and \( t(73) = 7.46, p < .001 \), respectively.
### Table 1A

*Mothers’ and Fathers’ Mentalizing, Mind-Mindedness, Psychopathological Symptomatology, and Reported Child Temperament*

<table>
<thead>
<tr>
<th></th>
<th>Mothers</th>
<th>Values</th>
<th>Fathers</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n = 74)</td>
<td></td>
<td>(n = 74)</td>
<td></td>
</tr>
<tr>
<td><strong>Mentalizing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean mental jokes score</td>
<td>1.66 (0.61)</td>
<td>0.00-3.00</td>
<td>1.64 (0.64)</td>
<td>0.40-3.00</td>
</tr>
<tr>
<td>Median</td>
<td>1.60</td>
<td></td>
<td>1.80</td>
<td></td>
</tr>
<tr>
<td><strong>Mind-mindedness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Proportion of mental attributes</td>
<td>0.33 (0.18)</td>
<td>0.00-0.82</td>
<td>0.33 (0.20)</td>
<td>0.00-0.83</td>
</tr>
<tr>
<td>Median</td>
<td>0.32</td>
<td></td>
<td>0.33</td>
<td></td>
</tr>
<tr>
<td><strong>Psychopathological symptomatology</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Severity Index</td>
<td>0.42 (0.33)</td>
<td>0.02-1.66</td>
<td>0.47 (0.37)</td>
<td>0.02-1.91</td>
</tr>
<tr>
<td>Positive Symptom Total</td>
<td>16.26 (11.03)</td>
<td>1.00-43.00</td>
<td>18.11 (11.97)</td>
<td>1.00-53.00</td>
</tr>
<tr>
<td>Positive Symptom Distress Index</td>
<td>1.37 (0.47)</td>
<td>0.14-3.57</td>
<td>1.31 (0.38)</td>
<td>1.00-3.50</td>
</tr>
<tr>
<td><strong>Reported child temperament</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extroversion</td>
<td>82.37 (14.29)</td>
<td>52-107</td>
<td>79.57 (14.05)</td>
<td>33-105</td>
</tr>
<tr>
<td>Effortful Control</td>
<td>115.57 (8.58)</td>
<td>90-133</td>
<td>114.01 (8.57)</td>
<td>95-136</td>
</tr>
<tr>
<td>Negative Affectivity</td>
<td>135.57 (23.83)</td>
<td>79-197</td>
<td>138.44 (21.52)</td>
<td>84-190</td>
</tr>
</tbody>
</table>
Correlates of Maternal and Paternal Mentalizing and Mind-Mindedness

Table 2A presents the correlations between mothers’ and fathers’ mentalizing and mind-mindedness and education level, psychopathological symptomatology, and reported child temperament.

Using Fisher’s r-to-z transformation, we found that the correlation coefficients between mothers’ and fathers’ mentalizing and their correlates were not significantly different (all $p$s > .39). Conversely, using Steiger’s Z method, we found a significant difference between maternal versus paternal mind-mindedness in relation to perceived children’s extroversion, $Z = 2.50$, $p = .012$, with the correlation coefficient being larger for mothers than fathers.
Table 2A

Correlations between Mothers’ and Fathers’ Mentalizing and Mind-mindedness and Socio-demographic, Psychopathological Symptomatology, and Reported Child Temperament

<table>
<thead>
<tr>
<th></th>
<th>Mentalizing</th>
<th>Mind-mindedness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mothers</td>
<td>Fathers</td>
</tr>
<tr>
<td><strong>Socio-demographic variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education level(^b)</td>
<td>.20(^+)</td>
<td>.25(^*)</td>
</tr>
<tr>
<td><strong>Psychopathological symptomatology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Severity Index(^a)</td>
<td>-.06</td>
<td>.02</td>
</tr>
<tr>
<td>Positive Symptom Total(^a)</td>
<td>-.02</td>
<td>.06</td>
</tr>
<tr>
<td>Positive Symptom Distress Index(^a)</td>
<td>-.26(^*)</td>
<td>-.18</td>
</tr>
<tr>
<td><strong>Reported Child Temperament</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extroversion(^a)</td>
<td>.06</td>
<td>.15</td>
</tr>
<tr>
<td>Effortful Control(^a)</td>
<td>.28(^*)</td>
<td>.14</td>
</tr>
<tr>
<td>Negative Affectivity(^a)</td>
<td>-.14</td>
<td>-.02</td>
</tr>
</tbody>
</table>

\(^+p < .10; \(^*p < .05\) \(^a\)Pearson Coefficient Correlation; \(^b\)Spearman Coefficient Correlation
Parental Mentalizing Abilities and Mind-mindedness

We found a trend-level association between mentalizing scores and mind-mindedness for both mothers, \( r(70) = .21, p = .072 \), and fathers, \( r(72) = .21, p = .074 \).

Next, based on the results from the correlational analyses described above, we performed hierarchical regression analyses to further examine the link between parental mentalizing and mind-mindedness, after accounting for their correlates. As shown in Table 3A, after education level, psychopathological symptomatology, and reported child temperament were taken into account, mentalizing was not a significant predictor of mind-mindedness in either mothers or fathers. Moreover, both models were non-significant.

The pattern of results was similar when we analysed the relations between parents’ use of mental references when describing the visual jokes, and mind-mindedness, \( r_s < .24, \beta_s < .20, ps > .05 \).
Table 3A

*Regression model for mothers’ (model A) and fathers’ (model B) mind-mindedness*

<table>
<thead>
<tr>
<th>Model A</th>
<th>Steps and variables</th>
<th>$R^2$ (Adjusted $R^2$)</th>
<th>$\beta$</th>
<th>$F$ change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 (df 6,65)</td>
<td>Education level (12th grade vs. others)</td>
<td>.12 (.04)</td>
<td>-0.09</td>
<td>1.46</td>
</tr>
<tr>
<td></td>
<td>Education level (Masters/doctoral degrees vs. others)</td>
<td></td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Psychopathological symptomatology (Positive Symptom Distress Index)</td>
<td></td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maternal perceived children’s extroversion</td>
<td></td>
<td>0.25*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maternal perceived children’s effortful control</td>
<td></td>
<td>0.20</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maternal perceived children’s negative affectivity</td>
<td></td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Step 2 (df 7,64)</td>
<td>Education level (12th grade vs. others)</td>
<td>.15 (.05)</td>
<td>0.08</td>
<td>1.95</td>
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<tr>
<td></td>
<td>Education level (Masters/doctoral degrees vs. others)</td>
<td></td>
<td>0.12</td>
<td></td>
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<tr>
<td></td>
<td>Psychopathological symptomatology (Positive Symptom Distress Index)</td>
<td></td>
<td>0.08</td>
<td></td>
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<td></td>
<td>Maternal perceived children’s extroversion</td>
<td></td>
<td>0.22*</td>
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<td>0.14</td>
<td></td>
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<td></td>
<td>Maternal perceived children’s negative affectivity</td>
<td></td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Maternal perceived children’s negative affectivity</td>
<td></td>
<td>0.18</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Model B</th>
<th>Steps and variables</th>
<th>$R^2$ (Adjusted $R^2$)</th>
<th>$\beta$</th>
<th>$F$ change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 (df 6,65)</td>
<td>Education level (12th grade vs. others)</td>
<td>.06 (-.03)</td>
<td>-0.05</td>
<td>.69</td>
</tr>
<tr>
<td></td>
<td>Education level (Masters/doctoral degrees vs. others)</td>
<td></td>
<td>0.14</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Psychopathological symptomatology (Positive Symptom Distress Index)</td>
<td></td>
<td>-0.09</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paternal perceived children’s extroversion</td>
<td></td>
<td>-0.06</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paternal perceived children’s effortful control</td>
<td></td>
<td>-0.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paternal perceived children’s negative affectivity</td>
<td></td>
<td>-0.06</td>
<td></td>
</tr>
<tr>
<td>Step 2 (df 7,64)</td>
<td>Education level (12th grade vs. others)</td>
<td>.09 (-.01)</td>
<td>-0.01</td>
<td>2.13</td>
</tr>
<tr>
<td></td>
<td>Education level (Masters/doctoral degrees vs. others)</td>
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<td>0.11</td>
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<td></td>
<td>Psychopathological symptomatology (Positive Symptom Distress Index)</td>
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<td>-0.07</td>
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<tr>
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<td>Paternal perceived children’s extroversion</td>
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<td>-0.12</td>
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</tr>
<tr>
<td></td>
<td>Paternal perceived children’s effortful control</td>
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<td>-0.14</td>
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<tr>
<td></td>
<td>Paternal perceived children’s negative affectivity</td>
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<tr>
<td></td>
<td>Mentalizing</td>
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<td>0.19</td>
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</tr>
</tbody>
</table>

* $p < .10$
Mind-Mindedness and Mentalizing Abilities in Mothers and Fathers

Mothers and fathers did not differ regarding their mentalizing score, $t(69) = .08$, $p = .93$, or mind-mindedness, $t(69) = .04$, $p = .97$. Furthermore, we found no significant correlation between mothers’ and fathers’ mentalizing, $r = .05$, $p = .68$, or between maternal and paternal mind-mindedness, $r = .09$, $p = .44$.

Power analysis for sample size adequacy

A series of sensitivity power analyses, using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009), were carried out, to find what would be the minimum detectable effect for 70- to-90% power and a sample size of 74. We concluded that we were able to detect small to medium effect sizes for correlations ($r \geq .25$) and for regressions ($f^2 \geq .06$).

Discussion

The main goal of this study was to examine the relation between mentalizing and mind-mindedness in mothers and fathers of preschool aged children. Our results extend those of Meins et al. (2006), who found no association between the way children described a friend as a mental agent and their mentalizing abilities. In the current study, the marginal associations between mentalizing and mind-mindedness became non-significant, both for mothers and fathers, after educational level, psychopathological symptoms, and children’s reported temperament were accounted for. It is important to note that, despite the weak associations, these were small to medium effects. Furthermore, when we examined mothers’ and fathers’ use of mental references in describing the visual jokes as an index of mentalizing, our results were similar. These findings are consistent with the proposal that mind-mindedness and mentalizing are distinct constructs that tap different adult competences - a result congruent with Meins et al.’s (2006) findings. Mind-mindedness could, then, be more accurately conceptualized as a relational quality (Meins et al., 2014), while mentalizing seems to reflect more basic cognitive-behavioral competence.

Additionally, when investigating the possible correlates of adults’ mentalizing and mind-mindedness, we found that the two were associated with different sets of variables. Mentalizing was linked to mothers’ socio-demographic and individual characteristics, such as educational level and psychopathological symptoms, in line with
previous investigations (e.g., Lee et al., 2005; Li et al., 2012). Our study thus extends
prior research by showing that higher overall levels of psychopathological symptoms,
and not only depressive symptoms, are associated with poorer mentalizing in a
normative sample. Moreover, mothers’ mentalizing was related to perceptions
concerning their children’s effortful control. It is possible that mothers who show more
mentalizing are more sensitive to certain characteristics of their children, such as
attentional and perceptive ones, thus perceiving their children as having more effortful
control. Conversely, the regression analyses showed that mind-mindedness was not
predicted by these maternal individual characteristics or by children’s reported
temperament. Regarding correlates of fathers’ mentalizing and mind-mindedness, the
only significant relation was a positive association between fathers’ mentalizing and
their education qualifications.

Comparing data from mothers and fathers, the correlation coefficient between
mind-mindedness and children’s perceived extroversion was larger for mothers than
fathers. It is possible that the way parents represent their children is accessing some
individual characteristics or specificities of their relationship with their children, which
may differ for mothers and fathers. Accordingly, and contrasting with previous evidence
(Lundy, 2013), we found no concordance between mothers’ and fathers’ mind-
mingedness.

