THE LINKS BETWEEN USE OF MENTAL STATE VERBS, THEORY OF MIND AND
SOCIAL SKILLS IN MIDDLE CHILDHOOD


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*To my family*

# ABSTRACT

Understanding mental states and using terms to express this understanding are considered to be important for social interaction. However, only a few studies examined mental state language, ToM and social skills together. The present study aimed to assess the nature of the association between mental state language and ToM and whether it extends to social skills in terms of two dimensions which were social competence and antisocial behaviors in school-age children. Participants were 80 Turkish elementary school children between the ages of 6 to 10 ($M_{age} = 8.48$, $SD = 1.00$, 43 girls). Mental state language, ToM, linguistic competence and general cognitive ability were assessed through behavioral tasks, and social skills were measured through teachers' reports. A hierarchical linear regression analysis showed that even though mental state language continued to be associated with ToM in elementary school, there were also other cognitive abilities such as linguistic complexity and general cognitive ability that accounted for the association between mental state language and ToM. In addition, ToM mediated the association between mental state language and social competence. Antisocial behaviors, on the other hand, were negatively correlated with mental state language but not with ToM. These results provided important contributions to understand the nature of the link between mental state language and ToM and its extent to social skills.

*Keywords*: Mental state language, theory of mind, social skills, school-age children

# ÖZET

Zihinsel durumları anlamak ve bu anlayışı ifade eden terimleri kullanmak sosyal etkileşim açısından önemli olarak görülmektedir. Fakat araştırmalar, zihinsel durumları ifade eden terimleri, zihin kuramını ve sosyal becerileri birlikte ele almamıştır. Bu araştırma, zihinsel durum terimleri ve zihin kuramı arasındaki ilişkinin doğasını incelemeyi ve bu ilişkinin sosyal becerilerin iki boyutuna (sosyal yeterlilik ve olumsuz sosyal davranış) olan uzantısını araştırmayı hedeflemektedir. 6-10 yaşları arasında ($Ort_{yaş}$ = 8.48, $S$ = 1.00, 43 kız) 80 ilkokul öğrencisinin katıldığı bu araştırmada, zihinsel durum terimleri, zihin kuramı, dilsel yetkinlik ve genel bilişsel beceri ölçümleri için çocuklar bazı testleri tamamlamıştır. Sosyal beceriler ise öğretmenlerin doldurdukları ölçekle değerlendirilmiştir. Hiyerarşik regresyon analizine göre bulgular, zihinsel durum terimleri kullanımının ilkokul döneminde de zihin kuramı ile ilişkili olduğunu, fakat genel bilişsel beceri ve dilsel karmaşıklık gibi başka bilişsel becerilerin zihinsel durum terimlerinin yordayıcı rolünü ortadan kaldırdığını göstermiştir. Ayrıca, zihin kuramının zihinsel durum terimleri ve sosyal yeterlilik arasındaki ilişkiye aracılık ettiği bulunmuştur. Olumsuz sosyal davranışların ise zihinsel durum terimleri ile olumsuz yönde ilişkili olduğu, ancak zihin kuramı ile bağlantılı olmadığı anlaşılmıştır. Bu sonuçlar, zihinsel durum terimleri ile zihin kuramı arasındaki ilişkinin yapısını ve bunun sosyal becerilere olan uzanımını anlamak için önemli katkılar sağlamıştır.

*Anahtar Kelimeler*: Zihinsel durum terimleri, zihin kuramı, sosyal beceriler, okul çağı dönemi