Some methodological issues should be considered when interpreting our
findings. First, we assessed mentalizing based on adults’ ability to consider mental
states when interpreting others’ behavior, looking at humorous cartoons. Future studies
should assess other aspects of adult mentalizing, such as its use during online
communication (Keysar, Barr, Balin, & Brauner 2000), to further explore potential
relations between mentalizing and mind-mindedness. Second, previous research has
consistently shown a link between adults’ mentalizing and their executive functioning
(e.g., Apperly et al., 2009). Thus, including a measure of executive functioning would
provide an important index of cognitive competence that one would expect to be related
to mentalizing, as a cognitive ability, and not to mind-mindedness, as a relational
construct (Meins et al., 2014). Also, it is possible that assessing mind-mindedness based
on parents’ spontaneous descriptions of their children is influenced by other factors,
such as the ‘transparency’ or ‘opacity’ of the child’s mental states as manifested in overt
behavior, or the richness or variety of social interactions that the parent draws upon
when thinking about the child. It would be interesting to see if using a different assessment, such as asking parents to choose between characteristics most like their own child, rather than asking parents to think about the characteristics themselves, would produce different results. Finally, our sample was constituted mainly of highly educated two-parent families, with mothers as primary caregivers, so our results may not generalize to other populations. Thus, it would be interesting to establish whether these findings can be replicated in a more heterogeneous sample.

Future research aimed at exploring additional correlates of adults’ mentalizing and mind-mindedness will certainly provide important contributions to the notion of mentalizing and mind-mindedness as distinct constructs, the former being a cognitive-behavioral competence, and the latter being a relational construct (Meins et al., 2014). Such research would help further test the proposal that there is a “competence-performance gap” (Meins et al., 2006, 2014) between having the ability to mentalize and using this ability spontaneously in everyday life.
References


CHAPTER 3

EMPIRICAL STUDY 2
Associations between mothers’ and fathers’ mentalizing abilities and mental state talk and their children’s theory of mind

Abstract

This study investigated concurrent relations between preschool children’s theory of mind (ToM) and their mothers’ and fathers’ mental state talk and mentalizing abilities. Participants were 74 families - mother, father, and child. No relation was found between maternal and paternal mentalizing abilities and their children’s ToM. However, maternal references to cognitions were related to children’s ToM abilities, even after accounting for mothers’ age and education qualifications and children’s verbal ability. While corroborating the link between maternal mental state talk and children’s socio-cognitive abilities, our results further suggest that this maternal propensity to use mental terms, particularly cognition-related, when interacting with their children, may be more important than parents’ own ability to reason about others’ behavior in terms of underlying mental states.
Theory of mind (ToM) refers to the ability to impute mental states (e.g., desires, beliefs, emotions) to oneself and to others, and to explain and anticipate behavior based on those mental states (Astington & Barriault, 2001). It has been an important topic in the developmental literature for several decades, with a particular focus on the preschool years, when typically developing children begin to acquire an explicit ToM (Wellman, Cross, & Watson, 2001). During this period, children start to display a clear understanding of false belief, that is, they begin to understand that people can have distinct beliefs about something, and that these beliefs can be true or false. At this point, children are said to understand the representational nature of beliefs and therefore to have a representational ToM (Wellman et al., 2001). However, during this critical stage for ToM development, there is significant inter-individual variability, with some children acquiring a better understanding of the mind earlier than others.

A considerable volume of research has sought to understand the mechanisms giving rise to individual differences in ToM abilities. One of the main approaches emphasizes the importance of children’s social world, in line with Vygotsky’s (1978) socio-cultural approach, which highlights the significance of interpersonal relationships for children’s cognitive development. Consistent with this approach, most of the research on individual differences in children’s ToM has focused on the role of social interaction, and particularly of parent–child interaction, in promoting children’s understanding of their own and others’ minds (Carpendale & Lewis, 2004).

Thus, an extensive line of research has consistently reported links between parents’ use of mental state terms when interacting with their children and the latter’s ToM. Dunn and colleagues (Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991) carried out the first longitudinal study examining the association between references to mental states in the family context and children’s ToM. Their results suggested that mother–child conversations about emotions and causality when children were aged 33 months were positively related to children’s ToM abilities at 40 months. Subsequently, several other studies have sought to further analyze this link by examining distinct features of parental discourse. For instance, Meins and colleagues (Meins, Fernyhough, Arnott, Leekam, & de Rosnay, 2013; Meins et al., 2002, 2003) found that mothers’ tendency to comment appropriately on their infants’ putative thoughts and feelings during free play interactions in the first year of life was positively associated with children’s ToM performance in the preschool years.
Also following this line, several studies have shown concurrent relations between parents’ references to mental states when interacting with their preschoolers and children’s ToM abilities, such that children whose parents make more references to mental states perform better on ToM tasks (e.g., LaBounty, Wellman, Olson, Lagattuta, Liu, & Liu, 2008; Symons, Peterson, Slaughter, Roche, & Doyle, 2005; Turnbull, Carpendale, & Racine, 2008). Furthermore, some of these studies suggested that what is important is not so much parents’ overall mental state references, but references to specific kinds of mental states, namely cognitions (e.g., Adrián, Clemente, & Vilanueva, 2007; Ensor, Devine, Marks, & Hughes, 2013; Ensor & Hughes, 2008; Slaughter, Peterson, & Mackintosh, 2007), which are thought to be the most complex and advanced mental state references, thus being truly representational (Bartsch & Wellman, 1995).

Whereas the link between mothers’ references to mental states and children’s ToM has been much studied, fewer researchers have investigated the potential differential contributions of mothers’ and fathers’ mental state references during parent-child interactions to their children’s ToM abilities. To our knowledge, only one study has addressed this question (LaBounty et al., 2008), reporting that only fathers’ mental references, specifically to negatively-valenced emotions, were related to better ToM abilities in their children. On the other hand, mothers’ mental references played a role in children’s emotion understanding. In addition, a more recent study has also explored mothers and fathers contributions to preschoolers’ ToM, but focusing on maternal and paternal mental descriptions of their children and their interactional attunement (Lundy, 2013). Findings from this study suggested similar contributions from mothers and fathers to their children’s ToM. Thus, mothers and fathers who used more mental attributes when describing their children, and who were more attuned to their children’s mental processes during a problem-solving interaction, had children who performed better on a set of ToM tasks. The present study aims to advance extant research by examining the concurrent relation between both mothers’ and fathers’ mental state references during dyadic interactions with their preschool children and children’s ToM.

Additionally, given the fundamental role of parent–child interaction in the development of children’s ToM, one could wonder whether parents’ own ToM or mentalizing abilities are also related to their children’s ToM. Only one study has addressed this question (Sabbagh & Seamans, 2008), assessing mothers’ and fathers’
mentalizing abilities using the *Reading the mind in the eyes* task (Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001) and children’s ToM using Wellman and Liu’s (2004) battery of five ToM tasks. The authors found that preschoolers whose mothers and fathers had higher mentalizing scores also showed better performance on ToM tasks, advancing the hypothesis of an intergenerational transmission of ToM. To date, no attempt has been made to replicate these findings. Moreover, the *Reading the mind in the eyes* task (Baron-Cohen et al., 2001) is thought to assess an affective component of adults’ mentalizing, and performance on this task has been shown to be unrelated to that on standard cognitive mentalizing tasks (Duval, Piolino, Bejanin, Eustache, & Desgranges, 2011). It would thus be interesting to examine the whether parents’ cognitive mentalizing abilities related to children’s ToM performance.

Finally, no study seems to have yet looked at the relations between parents’ own mentalizing abilities and use of mental state references. It could be hypothesized that parents who evidence better mentalizing abilities make more references to mental states when interacting and talking with their children. Conversely, research has been suggesting the existence of a competence-performance gap between having the ability to mentalize and using it in the everyday life (Meins, Fernyhough, & Harris-Waller, 2014; Meins, Fernyhough, Johnson, & Lidstone, 2006), supported by previous findings showing that adults, who are expected to have fully developed mentalizing skills, do not always use these abilities spontaneously (e.g., Keysar Lin, & Barr, 2003; Meins et al., 2014).

Thus, considering the agreement in the literature that parents’ references to mental states promote their children’s ToM abilities (e.g., Ensor et al., 2013; LaBounty et al., 2008; Meins et al., 2013), and in light of the fact that evidence concerning the relation between parents’ mentalizing abilities and children’s ToM is scarce, it is our aim to explore the concurrent links between children’s ToM and mothers’ and fathers’ mental state references and mentalizing abilities. Additionally, we investigated relations between mothers’ and fathers’ mentalizing abilities and their mental state references, as there has yet to be empirical evidence concerning this matter.
Method

Participants

Participants were 76 families (children, mothers, and fathers) who were recruited via child-care centers in the Oporto area, in the north of Portugal, for participation in a broader longitudinal study on the relation between children’s socio-cognitive and socio-emotional competences and their school readiness. Due to family circumstances, one mother and two fathers did not participate in the respective assessment session. Furthermore, one mother was not a native Portuguese-speaker, and was therefore excluded from the analyses. Thus, 74 mothers and 74 fathers participated in the study. Children (38 boys) were aged between 53 and 60 months ($M = 55.08, SD = 1.59$). Mothers were aged between 26 and 46 years ($M = 36.88, SD = 3.62$), and fathers’ ages ranged between 25 and 69 years ($M = 38.64, SD = 6.23$). The majority of the couples ($82.9%; n = 63$) were married. Regarding education level, most of the mothers ($68.9%; n = 51$) had a degree, 11 mothers ($14.9%$) had a masters or doctoral degree, while the remaining 12 ($16.2%$) had up to 12 years of formal education. Similarly, the majority of fathers ($42.5%; n = 31$) had a degree, 12 had a masters or doctoral degree ($16.4%$), and 30 ($41.1%$) had up to 12 years of formal education. The majority of the children in this study were first-born ($63.2%; n = 48$), and mothers were mostly the primary caregivers.

Procedure

Children visited the laboratory twice – one session with their mother and another with their father. In each of the sessions, mothers and fathers were first told about the purpose of the study as well as the detailed procedure, and gave written informed consent. Maternal and paternal mentalizing skills were assessed using the Visual Jokes Task (Corcoran, Cahill, & Frith, 1997). Mothers and fathers were then videotaped during a wordless picture-book story telling task with their children, in order to assess parental mental state references. Children’s ToM was assessed in the second session, using a battery of six tasks. Finally, children’s verbal ability was assessed using the Peabody Picture Vocabulary Test – Revised (PPVT-R, Dunn & Dunn, 1981).

Measures

Parents’ mentalizing skills. Mothers’ and fathers’ mentalizing skills were assessed using the Visual Jokes Task (Corcoran et al., 1997). This measure was
originally developed for clinical populations, such as patients diagnosed with schizophrenia (e.g., Marjoram et al., 2005) or depression (e.g., Uekermann et al., 2008). It has been shown to be sensitive to individual differences in mentalizing, distinguishing individuals with schizophrenia from healthy controls (Corcoran et al., 1997; Marjoram et al., 2005).

Mothers and fathers were presented with 10 black and white pictures, five depicting physical jokes and the other five mental jokes. The first set of jokes depends on the behavior of the protagonists only, and does not require mental states to be interpreted. The second set requires the attribution of mental states, such as ignorance, false belief, or deception to the characters in order to be correctly interpreted. The order of presentation of the pictures was counterbalanced for each participant, as was the set of ten visual jokes presented to mothers and fathers in the same family, so that each partner always viewed different pictures. Mothers and fathers were told that they were going to be presented with a set of pictures which were funny in some way; they were then asked to explain what they thought was funny about each picture. Maternal and paternal interpretations of the visual jokes were audiotaped and subsequently transcribed verbatim.