# ACKNOWLEDGMENTS

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**CHAPTER 1**

**INTRODUCTION**

Understanding behaviors and mental states of other people is a crucial ability in order to establish and maintain successful social interactions (Hofmann et al., 2016). The ability to understand one's own and other people's mental states, specifically, intentions, desires and beliefs (Olson, Astington, & Harris, 1988) and how these mental states are linked to behaviors is known as Theory of Mind (ToM) (Frith & Frith, 1999). The development of ToM follows a long trajectory and starts as an understanding of other people's desires, beliefs and false-beliefs in the preschool years and develops into an understanding of more advanced concepts such as deception during school years (Miller, 2009). Nevertheless, most of the prior work on the development of ToM focuses on the preschool period and overlooks the elementary school years (Hughes, 2016). Thus, there is still much to be discovered about ToM skills in school-age children and possible factors that can be associated with ToM in school years. Prior work with preschoolers has eminently examined the relation between the use of mental state language and ToM (e.g., de Villiers & Pyers, 2002). Nevertheless, it is not clear whether or not ToM continues to be associated with mental state language in school-age children. Moreover, there is little information on whether or not the links between mental state language and theory of mind extends to social skills. In order to fill these gaps in the literature, the present study examines the links between use of mental-state language, theory of mind and social skills in 6- to 10-year-old children. This study aims to offer more robust empirical evidence on the nature and extent of the links between these three domains in school-age children by taking linguistic competence and general cognitive ability into account.

**CHAPTER 2**

**LITERATURE REVIEW**

**2.1 Development of Theory of Mind**

The term Theory of Mind (ToM) is known as the ability to attribute mental states such as desires, beliefs and intentions to people and to make inferences about others' behavior based on their mental states (Wellman, 1990). Since mental states are not observable and can only be understood by making inferences, this ability is called a theory.

**2.1.1 Theory of mind in preschool years.** Theory of mind refers to an abstract ability, yet a basic understanding of mental states can be seen even in early years of life (Wellman, 2014). Starting from infancy, ToM follows a developmental sequence in a way that children acquire understanding of different aspects of mental states over time (de Villiers & de Villiers, 2014).

The earliest form of theory of mind is understanding of intentions which can be seen in children by the end of first year. Infants understand other people's goals and intentions and see them as agents who have intentions (Meltzoff, 1995; Wellman, 2014). Studies showed that infants as young as 14-months-old have understanding of intentions and goals (Gergely, Bekkering & Király, 2002) which forms an early ToM. A few months after the development of intention-understanding, infants begin to understand desires. Research has shown that 18-month-olds understand that their desires can be different from other people's desires (Repacholi & Gopnik, 1997).

After the development of intention and desire understanding, children come to understand beliefs and then false-beliefs which is a research area that has drawn great attention. At the age of 3, children start to understand people's beliefs and that these beliefs are important for explaining actions (Wellman & Bartsch, 1988). Although 3-year-olds can understand true beliefs, studies have repeatedly shown that children at this age are not able to understand false-beliefs (see Wellman, Cross, & Watson, 2001 for a meta-analysis).

Unlike true beliefs that can be understood based on one's own knowledge about a situation, false-belief understanding requires going beyond one's own knowledge of a situation since beliefs do no match the reality and is a good indicator of mental state understanding (Wellman et al., 2001; Hughes, Ensor, & Marks, 2011). False-belief understanding is usually assessed by tasks such as Sally-Anne Test that require children to anticipate other people's behaviors based on their beliefs, including beliefs that may contradict with reality. These tasks have revealed that false-belief understanding develops steadily between 3 to 4½ years (Wellman et al., 2001; Baron-Cohen, Leslie, & Frith, 1985; Wimmer & Perner, 1983) and 4-year-olds typically show an explicit understanding of others' true or false beliefs and know that people act according to their beliefs.

A considerable amount of research focused on early childhood while investigating ToM since it shows striking development including understanding of intentions, desires and beliefs (Wellman, 2014). The development of such understandings is important because it comprise a basis for later developments in theory of mind.