The transcripts were subsequently coded for the degree of mentalizing skills evidenced by mothers’ and fathers’ answers, in a scale ranging from 0 to 3, varying according to whether the participant made reference to the character’s mental states when explaining the joke. A score of 0 was attributed when the participants did not get the joke, or simply mentioned the elements of the picture (e.g., “The mice and a snake”); when the participant made a purely physical/behavioural description of the picture, a score of 1 was attributed (e.g., “The snake is watching the mice”); when there were implicit references to the characters’ mental states, but which entailed some degree of inference by the coder, a score of 2 was given (e.g., “The snake has mouse ears so it can eat the mice”); finally, when the characters’ mental and/or emotional states were considered and explicitly referred to in the interpretation of the picture, a score of 3 was attributed (e.g., “The snake wants to eat the mice, and so it is disguised as one of them”). Interrater reliability was assessed by computing the intraclass correlation coefficients ($r_{ICC}$) for 31% ($n = 24$) of maternal and paternal sets of jokes scored by two trained raters. Regarding the five physical jokes, intraclass correlations ranged between $r_{ICC} = .71$ and $r_{ICC} = .97$ and between $r_{ICC} = .84$ and $r_{ICC} = .99$ for mothers and fathers’
respectively. As to the set of five mental jokes, intraclass correlations ranged between $r_{ICC} = .94$ and $r_{ICC} = .99$, for mothers, and between $r_{ICC} = .80$ and $r_{ICC} = .98$ for fathers’. An average score for the mental jokes was used to index mentalizing abilities ($\alpha = .56$, for both mothers and fathers).

**Parental mental state references.** Parents’ use of mental state references was assessed using one of two wordless picture books: *Frog where are you?* (Mayer, 1969) and *Frog on his own* (Mayer, 1992). Mothers and fathers were asked to tell the story to their children, based on the book’s pictures. The assignment of either book was counterbalanced so that the story told by the mother and by the father of each child was different, and an equal number of mothers and fathers told each story. The interactions were videotaped, transcribed and then coded in order to assess parents’ use of mind-related words. If present, these were coded as (a) desires (e.g., like, dislike, want), (b) cognitions (e.g., think, know, imagine), and (c) emotions (e.g., happy, sad, angry). Similarly to previous studies (e.g., Jenkins, Turrell, Kogushi, Lollis, & Ross, 2003), utterances serving only as conversational devices (e.g., “I don’t know”), or which were repetitions of own or other’s utterances were not coded. In order to control for differences in verbosity, mothers’ and fathers’ mental state references were calculated as proportions of the total number of words used during the interaction. Interrater reliability was assessed by computing the intraclass correlation coefficients ($r_{ICC}$) for 21% ($n = 16$) of mother–child and father–child interactions, which were independently coded by two trained raters. Intraclass correlations for the three types of mental references ranged between $r_{ICC} = .89$ and $r_{ICC} = .99$, and between $r_{ICC} = .97$ and $r_{ICC} = .99$ for mothers and fathers, respectively.

**Children’s ToM.** Children’s ToM was assessed using a set of six standardized tasks. Four tasks were taken from Wellman and Liu’s (2004) ToM scale for preschoolers: (i) Diverse Beliefs, (ii) Knowledge Access, (iii) Unexpected Contents False Belief and (iv) Explicit False Belief, with two additional false belief tasks from Hughes et al. (2000): (v) Unexpected Contents II and (vi) Unexpected Location. The *Diverse Beliefs* task required children to be able to understand that a character had a different belief from their own, and to predict the character’s behavior based on that different belief. The *Knowledge Access* task assessed children’s understanding that
knowledge will depend on having access to information. In the *Unexpected Contents* task children were expected to predict that a character would think that inside a box of potatoe chips would be potatoe chips, based on the appearance of the box, rather than the actual contents of the box (a toy bear), which children had already seen. The *Explicit False Belief* task aimed to assess children’s ability to predict a character’s behavior when searching for a pair of gloves, based on the character’s false belief, rather than on the children’s own knowledge. The *Unexpected Contents II* task assessed children’s ability to recall their own false belief when first asked what is inside a kinder chocolate box, after being shown its actual contents (pencils). Finally, the *Unexpected Location* task required children to predict a character’s behavior when looking for his apple, based on his false belief, since the character had no knowledge that his apple had changed location. The first two tasks, being the easiest ones, were conducted in a fixed order; the order of the remaining four tasks was counterbalanced, in order to avoid contamination between tasks. All of the tasks were coded in terms of success or failure, and to succeed in each of the tasks children had to correctly answer both the control and the key questions.

A composite ToM measure was calculated, consisting on the sum of the child’s scores in all of the six tasks, thus ranging of scores from 0 to 6. Computing the reliability for this composite measure, the Cronbach’s alpha was .56, which falls in line with reliability coefficients reported in previous studies, using similar ToM measures (Astington & Jenkins, 1999; Meins et al., 2002, 2013).

**Socio-demographic information.** Each parent completed a socio-demographic questionnaire, which included information on parental age, years of education, and number of children.

**Children’s verbal ability.** Children’s verbal ability was assessed using the Peabody Picture Vocabulary Test – Revised (PPVT-R, Dunn & Dunn, 1981). Children were orally presented with words, and asked to choose from a set of four pictures, which one corresponded to the word previously heard. The coding consists of substracting the total number of errors to the highest item achieved. As Portuguese norms for this instrument are not yet available, age-adjusted residuals for the raw scores were computed and used in the statistical analyses.
Results

Descriptive Statistics and Preliminary analyses

Given that some of the variables, such as children’s ToM, fathers’ use of desires and emotion references, and mothers’ use of cognition references, were not normally distributed, we used non-parametric statistics in most of the analyses reported.

Children’s ToM scores ranged between 1 and 6 \((M = 3.47, SD = 1.55)\). Children’s verbal ability scores ranged between 46 and 126 \((M = 91.51, SD = 19.74)\).

Children’s ToM was not related to children’s age, \(r_s = .02, p = .90\), gender, \(r_{pb} = .11, p = .37\), or verbal ability, \(r_s = .13, p = .26\). We also found no associations between children’s ToM and mothers’ age, \(r_s = .19, p = .10\), maternal education level, \(r_s = .06, p = .62\), fathers’ age, \(r_s = .06, p = .63\), and paternal education qualifications, \(r_s = .05, p = .70\).

Descriptive measures for mothers’ and fathers’ mental state references and mentalizing abilities are presented in Table 1B.

<table>
<thead>
<tr>
<th></th>
<th>Mothers ((n = 74))</th>
<th>Fathers ((n = 74))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Range</td>
</tr>
<tr>
<td>Mentalizing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean mental jokes score</td>
<td>1.66 (0.61)</td>
<td>0.00 - 3.00</td>
</tr>
<tr>
<td>Mental state references</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of words</td>
<td>902.51 (320.87)</td>
<td>401 - 2236</td>
</tr>
<tr>
<td>Total number of mental references</td>
<td>19.92 (10.16)</td>
<td>6 – 64</td>
</tr>
<tr>
<td>Number of desire references</td>
<td>2.64 (2.29)</td>
<td>0 – 13</td>
</tr>
<tr>
<td>Number of cognition references</td>
<td>9.49 (6.26)</td>
<td>1 – 33</td>
</tr>
<tr>
<td>Number of emotion references</td>
<td>7.78 (4.22)</td>
<td>0 – 25</td>
</tr>
</tbody>
</table>
Compared with fathers, mothers made more references to mental states, in general, $Z = 2.45$, $p = .014$, and to cognition-related terms, in particular, $Z = 2.77$, $p = .006$. There was also a trend for mothers to use more emotion-related words compared with fathers, $Z = 1.78$, $p = .075$. On the other hand, regarding mentalizing, paired-sample analyses showed no significant differences between mothers and fathers, $t(69) = .08$, $p = .93$.

We found no relation between parents’ age and mentalizing abilities, both for mothers, $r = -.11$, $p = .35$, and fathers, $r = -.11$, $p = .37$. Conversely, we found a trend-level association between mothers’ education qualifications and mentalizing, $r_s = .20$, $p = .090$, and a significant relation between fathers’ education level and mentalizing, $r_s = .25$, $p = .033$. Regarding parents’ mental state references, the relation between mothers’ age and references to mental states, in general, and particularly to cognitions, approached significance, $r_s = .21$, $p = .072$ and $r_s = .20$, $p = .087$, respectively. Similarly, fathers’ age was marginally related to fathers’ use of mental references, $r_s = -.22$, $p = .061$. In addition, we found relations between mothers’ mental references and education qualifications, such that mothers with higher education qualifications made more references to cognitions, $r_s = .31$, $p = .008$, and less references to emotions, $r_s = -.28$, $p = .018$, when interacting with their children. On the other hand, fathers’ education qualifications and references to mental states were not associated.

The Relation Between Children’s ToM, Maternal and Paternal Mental State References and Mentalizing Abilities

Table 2B presents the correlations between children’s ToM skills and maternal and paternal mental state references and mentalizing abilities.
Table 2B

The relation between mothers’ and fathers’ mentalizing and mental references and children’s ToM

<table>
<thead>
<tr>
<th></th>
<th>Children’s ToM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mother</strong></td>
<td></td>
</tr>
<tr>
<td>Mentalizing abilities$^a$</td>
<td>.16</td>
</tr>
<tr>
<td><em>Mental state references</em></td>
<td></td>
</tr>
<tr>
<td>Desires$^a$</td>
<td>.14</td>
</tr>
<tr>
<td>Cognitions$^a$</td>
<td>.31$^{**}$</td>
</tr>
<tr>
<td>Emotions$^a$</td>
<td>.02</td>
</tr>
<tr>
<td>Total mental references$^a$</td>
<td>.24$^*$</td>
</tr>
<tr>
<td><strong>Father</strong></td>
<td></td>
</tr>
<tr>
<td>Mentalizing abilities$^a$</td>
<td>.01</td>
</tr>
<tr>
<td><em>Mental state references</em></td>
<td></td>
</tr>
<tr>
<td>Desires$^a$</td>
<td>.02</td>
</tr>
<tr>
<td>Cognitions$^a$</td>
<td>.00</td>
</tr>
<tr>
<td>Emotions$^a$</td>
<td>-.16</td>
</tr>
<tr>
<td>Total mental references$^a$</td>
<td>-.06</td>
</tr>
</tbody>
</table>

$^a$ Spearman Correlation Coefficient

As shown, mothers’ references to mental states in general, and particularly to cognitions, were associated with higher ToM scores in their children, but there were no relations between fathers’ mental state references and children’s ToM abilities.

We also found no relations between children’s ToM and either mothers’ or fathers’ mentalizing abilities (see Table 2B).

As mothers’ references to mental states were related to control variables, such as age and education level, we next conducted non-parametric partial correlations in order to examine the links between mothers’ tendency to refer to mental states in general, and specifically to cognitions, and children’s ToM, after mothers’ age and education level were accounted for. We also controlled for children’s verbal ability. We found that, after partialling out mothers’ age and children’s verbal ability, the link between mothers’ general references to mental states and children’s ToM fell to marginally significant, $r_s(67) = .22$, $p = .067$. However, the relation between mothers’ references to
cognitions and children’s ToM continued to be significant even after partialling out mothers’ age and education qualifications and children’s verbal ability, $r_s(66) = .29, p = .017$.

**The Relations Between Mothers’ and Fathers’ Mentalizing Abilities and Mental References**

Table 3B presents the correlations between mothers’ and fathers’ mentalizing abilities and use of mental references.

We found that, for both mothers and fathers, there were no significant relations, except for a trend-level association between mothers’ mentalizing and references to desires.

**Table 3B**  
*Associations between mothers’ and fathers’ mentalizing and mental references*

<table>
<thead>
<tr>
<th></th>
<th>Mentalizing abilities</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mother’s mental state references</strong></td>
<td></td>
</tr>
<tr>
<td>Desires$^a$</td>
<td>.22$^+$</td>
</tr>
<tr>
<td>Cognitions$^a$</td>
<td>.13</td>
</tr>
<tr>
<td>Emotions$^a$</td>
<td>-.02</td>
</tr>
<tr>
<td>Total mental references$^a$</td>
<td>.08</td>
</tr>
<tr>
<td><strong>Father’s mental state references</strong></td>
<td></td>
</tr>
<tr>
<td>Desires$^a$</td>
<td>.05</td>
</tr>
<tr>
<td>Cognitions$^a$</td>
<td>-.14</td>
</tr>
<tr>
<td>Emotions$^a$</td>
<td>.02</td>
</tr>
<tr>
<td>Total mental references$^a$</td>
<td>-.06</td>
</tr>
</tbody>
</table>

$^a$ Spearman Correlation Coefficient

**Discussion**

One of our aims was to investigate the links between children’s ToM, maternal and paternal mental state talk, and parental mentalizing abilities. Mothers’ mental state references during a book-reading task were positively related to children’s ToM, which
adds to an extensive literature documenting that parental mental state references are related to better ToM abilities in children (e.g., Dunn et al., 1991; Symons et al., 2005; Turnbull et al., 2008). Furthermore, mothers’ references to cognition-related terms were associated to higher ToM scores in their preschool children, a result which supports previous research documenting this specific link (Ensor et al., 2013; Ensor & Hughes, 2008; Slaughter et al., 2007). As cognitions are considered the most complex type of mental state, being truly representational (Bartsch & Wellman, 1995), this relation is not surprising. It is possible that, by making more references to this particular mental state, mothers might be promoting children’s exposure to and understanding of mental states as representations, and thus contributing to their children’s development of a ToM. In addition, when control variables, such as mothers’ age and educational level and children’s verbal ability were accounted for, only the link between mothers’ references to cognitions and children’s ToM continued to be significant, which comes to further highlight the relevance of maternal references to this particular mental state, instead of more general mental references, to children’s ToM. However, given the correlational nature of our data, it could also be that mothers who see their children as having better ToM abilities tend to use more complex mental terms when interacting to them, thus making more references to cognitions.

In contrast, we found no associations between fathers’ use of mental state language during book-reading and children’s ToM. First, it is important to acknowledge that mothers made proportionally more references to mental states in general, and specifically to cognitions, than fathers. Given the posited role of this particular mental state to children’s ToM abilities, it is likely that mother–child interactions were a richer context for promoting children’s ToM. In addition, fathers’ influence on their children’s ToM might operate otherwise, since there are differences in the way mothers and fathers interact and talk to their children (Kornhaber & Marcos, 2000; Lundy, 2003; Schwartz, 2004). Along this line, it would be important to look at other characteristics of fathers’ discourse patterns with their children. It might not be a matter of what the parent says, but how it is said: how well the interlocutors are tuned in, or connected, to each other’s talk (Ensor & Hughes, 2008), and how the parent responds to children’s use of mental state references during their interactions (Sabbagh & Callanan, 1998). Further research is needed in order to further examine these hypotheses, as it can be that these other characteristics of fathers’ discourse, other than its content, when interacting with their
children, are related to children’s ToM. Interestingly, our results differ from previous findings by Lundy (2013), as the author found links between preschool children’s ToM and both fathers’ mental descriptions of their children. These different results are possibly due to the nature of the tasks used, as Lundy assessed mothers’ and fathers’ use of mental attributes when describing their children, an offline measure, while we assessed mothers’ and fathers’ use of mental references, in the context of an interaction with their children, thus constituting an online measure.

On the other hand, we found no relation between maternal and paternal mentalizing abilities and their children’s ToM: children whose mothers and fathers evidenced more mentalizing abilities in interpreting visual jokes did not show better performance on the ToM tasks. The only additional study that tested this hypothesis found a significant association between parents’ performance on the Reading the Mind in the Eyes task (Baron-Cohen et al., 2001) and children’s ToM (Sabbagh & Seamans, 2008). However, it should be noted that the task used in this previous study assesses mainly emotion recognition, whereas in the present study we assessed parents’ ability to reason about others’ mental states. Furthermore, in Sabbagh and Seamans’ (2008) study, children’s ToM was assessed using a battery which included emotion-related tasks, while in our study the set of tasks focused on children’s understanding of beliefs. According to some authors, ToM consists of a cognitive component and an affective component (Vetter, Altgassen, Phillips, Mahy, & Kliegel, 2013). The Reading the Mind in the Eyes task may, then, be a good measure of the affective component of ToM (Duval et al., 2011), whereas the Visual Jokes task is likely measuring more cognitive components of mentalizing, in that it assesses adults’ ability to understand characters’ behaviors based on their mental states. It is possible that the link reported by Sabbagh and Seamans (2008) reflects the relation between parents’ and children’s ToM in its affective dimension. It would be interesting for future studies to further examine this relation by assessing parents’ and children’s ToM in both its cognitive and affective components.

Our results thus suggest that, more important than mothers’ ability to mentalize about others’ behavior, in general, is their propensity to focus on mental states when interacting with their preschool children. In addition, we found no relations between parents’ use of mental state language during book-reading and their performance on the mentalizing task for both mothers and fathers. This result is consistent with previous
evidence suggesting that adults, who are expected to have fully developed mentalizing abilities, do not always use this competence spontaneously. For instance, Keysar and colleagues (Keysar et al., 2003) found that adults frequently failed to take into account others’ visual perspectives when asked to move objects around a grid. Similarly, in a recent study, Meins and colleagues (Meins et al., 2014) showed that adults did not always use their mentalizing skills spontaneously in referring to mental attributes when asked to describe others. Our findings are also in line with the pattern of results reported in children. Meins et al. (2006) found no relation between ToM performance and children’s tendency to use mental state language when narrating a wordless picture book. Taken together, these results suggest that the ability to mentalize is different from using this ability spontaneously in everyday life to understand and interpret people and their behavior.

If parents’ propensity to use mental state language when narrating a story does not reflect their mentalizing abilities, what other underlying factors might relate to individual differences in parents’ mental state discourse? It is possible that parents’ tendency to refer to the mental world when talking to their children reflects aspects more specifically linked to parenthood, such as their sensitivity, an important characteristic for open communication in parent-child relationships (Ontai & Thompson, 2002, 2008). It could be that parents who are more sensitive in their interactions with their children, thus being more invested in that relationship, would also tend to focus on mental states when interacting with their children, in an attempt to scaffold their social-cognitive development.

It could also be that parents’ propensity to refer to mental states when interacting with their children reflects a more specific form of sensitivity: mind-mindedness (Meins, 1997). Mind-mindedness is defined as the extent to which parents treat their children as mental agents (Meins, Fernyhough, Russell, & Clark-Carter, 1998), enabling them accurately to read their children’s mental states (Meins, Fernyhough, Fradley, & Tuckey, 2001). Hence, more mind-minded parents, who represent their children in terms of their mental characteristics (e.g., curiosity, intelligence), might pick up on those mental attributes and act on them by referring more frequently to mental states, thereby promoting their understanding of the mind. In fact, this is consistent with previous findings suggesting relations between parents’ descriptions of their children as mental agents and children’s ToM abilities, such that parents who use more mental
attributes when describing their children have children who perform better on ToM tasks (de Rosnay, Pons, Harris, & Morrell, 2004; Lundy, 2013; Meins et al., 1998).

In addition, it should be noted that the picture-book task encouraged mainly parental references to the story-characters’ mental states. It would be interesting to employ a more interactional task while assessing parents’ appropriate comments on their children’s mental states, or mind-mindedness (Meins et al., 2001). Moreover, even though we adopt the theoretical stance that parental use of mental state terms fosters children’s ToM, the correlational nature of our data warrants cautious interpretation.

To the authors’ knowledge this is the first study to examine the concurrent links between children’s ToM, their parents’ mental state talk, and parental mentalizing abilities. These results support previous investigations, showing the importance of the relation between children’s social cognition and parental mental state talk, while highlighting a specific link between children’s ToM abilities and their mothers’ references to cognition-related terms during mother-child interactions. Nevertheless, it seems that the link between parents’ mentalizing abilities and children’s ToM is not straightforward, and thus should be addressed by future research, while considering both mothers’ and fathers’ independent contributions to children’s social-cognitive development.
References


Empirical Study 2: Mentalizing, Mental state talk and Theory of mind


CHAPTER 4

EMPIRICAL STUDY 3
The relation between preschoolers’ theory of mind and mental state talk and their links with later social competence and behavior

Abstract
The present study had two main aims: a) to investigate the concurrent links between children’s theory of mind (ToM) and their use of mental state references at 55 months, b) to examine the longitudinal relations between preschool children’s social understanding as indicated by their ToM and use of mental references, and their later social competence and behavior, at 69 months. Participants were 73 children and their mothers. We found an association between children’s ToM abilities and their tendency to refer to mental states, specifically cognitions, during interactions with their mothers. Moreover, both children’s ToM and references to mental states were longitudinally related to children’s social competence and behavior, but only for girls. Our results support the idea that ToM, as assessed via false belief tasks, and children’s tendency to refer to mental states during everyday interactions are two important related markers of children’s social understanding, both linked to children’s social competence and behavior, while highlighting the importance of considering gender-specific effects when investigating children’s social cognition.
During the preschool years, children go through major changes in their social understanding and their understanding of own and others’ minds. In fact, it is typically between the ages of 3 to 5 years that children are said to have developed an explicit theory of mind (ToM), the ability to attribute mental states (e.g., desires, beliefs, emotions) to oneself and to others, and to understand and anticipate behavior based on those mental states (Astington & Barriault, 2001). It is during this time that children start being able to understand false beliefs, that is, that two people can have distinct beliefs about the same situation, and that those beliefs can even be false. Thus, false belief understanding is considered an important marker of ToM acquisition, and it is when children start succeeding in false belief tasks that they are said to understand the representational nature of beliefs and therefore to have developed a representational ToM (Wellman, Cross, & Watson, 2001). Accordingly, most studies on ToM have measured children’s understanding of the mind using false belief tasks, in which they are presented with short stories and asked to explain or to predict a character’s behavior, based on the character’s inferred mental states (Wellman et al., 2001; Wellman & Liu, 2004).

Research findings show that some children display an earlier understanding of the mind and that these inter-individual differences appear to be related to several aspects of children’s social context, particularly family characteristics. For example, children with siblings (e.g., McAllister & Peterson, 2007; Ruffman, Perner, & Parkin, 1999), with a secure attachment (e.g., Repacholi & Trapolini, 2004; Symons & Clark, 2000) and whose parents use specific disciplinary strategies (e.g., Hughes, Deater-Deckard, & Cutting, 1999; Ruffman et al., 1999) show better performance on ToM tasks. Also following this line, an extensive body of research has focused on the role of mental state talk, specifically parents’ use of mind-related words, in promoting children’s ToM abilities. Hence, researchers have consistently shown that parents who make more references to mental states when interacting and talking with their offspring have children who perform better on ToM tasks (e.g., Meins, Fernyhough, Arnott, Leekam, & de Rosnay, 2013; Ruffman, Slade, & Crowe, 2002; Ruffman, Slade, Devitt, & Crowe, 2006; Symons, Peterson, Slaughter, Roche, & Doyle, 2005). While these studies have mostly been looking at the importance of parents’ mental references, others focused on children’s own tendency to spontaneously refer to mental states, considering this as an important marker of children’s growing understanding of their own and
others’ minds (e.g., Bartsch & Wellman, 1995; Bretherton & Beeghly, 1982; Osório, Meins, Martins, Martins, & Soares, 2012).

Furthermore, while children’s performance on false belief tasks continues to be taken as indexing their underlying understanding of the mind, studies have revealed that even younger children, who are not expected to succeed in false belief tasks, show some understanding of mental states during their everyday social interactions (Dunn, 1988, 1991). Therefore, it may be that other manifestations of children’s understanding of the mind, such as their tendency to refer to mental states when interacting with others, can provide an additional, more naturalistic and possibly even closer index of children’s social understanding (Hughes, Lecce, & Wilson, 2007). Accordingly, some studies have sought to assess children’s understanding of the mind using more naturalistic paradigms, by looking at children’s spontaneous use of mind-related references, both in interactional and non-interactional contexts. For instance, research from our group showed that 3-year-old children’s use of desire-related terms in pretend play with their mothers was linked to their ability to incorporate an experimenter’s symbolic suggestions – a social-cognitive ability thought to precede ToM (Osório et al., 2012). In addition, prior research suggests links between children’s performance on ToM tasks and their use of mental references. In this sense, several studies showed that children who evidence better ToM abilities are those who employ more references to mental states during interactions with their parents (Ensor & Hughes, 2008; Nielsen & Dissanayake, 2000; Ruffman et al., 2006), siblings and friends (Brown, Donelan-McCall, & Dunn, 1996; Hughes & Dunn, 1998; Hughes et al., 2007; Hughes, Ensor, & Marks, 2011). Following the same line, Symons and colleagues (2005) found similar results when assessing children’s spontaneous use of mental references in a non-interactional context, during a narrative task, in response to a set of photographs they were presented with. However, the authors did not find this relation when children’s mental references were assessed during dyadic shared book-reading interactions with their parents. Also, in a more recent study, Meins and colleagues (Meins et al., 2013) showed links between children’s ToM abilities and their use of mental state terms as reported by their mothers in a questionnaire. However, despite the great amount of literature documenting this relation, only the latter study examined ToM using a battery of tasks, assessing children’s understanding of distinct mental concepts that compose ToM development.
The present study aims to extend previous research by examining the concurrent relations between children’s performance on a battery of ToM tasks and their use of mental state references during mother-child shared book-reading interactions, while also investigating the longitudinal associations between these two indices of preschool children’s social understanding and their social competence and behavior, later on, before entering school.