**2.1.2 Theory of mind in elementary school**. When children come to school age, they start to have an understanding of more advanced mental states. This sophisticated understanding can be defined as the ability to attribute mental states to other people in order to understand their behavior in unclear and complex social situations (Białecka-Pikul, Kołodziejczyk, & Bosacki, 2017). It includes concepts such as white lie, misunderstanding and second-order beliefs. The concept of second-order belief was introduced to the literature by Perner and Wimmer (1985). While in first-order belief it was critical to understand other person's belief about a given situation, in second-order belief it is critical to understand someone's belief about another person's belief. Perner and Wimmer (1985) argued that first-order beliefs are limited in explaining social interactions completely and to be involved in social interactions, people need to have an understanding of second-order beliefs. To examine the development of second-order beliefs in children, they presented a story that depicted an event on a

character's belief about another character's belief. The findings indicated that most of the 6-year-old children and nearly all of the 7 to 9-year-old children understood second-order belief and were successful at the task (Perner & Wimmer, 1985).

In addition to the second-order belief task, another frequently used task is the Strange Stories Task that was originally developed for individuals with autism by Happé (1994). O'Hare, Bremner, Nash, Happé, and Pettigrew (2009) modified the Strange Stories Task to assess typically developing children between the ages of 5 to 12. The task included 12 short stories about situations that involve different mental states: sarcasm, lie, white lie, joke, pretense, persuasion, misunderstanding, double bluff, appearance/reality, contrary emotions, forget and figure of speech. In the task, the experimenter read the stories and children were presented with a cartoon accompanying each story. Then, they were asked to respond to two questions that measured mental-state understanding. The findings revealed that typically developing children's performance increased with age. However, some concepts like persuasion were found to be difficult for children to understand, suggesting that some mental state concepts may follow different developmental patterns resulting in later success in the task. Moreover, this study showed that Strange Stories is an appropriate task to measure advanced ToM skills in typically developing children between the ages of 5 and 12.

White, Happé, Hill, and Frith (2009) carried out another adaptation of the Strange Stories task by adding more story sets. These story sets included mental, human, animal, nature stories and unlinked sentences that were predicted to reflect differences in the ToM understanding of children with autism. While unlinked sentences included several sentences about unrelated situations, other sets consisted of stories that have content integrity. The researchers included these new story sets as control stories to extend the original task's limited scope. In the study, they compared 7- to 10-year-old children with autism with typically developing children. Of interest was whether there would be differences in

performance across different story sets. In support of this possibly, while there was no difference in children's performance on nature stories and unlinked sentences for both groups, children with autism had significantly poorer performance on mental, human and animal stories compared to the control group. These results were important to show that impairments in ToM do not just reveal themselves in mental stories but also in stories about humans and animals. In other words, a deficit in ToM extends to children's understanding of agents (human and animal) even though it does not necessarily include mental-state understanding.

To summarize, early studies on ToM pointed out the dramatic development in false-belief understanding during preschool years. However, the development of ToM does not stop at the end of preschool rather, children continue to develop a more advanced understanding of ToM including misunderstanding, irony and double bluff during school years between the ages of 6 to 12.

## 2.2 Mental State Language and Theory of Mind

Language is argued to be a powerful tool for expressing thoughts and beliefs (Lupyan, 2016). It also allows people to make a distinction between reality and hypothetical situations in a way that can represent both reality and perceptions of reality (Astington & Baird, 2005b). Due to these roles of language, the possible relationship between language and theory of mind has attracted attention from researchers and several studies have revealed significant associations between the two (Ruffman, Slade, & Crowe, 2002; de Villiers & Pyers, 2002; Meins & Fernyhough, 1999). Nevertheless, there were discussions on how and why language and ToM are related. Some researchers proposed that conversations provide children an opportunity to realize that people can have different emotions, knowledge and beliefs and thus children can develop an understanding of mental states through conversations (Harris, 2005). This view was supported by longitudinal studies which showed that earlier conversational input that children received in family were

related to later false-belief understanding (Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991).