In fact, while many researchers focused on individual differences in ToM and their relation with variables from children’s social context, several studies have also looked at the links between children’s ToM abilities and other social competences, yielding mixed results. While some authors found results suggesting that children who evidenced better performance on ToM tasks were rated by their teachers as displaying more prosocial and socially competent behaviors, both concurrently (e.g., Capage & Watson, 2001; Lalonde & Chandler, 1995; Weimer & Guajardo, 2005) and longitudinally (e.g., Razza & Blair, 2009), others did not find this relation (e.g., Garner, Curenton, & Taylor, 2005). Furthermore, findings from other studies suggested concurrent associations between preschoolers’ ToM and their social competence reported by teachers, depending on children’s gender. Thus, Walker (2005) found that 3-to 5-year-old girls who showed better ToM were rated by their teachers as displaying more prosocial behaviors. On the other hand, boys who performed better on the ToM tasks were rated by their teachers as showing more aggressive or disruptive and less shy and withdrawn behaviors. Similar results were reported by Razza and Blair (2003), who carried out a study with 4-year-old children from low-income backgrounds and found relations between girls’ but not boys’ ToM and social competence. To our knowledge, these were the only two studies that looked at gender differences in the relation between preschoolers’ ToM and social competence. However, seeing as both studies were cross-sectional, only concurrent links were explored; it is our aim to investigate the existence of longitudinal relations between ToM and social competence and behavior, also exploring possible gender differences in this relation.

Furthermore, while several studies examined the relations between children’s ToM abilities and social competence, only one study investigated the links between children’s spontaneous displays of social understanding, such as children’s references to mental states, and their social competence. Garner, Dunsmore and Southam-Gerrow (2008) examined mother-child discourse about emotions in a book-reading task and
found that preschool children who gave more emotion explanations showed more prosocial behavior, observed during children’s interactions with their peers. However, Garner et al. (2008) focused specifically on concurrent discourse about emotions only, thus not looking at links between references to other mental states, such as cognitions or desires, and children’s behavior. The authors also did not investigate possible gender differences in children’s discourse, and its relations with social behavior, which our study also aims to explore.

In sum, this paper has two main aims: a) to investigate the concurrent links between children’s ToM and use of mental state references, and b) to examine the longitudinal relations between preschool children’s social understanding - ToM and use of mental references - and their later social competence and behavior. Additionally, given that prior research suggests that the links between children’s ToM and social competence may vary according to children’s gender (Razza & Blair, 2003; Walker, 2005), we also investigate the relations between children’s social understanding and social competence, for girls and for boys, separately. Finally, because we examined children’s use of mental references during interactions with their mothers, we look at the relations between children’s and mothers’ discourse during those interactions, in order to control for the possible links between the two. Similarly, we also examine the relations between children’s ToM and mental references and other control variables, such as mothers’ educational level, children’s age at the time of the assessment and verbal ability.

Method

Participants

Seventy-three mother-child dyads were recruited via child-care centers in the north of Portugal, for participation in a broader longitudinal study on the relation between children’s socio-cognitive and socio-emotional competences and their school readiness. Children (38 boys, 52.1%) were assessed at two time points: at 4 ½ years (Time 1, T1) and around one year later (Time 2, T2). At T1 children were aged between 53 and 60 months ($M = 55.01$, $SD = 1.55$), and the majority were first-borns (61.6%; $n = 45$). Mothers were mostly the primary caregivers. At T2 children had on average 69.53 months ($SD = 3.01$, range 65-76 months).
At T1 mothers were aged between 26 and 46 years ($M = 36.89, SD = 3.64$). Concerning education level, most of the mothers (68.5%; $n = 50$) had a degree, 11 mothers (15.1%) had a masters or doctoral degree, while the remaining 12 (16.4%) had up to 12 years of formal education.

**Procedure**

At T1 children visited the laboratory twice. In the first session, mothers were given information about the purposes of the study as well as the detailed procedures, and gave written informed consent. Mothers and children were then videotaped during a wordless picture-book reading task, in order to assess mothers’ and children’s use of mental references. Children’s ToM was assessed in the second session, using a battery of six standardized tasks. Children’s verbal ability was assessed using the Peabody Picture Vocabulary Test – Revised (PPVT-R, Dunn & Dunn, 1981).

At T2, children were visited twice in their preschool. In one of the visits, children’s social competence was assessed by teacher report using the Portuguese version of the Social Competence and Behavior Evaluation Scale (LaFreniere & Dumas, 1996; Portuguese version, Santos & Veríssimo, 2008).

**Measures**

**Children’s ToM.** Children’s ToM was assessed using a set of six standardized tasks, namely four tasks from a ToM scale for preschoolers (Wellman & Liu, 2004): (i) Diverse Beliefs, (ii) Knowledge Access, (iii) Unexpected Contents False Belief and (iv) Explicit False Belief; and two additional false belief tasks (Hughes, Adlam, Happé, Jackson, Taylor, & Caspi, 2000): (v) Unexpected Contents II and (vi) Unexpected Location. The *Diverse Beliefs* task required children to be able to understand that a character had a different belief from their own, and to predict the character’s behavior based on that different belief. The *Knowledge Access* task assessed children’s understanding that knowledge will depend on having access to information. In the *Unexpected Contents* task children were expected to predict that a character would think that inside a box of potatoe chips would be potatoe chips, based on the appearance of
the box, rather than the actual contents of the box (a toy bear), which children had already seen. The *Explicit False Belief* task aimed to assess children’s ability to predict a character’s behavior when searching for a pair of gloves, based on the character’s false belief, rather than on the children’s own knowledge. The *Unexpected Contents II* task assessed children’s ability to recall their own false belief when first asked what is inside a kinder chocolate box, after being shown its actual contents (pencils). Finally, the *Unexpected Location* task required children to predict a character’s behavior when looking for his apple, based on his false belief, since the character had no knowledge that his apple had changed location. The first two tasks, being the easiest, were conducted in a fixed order; the order of the remaining four tasks was counterbalanced, in order to avoid contamination between tasks. All of the tasks were coded in terms of success or failure, and to succeed in each of the tasks children had to correctly answer both the control and the key questions.

A randomly selected 31% (n = 24) of the videotapes were coded by a second blind coder. Interrater reliability was calculated using Cohen’s kappa and ranged between .88 (for the Unexpected Contents II task) and 1 (for all the other tasks). A composite ToM measure was calculated, consisting on the sum of the child’s scores in all of the six tasks, thus scores ranged from 0 to 6. Chronbach’s alpha for this composite measure was .55, which falls in line with reliability coefficients reported in previous studies, using similar ToM measures (Astington & Jenkins, 1999; Meins et al., 2002, 2013).

**Mental state references.** Mothers and children were videotaped during a shared book-reading task, using one of two wordless picture books: *Frog where are you?* (Mayer, 1969) and *Frog on his own* (Mayer, 1992). Mothers were asked to tell the story to their children, based on the book’s pictures. The interactions were videotaped, transcribed and then coded in order to access mothers’ and children’s use of mind-related words. If present, these were coded as a) desires: e.g., like, dislike, want, b) cognitions: e.g., think, know, imagine, and c) emotions: e.g., happy, sad, angry. Similarly to previous studies, utterances serving only as conversational devices (e.g. “I don’t know”), or which were repetitions of own or other’s utterances were not coded (Jenkins, Turrell, Kogushi, Lollis, & Ross, 2003; Ruffman et al., 2002). In order to control for differences in verbosity, mothers’ and children’s mental state references
Empirical Study 3: Preschoolers’ social understanding and later social competence

were calculated as proportions of the total number of words used during the interaction. Interrater reliability was assessed by computing the intraclass correlation coefficients ($r_{ICC}$) for 21% ($n = 16$) of mother-child interactions, which were independently coded by two trained raters. Intraclass correlations for the three types of mental references ranged between $r_{ICC} = .89$ and $r_{ICC} = .99$ for mothers, and were $r_{ICC} = 1$ for the three types of mental references, for children.

**Children’s verbal ability.** Children’s verbal ability was assessed using the Peabody Picture Vocabulary Test – Revised (PPVT-R, Dunn & Dunn, 1981). Children were orally presented with words, and asked to choose from a set of four pictures, which one corresponded to the word previously heard. The coding consists of substracting the total number of errors to the highest item achieved. As Portuguese norms for this instrument are not yet available, age-adjusted residuals for the raw scores were computed and used in the statistical analyses.

**Children’s social competence and behavior.** At T2, teachers were asked to complete the Portuguese version of the Social Competence and Behavior Evaluation Scale (SCBE-30; LaFreniere & Dumas, 1996; Portuguese version, Santos & Veríssimo, 2008), aiming to assess children’s social competence and aggressive behavior. This version comprises 30 items, in which teachers are invited to rate the frequency of several children’s behaviors on a 6-point likert scale, ranging from 1 (“Never”) to 7 (“Always”). There is also an option for “Cannot assess” behaviors (N). These items are arranged in three subscales. The subscale Anger-Aggression describes children’s oppositional and aggressive behaviors; the Anxiety-Withdrawal subscale reflects children’s anxious, withdrawn and dependent behaviors; finally, the Social Competence subscale describes children’s positive and adaptive behaviors, reflecting social flexibility and emotional maturity. Chronbach’s Alphas for the Portuguese version were .75 (Anger-Aggression), .73 (Anxiety-Withdrawal) and .73 (Social Competence).

**Analytic strategy**

We first performed preliminary analyses concerning children’s ToM and mental state references at T1 and social competence at T2, and their relations with control variables: mothers’ educational level, mothers’ total number of words and mental
references used during the shared book-reading interactions; and children’s age and verbal ability. Next, we carried out the correlational analyses addressing our two main aims: first examining the concurrent relations between children’s ToM and mental state references at T1, and then investigating the longitudinal links between children’s ToM and mental state references at T1 and children’s later social competence. Finally, we examined gender differences regarding children’s ToM, mental references and social competence, and performed the correlations examining the links between children’s ToM and mental references at T1 and social competence at T2, for boys and girls, separately. Given that the analysed variables did not meet the assumptions for parametric statistical analysis, non-parametric statistics were used.

Results

Descriptive Statistics and Preliminary analyses

Table 1C presents the descriptive measures regarding children’s mental state references, ToM, verbal ability scores and social competence and behavior.
Table 1C

Descriptive statistics regarding children’s mental state references, ToM, verbal ability and later social competence and behavior

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean (S.D)</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Children’s variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of words</td>
<td>86.52 (73.44)</td>
<td>2-433</td>
</tr>
<tr>
<td>Total number of mental references</td>
<td>1.45 (2.10)</td>
<td>0-13</td>
</tr>
<tr>
<td>Number of desire references</td>
<td>0.48 (0.94)</td>
<td>0-6</td>
</tr>
<tr>
<td>Number of cognition references</td>
<td>0.56 (1.13)</td>
<td>0-6</td>
</tr>
<tr>
<td>Number of emotion references</td>
<td>0.41 (0.81)</td>
<td>0-5</td>
</tr>
<tr>
<td>ToM</td>
<td>3.42 (1.53)</td>
<td>1-6</td>
</tr>
<tr>
<td>Verbal ability</td>
<td>91.26 (19.95)</td>
<td>46-126</td>
</tr>
<tr>
<td><strong>Social Competence and Behavior</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anger-Aggression</td>
<td>1.39 (0.52)</td>
<td>1.00-3.78</td>
</tr>
<tr>
<td>Anxiety-Withdrawal</td>
<td>1.41 (0.45)</td>
<td>1.00-2.80</td>
</tr>
<tr>
<td>Social Competence</td>
<td>4.42 (0.98)</td>
<td>1.40-6.00</td>
</tr>
</tbody>
</table>

The correlations between children’s ToM, mental state references and social competence and behavior and the control variables are presented in Table 2C.

Children’s ToM was not significantly related to mothers’ education level, children’s age and verbal ability. However, it was significantly related with mothers’ references to mental states during the book-reading interactions, $r_s = .24, p = .039$.

As to children’s mental references, we found no significant relations with mothers’ education level. However, when we examined the links with mothers’ discourse during the dyadic interaction, we found significant relations between the total number of words used by the mother and children’s references to cognitions, $r_s = .25, p = .037$, as well as a trend-level association with children’s references to desires, $r_s = .20, p = .095$. Mothers’ and children’s use of mental references were not related. Regarding children’s characteristics, we only found a significant relation between children’s age and references to emotions, $r_s = .23, p = .046$. On the other hand, we found no significant relations between children’s age and references to desires, cognitions or to
mental states in general. We also found no significant associations with children’s verbal ability.

Concerning children’s social competence and behavior, assessed at T2, reported children’s aggressive behavior and anxiety-withdrawal were significantly negatively associated with mothers’ educational level, \( r_s = -0.30, p = .014 \) and \( r_s = -0.28, p = .022 \), respectively. Children’s social competence, on the other hand, was not related to mothers’ educational level. In addition, no associations were found with children’s variables, such as age and verbal ability.

Because children’s age, mothers’ educational level and mothers’ total number of words and mental references used during the shared book-reading interaction were significantly associated to children’s mental references, ToM and social competence and behavior, we controlled for these variables in the subsequent analyses. Moreover, considering that children’s verbal ability is a well-known correlate of ToM (Milligan, Astington, & Dack, 2007), we also controlled for this variable, in spite of not being associated with any of our main variables.
Table 2C
The relation between children’s mental state references, ToM, and later social competence and behavior and mothers’ and children’s control variables

<table>
<thead>
<tr>
<th></th>
<th>Mothers’ variables</th>
<th>Children’s variables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Education level</td>
<td>Total number of words</td>
</tr>
<tr>
<td>Children’s ToM (T1)</td>
<td>.06</td>
<td>-.05</td>
</tr>
<tr>
<td>Children’s Mental references (T1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total mental references</td>
<td>-.07</td>
<td>.18</td>
</tr>
<tr>
<td>Desires</td>
<td>-.12</td>
<td>.20*</td>
</tr>
<tr>
<td>Cognitions</td>
<td>.09</td>
<td>.25*</td>
</tr>
<tr>
<td>Emotions</td>
<td>-.15</td>
<td>.12</td>
</tr>
<tr>
<td>Social competence and behavior (T2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anger-aggression</td>
<td>-.30*</td>
<td>-.04</td>
</tr>
<tr>
<td>Anxiety-withdrawal</td>
<td>-.28*</td>
<td>.05</td>
</tr>
<tr>
<td>Social competence</td>
<td>-.00</td>
<td>-.14</td>
</tr>
</tbody>
</table>

*p < .10; *p < .05; Spearman Correlation Coefficient
The relation between children’s ToM and mental references.

We found a significant positive relation between children’s ToM abilities and their use of cognition terms, $r_s = .25, p = .036$. Therefore, children who evidenced a better ToM used more cognition references when interacting with their mothers. On the other hand, we found no significant associations between children’s ToM skills and their references to desires, emotions or to mental states in general, $r_s = -.01, p = .95$, $r_s = -.19, p = .11$ and $r_s = .07, p = .58$, respectively.

Furthermore, after controlling for children’s age at the time of the assessment, verbal ability, and mothers’ total number of words and proportion of mental references during the shared book-reading, the pattern of results was the same, with children’s ToM being associated only with children’s references to cognitions, $r_s (66) = .29, p = .016$.

Relations between children’s social understanding and later social competence and behavior.

Table 3C shows the full and partial correlations between children’s ToM abilities and mental references at T1 and their social competence and behavior later on, at T2.
We found no significant associations between children’s ToM and the social competence and behavior subscales. On the other hand, in what regards the links between children’s mental references and their later social competence, we found a trend-level negative association between children’s use of cognition terms and their scores in the anger-aggression subscale one year later, $r_s = -.24, p = .051$. Therefore, children who used more cognition terms when interacting with their mothers at age 4 ½ years tended to be rated by their teachers as showing less aggressive behavior later on. We also found a trend-level positive association between children’s use of desire terms and their scores in the anger-aggression scale, $r_s = .23, p = .063$, such that children who used more desire terms at age 4 ½ years tended to be rated by their teachers as evidencing more aggressive behavior one year later. Conversely, we found no significant relations between children’s use of emotion-related terms and their reported social competence and behavior.

After partialling out children’s age, verbal ability and mothers’ educational level, total number of words and mental references used during the shared book-reading interaction, the relation between children’s references to cognitions and later ratings of aggressive behavior continued to be marginally significant, $r_s (59) = -.22, p = .092$. 

---

Table 3C

Full/partial correlations between children’s mental state references, ToM, and later social competence and behavior

<table>
<thead>
<tr>
<th></th>
<th>Anger-Aggression</th>
<th>Anxiety withdrawal</th>
<th>Social competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children’s ToM</td>
<td>-.15/- .11</td>
<td>-.16/- .19</td>
<td>.09/.09</td>
</tr>
<tr>
<td>Children’s Mental references</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total mental references</td>
<td>.00/- .01</td>
<td>-.11/- .19</td>
<td>.12/.17</td>
</tr>
<tr>
<td>Desires</td>
<td>.23$^+/ .18$</td>
<td>-.03/- .12</td>
<td>.01/.03</td>
</tr>
<tr>
<td>Cognitions</td>
<td>-.24$^+/- .22^+$</td>
<td>-.09/- .10</td>
<td>.12/.20</td>
</tr>
<tr>
<td>Emotions</td>
<td>-.11/- .17</td>
<td>-.02/- .07</td>
<td>.06/.12</td>
</tr>
</tbody>
</table>

Note: Partial correlations, controlling for mothers’ educational level, total number of words and proportion of mental references used during the book-reading interaction and children’s age and verbal ability at T1.

$^+ p < .10$; Spearman Correlation Coefficient
However, the link between children’s references to desires and later ratings concerning aggressive behavior was rendered non-significant, $r_s (59) = .18, p = .16$.

**Gender differences in children’s ToM, mental references and social competence and behavior.**

We then looked at gender differences concerning our main variables (Table 4C), and found no significant differences between boys and girls, either concerning their performance on the ToM tasks or their use of mental states during interactions with their mothers.

However, in what concerns children’s social competence and behavior, we did find significant gender differences, namely regarding the anxiety-withdrawal scale, $Z = -4.09$, $p < .001$. Thus, girls were rated by their teachers as showing more anxious-withdrawn behavior, when compared to boys. In addition, we found a marginally significant difference regarding the anger-aggression subscale, $Z = -1.72$, $p = .086$. Therefore, boys tended to be rated by their teachers as displaying more aggressive behavior than girls. We found no gender differences regarding the social competence subscale, $Z = -1.27$, $p = .21$. 
Table 4C

Gender differences regarding children’s ToM, mental state talk and social competence and behavior

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (S.D)</td>
<td>Mean (S.D)</td>
<td></td>
</tr>
<tr>
<td><strong>ToM</strong></td>
<td>3.32 (1.47)</td>
<td>3.53 (1.60)</td>
<td>-.53</td>
</tr>
<tr>
<td><strong>Mental references</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total mental references</td>
<td>1.32 (2.30)</td>
<td>1.60 (1.87)</td>
<td>-.41</td>
</tr>
<tr>
<td>Desires</td>
<td>0.53 (1.16)</td>
<td>0.43 (0.66)</td>
<td>-.11</td>
</tr>
<tr>
<td>Cognitions</td>
<td>0.47 (1.18)</td>
<td>0.66 (1.08)</td>
<td>-.72</td>
</tr>
<tr>
<td>Emotions</td>
<td>0.32 (0.57)</td>
<td>0.51 (1.01)</td>
<td>-.54</td>
</tr>
<tr>
<td><strong>Social competence and behavior</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anger-Aggression</td>
<td>1.46 (0.57)</td>
<td>1.31 (0.44)</td>
<td>-1.72*</td>
</tr>
<tr>
<td>Anxiety-Withdrawal</td>
<td>1.20 (0.21)</td>
<td>1.66 (0.53)</td>
<td>-4.09***</td>
</tr>
<tr>
<td>Social Competence</td>
<td>4.30 (0.95)</td>
<td>4.56 (1.02)</td>
<td>-1.27</td>
</tr>
</tbody>
</table>

* p < .10; *** p < .01

Note: Although we report the results from Mann-Whitney tests, carried out with the proportions of children’s mental references, for the purpose of data intelligibility, we present the means and standard deviations of the original raw variables.

Relations between children’s social understanding and later social competence and behavior, by gender.

Finally, we looked at the relations between children’s ToM abilities and mental references at T1 and their social competence and behavior later on, at T2, separately for boys and girls (Table 5C).
Table 5C

Full/partial correlations between children’s mental state references, ToM, and later social competence and behavior, by gender

<table>
<thead>
<tr>
<th></th>
<th>Social competence and behavior</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Anger-Aggression</td>
<td>Anxiety withdrawal</td>
</tr>
<tr>
<td>Children’s ToM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>.14/.08</td>
<td>.06/.03</td>
</tr>
<tr>
<td>Girls</td>
<td>-.45*/- .26</td>
<td>-.40*/- .49*</td>
</tr>
<tr>
<td>Children’s Mental references</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total mental references</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>-.04/- .09</td>
<td>-.18/- .19</td>
</tr>
<tr>
<td>Girls</td>
<td>.03/.05</td>
<td>-.14/- .30</td>
</tr>
<tr>
<td>Desires</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>.14/.03</td>
<td>-.08/- .10</td>
</tr>
<tr>
<td>Girls</td>
<td>.36*/.28</td>
<td>.05/- .07</td>
</tr>
<tr>
<td>Cognitions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>-.12/- .13</td>
<td>-.21/- .20</td>
</tr>
<tr>
<td>Girls</td>
<td>-.36*/- .39*</td>
<td>-.09/- .22</td>
</tr>
<tr>
<td>Emotions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>-.10/- .08</td>
<td>-.19/- .16</td>
</tr>
<tr>
<td>Girls</td>
<td>-.12/- .13</td>
<td>.05/- .13</td>
</tr>
</tbody>
</table>

Note: Partial correlations, controlling for mothers’ educational level, total number of words and proportion of mental references used during the book-reading interaction and children’s age and verbal ability at T1.