Other researchers have placed more emphasis on structures of language rather than functions of language such as communication. In this view, researchers have two perspectives that emphasize the role of lexical semantics (mental state terms) and complementation syntax (Astington & Baird, 2005a). In language terms that refer to mental states are known as mental state terms (Montgomery, 2005). Mental state terms usually include desire, emotion and cognitive terms (Wellman, Phillips, & Rodriguez, 2000; Hughes, Lecce, & Wilson, 2007). Studies found that children around the world acquire these terms in an order (Tardif & Wellman, 2000). Around 18 months children start to use some basic emotion terms such as *mad* and *happy* (Dunn, Bretherton, & Munn, 1987) and desire terms such as *want* (Bartsch & Wellman, 1995). Cognitive terms including *think* and *know* appears around 28 months. However, children do not show a real mental state function for these terms until 30 months (Shatz, Wellman, & Silber, 1983). It seems that mental state language is acquired in an ever-evolving process that transforms from a basic usage to a more advanced one that reflects a genuine understanding of mental states. Furthermore, within this period, children's understanding of mental states also improves. Some researchers explained this development by suggesting that children's understanding of mental states can be promoted by using mental state terms over time (Astington & Baird, 2005a). In other words, it is argued that mental state language supports a conceptual understanding of mental states.

Other researchers give particular importance to a specific grammatical property of verbs that refer to mental states known as sentential complementation. Sentential complements include a main verb (e.g., think) and an embedded clause. In this construction, the embedded clause and the main clause can have different truth values. For instance, while the embedded clause "the marble is in the basket" is false, this construction allows the

false statement to be embedded into a main clause "Sally thinks that the marble is in the basket" that represents Sally's belief and is in fact true. Therefore, these sentences can emphasize mental states and reality (de Villiers, 2005; de Villiers & de Villiers, 2000, 2009).

Hale and Tager-Flusberg (2003) tested the role of sentential complementation on false belief understanding in their training study. They conducted three types of training with preschoolers. The first group was trained on false-beliefs without the use of mental state verbs. In the second group, the experimenter used sentential complement to explain the story. The third group was the control group where the experimenter used relative clauses during the training. The results showed that after the training children that were trained on sentential complements improved on both linguistic tasks and ToM tasks, while children that were trained on false beliefs did not improve their language knowledge but, improved their performance ToM tasks. Children who were trained on relative clauses showed improvement in neither of the tasks. In brief, this study revealed that using sentential complements that involve false beliefs promoted false-belief understanding among preschool children. However, because of the fact that the training that did not use this linguistic structure was also found to be successful to promote ToM, it can be concluded that language is one of the supporting factors but, it is not necessary for the representation of mental states (see Ünal & Papafragou, 2018 for a discussion).

Converging evidence for this idea came from a training study by Lohmann and Tomasello (2003). In this study, preschoolers took part in four different types of training. In the full training group, children received a training in which the experimenter emphasized the deceptive aspect of the object and used either mental state or communication verbs in sentential complement constructions. In the second group, the only emphasis was on the object's deceptive aspect and the experimenter did not use mental state language or sentential complements. In the third group, the experimenter just said "Look! … But, now

look!" to draw attention to deceptive aspects. Children in the last group were exposed to use of mental state or communication verbs and sentential complement constructions without the emphasis on the deceptive aspects. They found that preschoolers who were trained on deceptive aspects of the objects with the use of either mental state or communication verbs in sentential complements showed the biggest improvement in false-belief understanding. They found that explaining deception without the use of mental state language and sentential complements had no positive impact on children's improvement. In general, this study showed the importance of sentential complement constructions with the use of mental state language and emphasizing the deceptive aspects of the objects in order to promote false-belief understanding.