* p < .10; * p < .05; Spearman Correlation Coefficient

Regarding ToM, we found significant relations between ToM and social competence and behavior, only for girls. Therefore, girls who performed better on the ToM tasks were rated by their teachers as showing less aggressive, $r_s = -.45$, $p = .012$, and shy/withdrawn behavior, $r_s = -.40$, $p = .029$, and as evidencing more social competence, $r_s = .38$, $p = .040$ one year later. After controlling for girls’ age, verbal ability and mothers’ education level, total number of words and mental references used during the shared book-reading interaction, the relation between ToM and later ratings regarding shy/withdrawn behavior remained significant, $r_s (23) = -.49$, $p = .013$. 86
However, the association between girls’ ToM and later scores concerning the social competence subscale fell to marginally significant, $r_s(23) = .37$, $p = .068$, while the relation with teachers’ ratings regarding aggressive behavior was rendered non-significant, $r_s(23) = -.26$, $p = .22$. Similarly, when looking at children’s use of mental references, we also found links with later social competence and behavior, only for girls. Thus, girls who referred more to desires at 4½ years were rated by their teachers as showing more aggressive behavior later on, $r_s = .36$, $p = .049$. Conversely, girls who made more references to cognitions at age 4½ were rated by their teachers as evidencing less aggressive behavior one year later, $r_s = -.36$, $p = .046$. Regarding children’s references to emotions, we found no significant relations with the social competence and behavior subscales. Partialing out girls’ age, verbal ability, mothers’ educational level, total number of words and mental state references used during their interaction, the relation between children’s references to cognitions and teachers’ ratings regarding aggressive behavior fell to marginally significant, $r_s(23) = -.39$, $p = .053$. Moreover, a significant association emerged between children’s references to cognition terms and scores concerning the social competence subscale, $r_s(23) = .45$, $p = .023$. The link between children’s references to desires and the aggressive behavior subscale became non-significant, $r_s(23) = .28$, $p = .17$.

**Discussion**

Our first main goal was to investigate the concurrent links between children’s ToM and use of mental state references. We found associations between children’s ToM abilities and children’s tendency to refer to mental states, specifically to cognitions. Children who performed better on the ToM tasks also used more cognition-related terms during a shared book-reading interaction with their mothers, even after controlling for children’s age, verbal ability and mothers’ discourse during their interactions. This is congruent with previous findings (e.g., Ensor & Hughes, 2008; Nielsen & Dissanayake, 2000; Ruffman et al., 2006), suggesting that children who perform better in a standardized battery of ToM tasks, also display a better understanding of the mind in real-life interactions with others, by focusing and referring more frequently to mental states in their discourse. Furthermore, it seems that this link is specific to children’s references to cognitions, as we did not find any relations with children’s references to
other mental states, such as desires or emotions, or to mental states in general. It is important to note that the battery of ToM tasks we used in this study was composed only of cognition-related tasks, thus consisting in a measure mainly oriented towards the assessment of false belief understanding. Also, as cognitions are considered the most complex and advanced type of mental states, being truly representational (Bartsch & Wellman, 1995), this relation does not come as a surprise. It is possible that children who performed better on these cognition-related tasks focused more on the cognitive states of the story characters, and therefore referred more often to cognitions.

Our results might have also been influenced by the social partner with whom the child was interacting. This is consistent with previous findings showing that children use more mental references when interacting with friends and siblings than with their mothers (Brown & Dunn, 1992; Brown et al., 1996; Hughes, Marks, Ensor, & Lecce, 2010), leading some authors to argue that children’s social understanding is relationship-specific (Hughes & Dunn, 2002; Hughes et al., 2007, 2010). Therefore, children might apply their understanding of the mind differently, in different relationships (Hughes, 2011). In what concerns our study, it is possible that, because these shared book-reading interactions were mostly guided by the mother, children were not as spontaneous as they would be when talking with a sibling or a friend and, talking less, used fewer references to mental states. Still, it is noteworthy that our results held even after controlling for mothers’ discourse. Another possibility is that the links between children’s performance on standardized ToM tasks and children’s tendency to refer to mental states during their daily interactions is reflecting the role of other individual characteristics, such as children’s temperament. It could be, for instance, that children who are more extroverted tend to talk more, when interacting with others, and thus use more mental state references, when compared to more introverted children. Further investigation is needed, as it would be interesting for future studies to examine these hypotheses.

Our second aim was to examine the longitudinal relations between preschool children’s social understanding, indexed by their ToM and use of mental references, and their social competence and behavior, later on. We found no associations between children’s ToM abilities and teacher ratings of their social competence and behavior, one year later. However, when we looked at these analyses by gender, we found that ToM was related to girls’ social competence and behavior. Specifically, after controlling
for children’s age, verbal ability and mothers’ educational level and discourse during the shared book-reading interactions, girls who performed better on the ToM tasks were rated by their teachers as evidencing less shy/withdrawn behavior and tended to be rated as showing more socially competent behavior. These results are congruent with, and extend, previous research (Razza & Blair, 2003; Walker, 2005), which found relations between children’s ToM and social competence to differ according to children’s gender, reporting concurrent associations between girls’ ToM and socially competent and prosocial behaviors. Although we also found gender differences regarding children’s shy/withdrawn behavior, with girls being rated by their teachers as showing more of this type of behavior, we found only a tendency for boys to be reported to show more aggressive behavior, and no gender differences concerning the social competence subscale or ToM, which makes these results more interesting. So, it may be that girls and boys differ as to how they use their ToM abilities, in their everyday life and interactions with others (Razza & Blair, 2003; Walker, 2005). It is also possible, as pointed out by Walker (2005), that gender-specific styles of social interaction have a role in explaining this relation between ToM and social competence and behavior. Our results, along with previous reports, suggest that it may be important to consider gender-specific effects when investigating children’s social understanding and its relations with other social-emotional outcomes. Furthermore, and to the best of our knowledge, ours is first study to show, longitudinally, gender-specific relations between preschool children’s ToM and their social competence, assessed around one year later. This longitudinal design extends previous cross-sectional studies, in that it makes it possible to draw potential causality links, thus giving support to the idea that it is girls’ ToM at 4 ½ years that promotes their social competence and behavior around one year later. However, it is important to note that, because we did not assess children’s social competence and behavior at 4 ½ years, it remains unclear whether ToM at T1 is promoting children’s social competence and behavior at T2, or whether our results merely reflect the associations between children’s ToM and social competence and behavior across time. Thus, this is an important aspect to be considered in future research.

Moreover, and in spite of not finding relations between children’s ToM and social competence and behavior for the full sample, we did find marginally significant relations between children’s references to cognition terms and teachers’ ratings
regarding aggressiveness. Specifically, children who used more cognition terms during their interactions with their mothers tended to be rated by their teachers as showing less aggressive behavior, around one year later, even after accounting for other variables, such as children’s age and mothers’ education level and discourse during their interaction. So, in spite of being a weak relation, thus in need of further investigation, it is possible that children’s tendency to use cognition-related references constitutes an index of children’s social understanding, closer to what children actually do in their everyday lives (Hughes et al., 2007). In turn, this would help explain why it is related to teachers’ ratings of children’s everyday behavior. It is also interesting to note that when we analysed the links between children’s mental references and their later social competence and behavior by gender, our results were similar to the ones we found regarding ToM, in that, after controlling for children’s age, verbal ability, mothers’ education level and discourse during their interactions, girls who used more references to cognitions during interactions with their mothers were one year later rated by their teachers as evidencing more social competence, and tended to be rated as evidencing showing less aggressive behavior. These results are also consistent with the idea mentioned above, that it may be relevant to take into account gender-specific effects when investigating children’s social understanding.

Some methodological issues should be taken into account when interpreting our findings. In this sense, it is important to note that in the shared book-reading task mothers were instructed to tell the story to their children, thus guiding the interaction. Therefore, as children talked notably less, they also made fewer mental references. Accordingly, we found that children whose mothers talked more, using more words during the story-telling, referred more to cognition terms, and tended to use more desire terms, during that same interaction. Thus, it is possible that mothers’ speech influenced children’s performance and also correlated with some other factors related to the child’s later social competence. Indeed, mothers who talk more can direct their interventions to stimulate their children to think about and talk more about mental states, particularly cognitions. Therefore, mothers may be scaffolding their children’s understanding of the mind, which is consistent with existing literature showing the crucial role that parents have in promoting their children’s social understanding (Meins et al., 2013; Ruffman et al., 1999, 2002, 2006; Symons et al., 2005). Also in line with this idea, our findings showed that children whose mothers referred more to mental states during their
interactions had a better performance on the ToM tasks, and when we controlled for these mothers’ mental references, along with the total number of words used, mothers’ educational level and children’s age and verbal ability, the links between children’s ToM and later ratings regarding aggressive behavior and social competence were weakened. In addition, it is also important to note that in our study children’s social competence and behavior were assessed only in the perspective of the teacher, using a questionnaire. It would be important for future studies to include more than one informant, in order to get a more complete perspective on children’s competences and behavior. Also, it would be interesting to explore the pattern of results obtained with observational measures of children’s social competence and behavior.

To our knowledge, this is the first study to examine the longitudinal relations between two indices of preschool children’s social understanding – ToM and mental references –, and their social competence. Our findings show, for the first time, not only that children’s performance on a standardized battery of ToM tasks is related to children’s references to mental states, specifically cognitions, during mother-child interactions, but also that the two are related to children’s reported social behavior one year later, and only for girls. Our findings showing that for girls, but not for boys, ToM and mental references were related with later social competence highlight the importance of further exploring gender-specific effects when studying children’s social cognition, falling in line with previous suggestions that boys and girls may differ in how they use their socio-cognitive abilities in their real-life interactions (Razza & Blair, 2003; Walker, 2005). Moreover, the fact that we found an association between children’s ToM and mental references, and that both ToM and mental state talk showed a similar longitudinal pattern of gender-specific results, in relation to later social competence and behavior, brings further support to the idea that we are talking about two important indices of children’s social understanding, which are similarly reflected in children’s later social competence and behavior. Therefore, it would be interesting for future studies to continue to explore these relations, thus bridging the gap between using experimental and naturalistic paradigms in assessing children’s understanding of the mind, while examining the relations between this wider view of children’s social understanding and other children’s outcomes.
Chapter 4

References


Hughes, C., Lecce, S., & Wilson, C. (2007). “Do you know what I want?” Preschoolers’ talk about desires, thoughts and feelings in their conversations with sibs and


CHAPTER 5

CONCLUSION
Parents’ mentalizing and children’s theory of mind

Over the last few decades, a great volume of research investigated the development of children’s ability to think about their own and others’ mental states, their theory of mind (ToM). However, as fewer studies have looked at adults’ mentalizing abilities, in normative samples, it was one of our aims to address this gap, by examining adults’ mentalizing abilities, and specifically investigating some of its possible correlates. Moreover, as the links between adult mentalizing and perceptions of the child as a mental agent (mind-mindedness) seem to be in need of some clarification, an important question that guided this research, and was the main focus of our first paper, regarded the nature of the relation between the two constructs. In addition, while a consistent line of research has been showing relations between characteristics of parent-child relationships and children’s ToM, the role of some parental characteristics such as their mentalizing abilities have been suggested (e.g., Sabbagh & Seamans, 2008) but far less studied. Thus, falling in line with the theoretical framework highlighting the crucial role that parents, and parent-child interaction, have in the development of children’s ToM (Carpendale & Lewis, 2004), we sought to address these questions, by focusing our investigation on selected maternal and paternal characteristics, such as mentalizing abilities and mental state discourse, in relation to their preschool children’s ToM. In addition, concerning parents’ mental state talk, while several studies have shown its importance in promoting children’s ToM abilities, few of these studies have included both mothers’ and fathers’ mental state talk, and to our knowledge none has looked at the links between parents’ mental state talk and their mentalizing abilities. Thus, our study also focused on the relation between both mothers’ and fathers’ mentalizing abilities, their mental state talk and children’s ToM, and this was the main goal of the second paper of this dissertation.

Therefore, whereas our first two papers were centered on studying possible parental competences and characteristics that could be related to individual differences in preschool children’s ToM, our final paper aimed at looking further into the child development, and exploring the links between children’s understanding of the mind and later social outcomes, namely children’s social competence and behavior. With this third paper we aimed at addressing the mixed findings uncovered by prior research when examining the links between children’s ToM and social competence and behavior, as well as possible gender-specific relations suggested by previous studies (Razza &
Blair, 2003; Walker, 2005). Moreover, instead of looking only to children’s performance in false belief tasks as an indicator of ToM, we looked also at children’s use of mental state references during interactions with their mothers as an additional, and possibly more naturalistic, index of children’s social cognition (Hughes, Lecce, & Wilson, 2007). Thus, we investigated the concurrent associations between these two indices of preschoolers’ social understanding, ToM and mental state references, and investigated its longitudinal relations with children’s social competence and behavior, one year later. Furthermore, we explored gender-specific associations.

A summary of our empirical findings is presented below.

**Summary of empirical findings**

Our first two papers looked at possible family variables, and specifically parental ones, that could be related to individual differences in children’s ToM abilities. Accordingly, in paper 1, we aimed to investigate two parental variables that have been shown in previous studies to be related to children’s ToM: parents’ mentalizing abilities (e.g., Sabbagh & Seamans, 2008) and representations of the child as a mental agent, mind-mindedness (e.g., Lundy, 2013). More specifically, we examined the relation between these two parental competences, while investigating their potential associations with socio-demographic, parental, and child variables. Our findings showed that, after other variables, such as parents’ educational level, psychopathological symptoms, and children’s reported temperament were accounted for, mentalizing and mind-mindedness were not associated, both for mothers and fathers. Moreover, when exploring some of the possible correlates of the two competences, we found that these differed. Mentalizing was associated with mothers’ socio-demographic and individual characteristics, such as education level and psychopathological symptoms. It was also related to mothers’ perceptions concerning their children’s temperament, namely effortful control. On the other hand, mind-mindedness was not predicted by any of these variables. As to fathers’ mentalizing and mind-mindedness we only found a relation between fathers’ mentalizing and education qualifications, an individual characteristic. Therefore, the fact that mentalizing and mind-mindedness were shown to have distinct correlates, and that after these were taken into account mentalizing and mind-mindedness were not significantly associated, offered further support to the idea that the two are distinct competences in adults. Mind-mindedness could, then, be more of a
relational quality (Meins, Fernyhough, & Harris-Waller, 2014), while mentalizing might reflect a more basic social-cognitive competence. Our results thus extended previous findings with children (Meins, Fernyhough, Johnson, & Lidstone, 2006), falling in line with prior suggestions of the existence of a gap between having the ability to mentalize and the tendency to use it spontaneously in the everyday life (Meins et al., 2006, 2014). Additionally, we found no concordance between the way mothers and fathers described their children as mental agents, suggesting the possibility that the way parents represent their children is accessing some individual characteristics or specificities of their relationship with their children, which may differ for mothers and fathers.

Results from paper 2 came to give further support, and extend these findings. In this second paper we aimed at investigating the concurrent relations between mothers’ and fathers’ mentalizing abilities and mental state talk and their preschool children’s ToM. Our results showed no relations between mothers’ and fathers’ mentalizing abilities and their children’s ToM. However, mothers’ propensity to refer to mental states, and specifically cognitions, was related to a better ToM performance by their children. Moreover, when control variables, such as mothers’ age and educational qualifications and children’s verbal ability were accounted for, only the link between maternal references to cognitions and children’s ToM remained significant. Our results fall in line with previous research (e.g., Ensor, Devine, Marks, & Hughes, 2013; Ensor & Hughes, 2008; Slaughter, Peterson, & Mackintosh, 2007), in showing a concurrent link between mothers’ references to a specific mental state, cognitions, and children’s ToM abilities. As to fathers’ use of mental references, we found no association with children’s ToM. Thus, our results differed for mothers and fathers, which is congruent with our finding of no concordance regarding the representations of their children as mental agents (mind-mindedness), presented in the first paper. As mothers and fathers seem to have distinct ways of interacting and talking with their children, as prior studies showed (e.g., John, Halliburton, & Humphrey, 2013; Kornhaber & Marcos, 2000; Schwartz, 2004), it can be that these different parenting styles are reflected in the apparent distinct ways in which mothers and fathers think about and describe their children as mental agents, and also in how they contribute to their children’s ToM. Regarding the latter, mothers’ talk about mental states, specifically cognitions, seems to have an important role, whereas fathers’ does not. Therefore, there can be other aspects of fathers’ discourse that are important to their children’s socio-cognitive development,
as was already discussed. Additionally, we looked at the relations between parents’ mentalizing abilities and use of mental references during dyadic interactions with their children, and we found that these were not related. Again, this result was congruent with findings from our first paper, and with the idea advanced by previous research, that having the ability to mentalize is not the same as using this ability spontaneously in the everyday life (Meins et al., 2006, 2014).

In sum, it seems that mothers and fathers who display better mentalizing abilities, as assessed in this study, are not necessarily the ones who are more mind-minded (in the sense of describing their children focusing mainly on their mental attributes) or who refer more to mental states when telling a story to their children. In addition, in what concerns children’s ToM, it appears that parents’, and specifically mothers’, propensity to refer to mental states while interacting with their children is more important than parents’ own more generalised ability to reason about others’ behavior in terms of underlying mental states. Also important to note, our findings suggest the possibility that mothers and fathers have different ways of thinking about their children as mental agents, and contribute differently to their children’s ToM abilities, an idea that would be interesting to be further explored in future studies.

In paper 3, we continued to focus on individual differences in children’s ToM, but now aiming to see if these were reflected in children’s later social competence and behavior, as previous studies have also suggested (e.g., Capage & Watson, 2001; Lalonde & Chandler, 1995; Weimer & Guajardo, 2005). We also looked at children’s mental state talk, another arguably more naturalistic, index of children’s understanding of mind (Hughes et al., 2007), in order to further explore these links. Thus, paper 3 had two main goals. First, we aimed at investigating the concurrent links between preschoolers’ ToM and their use of mental state references. Second, we intended to examine the longitudinal relations between preschool children’s social understanding as indicated by their ToM and use of mental references, and their later social competence and behavior. In addition, following previous suggestions of gender-specific associations between children’s ToM and social competence and behavior (e.g., Razza & Blair, 2003; Walker, 2005), we also explored this possibility and looked at the links between children’s social understanding and social competence and behavior, by gender. We found an association between children’s ToM abilities and their tendency to refer to mental states, specifically cognitions, during interactions with their mothers.
This result was congruent with previous findings (e.g., Ensor & Hughes, 2008; Nielsen & Dissanayake, 2000; Ruffman, Slade, Devitt, & Crowe, 2006), showing that children who perform better in the standardized battery of ToM tasks, also display a better understanding of the mind in real-life interactions with others, by focusing on, and referring more frequently to, mental states in their discourse. Moreover, our study showed, for the first time, that these two indices of children’s social understanding were longitudinally related to children’s reported social competence and behavior, but only for girls. Our results thus highlighted the importance of further exploring gender-specific effects when studying children’s social cognition, falling in line with previous suggestions that boys and girls may differ in how they use their socio-cognitive abilities in their real-life interactions (Razza & Blair, 2003; Walker, 2005).

Interestingly, while adults’ mentalizing seems to be unrelated to their use of this competence in their everyday life (for instance, in their mental descriptions of their children, or talk about mental states), children’s ToM was associated to their mental state talk, specifically cognitions. It can be that in preschool years, when ToM was typically acquired and is still being developed, children appeal more to their ToM abilities when talking about mental states, for instance. On the other hand, in adulthood, when mentalizing is expected to be fully developed, it may be that it has become a more independent competence, and that adults do not necessarily need to appeal to it when it would be expected for them to do so, in their everyday life.

In conclusion, with this study we aimed at further investigating the role played by social relationships, particularly in the family context, in children’s ToM development, falling in line with the theoretical framework that parents have an important role in their children’s ToM development (Carpendale & Lewis, 2004). In addition, we intended also to look further into children’s development and, maintaining our focus on the individual differences in preschoolers’ ToM development, see how these would be reflected in children’s later social outcomes.

Limitations

Some limitations should be taken into account when interpreting our findings. First, these emerged from concurrent associations, which limits our conclusions in terms of inferring causal links. Thus, it would be important to see if similar results are replicated with a longitudinal design. It would be interesting to see if parents’
mentalizing and mental state talk, assessed at an earlier time point, around children’s age of 3 years, for instance, would be predictors of children’s ToM abilities, assessed later on, at age 4 ½ years. Moreover, because this study was part of a broader longitudinal project, focused mainly on children’s socio-cognitive and socio-emotional development, there were relatively few parental measures available. It would have been interesting, for instance, to explore other possible correlates of parents’ mentalizing abilities, such as executive functioning or IQ. Relatedly, parental mentalizing was only assessed using one measure, which has mainly been used with clinical samples (e.g., Corcoran, Cahill, & Frith, 1997; Marjoram et al., 2005). However, we still found individual differences in the way adults’ interpreted the visual jokes and, consistent with studies that used this measure with clinical samples (e.g., Corcoran et al., 1997; Marjoram et al., 2005), participants evidenced more mentalizing when interpreting the mental jokes, when compared to the physical ones. Thus, it seems that this measure worked well when used with a normative sample. Also, as adult mentalizing seems to encompass a wide range of abilities, typically assessed in several distinct contexts (e.g., Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001; Bernstein, Thornton, & Sommerville, 2011; Epley, Morewedge, & Keysar, 2004; Samson, Apperly, Braithwaite, Andrews, & Scott, 2010), it would have been interesting to use more than one measure in assessing adults’ mentalizing, for instance assessing adults’ ability to use their mentalizing in communicating with others (Communication game, Keysar, Barr, Balin, & Brauner, 2000), or in decoding others’ mental states based on eye expressions (Eyes task, Baron-Cohen et al., 2001), giving us a broader view of this competence in adults (also possibly reducing measurement error).

Implications for future studies

Our findings bring forth some interesting questions to be addressed by future research. First, when considering the relation between adult mentalizing and mind-mindedness, it would be interesting in future studies to explore other possible correlates of the two competences (e.g., adults executive functioning, parental sensitivity), which would help shed light on the question of whether the two are indeed distinct constructs in adults. In addition, the use of other measures, and of more than one measure, of adult mentalizing, for instance assessing both its cognitive and affective components (Vetter, Altgassen, Phillips, Mahy, & Kliegel, 2013), could help further clarify this question. It
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would also be interesting for future research to investigate the links between parental mentalizing, mental state talk and their children’s ToM, using a longitudinal design. Moreover, our results differed for mothers and fathers, suggesting possible distinct relations between maternal and paternal characteristics and their children’s socio-cognitive outcomes. As few studies have explored both mothers’ and fathers’ contributions to the development of children’s ToM abilities, it would be interesting to do so, and investigate different characteristics of parental discourse, for instance, and its impact in children’s ToM development. It could be that mothers promote their children’s ToM via mental state talk, as documented by previous research (e.g., Ensor et al., 2013; Ensor & Hughes, 2008; Symons, Peterson, Slaughter, Roche, & Doyle, 2005; Turnbull, Carpendale, & Racine, 2008) and by our study, and fathers have different ways of doing so, through other aspects of their qualitatively distinct interactions with their children (Dickson, Walker, & Fogel, 1997; John et al., 2013; Kornhaber & Marcos, 2000; Lundy, 2003; Schwartz, 2004). Finally, our findings showing that children’s performance on a battery of ToM tasks were related to their use of mental state during interactions with their mothers, and that both ToM and mental state talk showed similar associations with social competence and behavior (at least for girls), bring further support to the idea that these are two important and distinct indices of children’s social understanding, with similar implications in children’s later social competence and behavior. Thus, it would be interesting for future research to further explore these relations, possibly assessing children’s use of mental references during interactions with different social partners (e.g., parents, siblings, and friends). This would give us a broader view and a better understanding of children’s socio-cognitive abilities, while bridging the gap between using experimental and naturalistic paradigms in assessing children’s understanding of the mind. In addition, in order to have a better understanding of the relations between children’s social understanding and social competence, it would be interesting to examine the links between the two while adopting a broader perspective on children’s social competence, and using obervational measures as well, in order to complement questionnaires, as previous research has done (e.g., Santos, Vaughn, Peceguina, & Daniel, 2014; Santos, Vaughn, Peceguina, Daniel, & Shin, 2014). Furthermore, as the relation we found between children’s social understanding and later social competence was specific to girls, congruently with
previous research, our results also highlight the importance of considering gender-specific effects when investigating children’s social cognition.

In sum, our study comes to add to and extend previous research, in showing the importance of preschool children’s understanding of their own and others’ mind, particularly to their later social competence and behavior. Furthermore, our findings highlight the relevance of continuing to explore both mothers’ and fathers’ possible differential contributions to their children’s social cognition.
Conclusion

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