Although, studies on the association between false-belief understanding and mental state language provided important findings for preschool period this line of work has overlooked the school years. Furthermore, the limited work in this domain has revealed mixed findings. One of the early studies that investigated this association in school-age children was conducted by Charman and Shmueli-Goetz (1998) with typically developing 7-year-olds. In this study, they classified mental state terms in four categories which were emotion terms, physiological terms, cognitive terms and behavioral emotional terms. The results revealed no association between use of mental state terms and theory of mind. A support for this finding was provided by Meins, Fernyhough, Johnson, and Lidstone (2006) in a study that explored 7 to 9-years-olds' use of mental state terms in two different non-interactional task and its link with ToM. Even though they found that the performances on these different tasks were positively correlated, no association was found between use of mental state terms on any task and ToM. While these studies investigated the use of mental state terms, Grazzani and Ornaghi (2012) highlighted the difference between using mental state terms and understanding them. Their results showed that while there was a moderate correlation between use of mental state terms and ToM, there was a stronger correlation

between ToM and understanding mental terms that was assessed by a test of metacognitive verb comprehension.

Even though correlational studies found no significant or at most moderate association between use of mental state language and ToM, training studies with school-age children suggest a stronger association between mental state language and ToM. Lecce, Bianco, Devine, Hughes, and Banerjee (2014) implemented a conversation-based training and investigated its effect on ToM in primary school children. The training consisted of four sessions in which stories and language exercises were presented to children and encouraged them to discuss together with the group. While in the experimental group, the stories and exercises were about mental states, in the control group they were about physical events. Also, experimenters used mental state language during the sessions in the experimental group. After the training, the results revealed that children in the experimental group outperformed the control group in the post-test. Furthermore, the improvement in ToM was stable over 2 months (Lecce et al., 2014).

Overall, training studies showed that ToM can be promoted by socio-linguistic trainings. These findings indicate that the development of ToM does not only rely on the increases in age but also on the contextual factors. However, contradictory findings that were provided by correlational studies and training studies should be taken into consideration. This contradiction can result from the fact that training studies did not only train children on mental state language but they also train them on stories about mental states. Since they measured children's theory of mind by using Strange Stories Task which was similar to the stories used in the training, children could be familiar with the task after the training. This might be one possible explanation for the contradictory findings. However, more correlational and training studies are needed to clarify the association between mental state language and ToM in school-age children.

**2.3 Theory of Mind and Social Skills**

Theory of mind is also considered to be important for social skills and interactions since thinking about mental states can make people adjust their actions and social behaviors (e.g., Hofmann et al., 2016). However, social skills comprise several specific skills in itself which makes it difficult to touch on every aspect in a study. Because of that, the specific relation between ToM and social skills is not very clear. Moreover, it is important to address both prosocial behaviors and antisocial behaviors to examine an ability and a deficiency in social skills. For this reason, the present study focuses on social skills in two aspects which consist of both positive social behaviors (social competence) as well as antisocial behaviors.

**2.3.1 Theory of Mind and Social Competence.** Social competence has been defined as a concept that includes several desirable social skills (Rose-Krasnor, 1997). Since it is a broad concept which includes different social skills, defining it and specifying its content were found to be difficult for researchers (Bosacki & Astington, 1999). Even though there is not just one definition of social competence, it generally includes popularity among peers, engaging in social interaction and forming friendships. It is argued to be significantly related to understanding other people's mental states (Hofmann et al., 2016).

Several studies investigated the relation between false-belief understanding and social competence in the preschool period. Slaughter, Dennis, and Pritchard (2002) assessed ToM and peer acceptance among 4- to 6-year-old children. They found that the association between ToM and peer acceptance was stronger in children who were over 5 years of age compared to 4-year-olds. Watson, Nixon, Wilson, and Capage (1999) investigated preschoolers' conversations with peers and their social skills rated by teachers in relation to their false-belief understanding. The findings indicated that there is a positive but moderate link between these constructs. A recent study with Turkish children in child-rearing institutions also did not find an association between ToM and social competence in children

younger than 5 (Etel & Yağmurlu, 2015). However, since these children were raised in a disadvantageous environment, the lack of an association for this preschooler sample should be interpreted with caution. A later longitudinal study by Razza and Blair (2009) argued that social competence and ToM are associated with each other in a bidirectional way. That is, children's ToM predicted their later social competence and their social competence predicted their ToM later on. Hughes et al. (2011) also found positive associations between ToM and social interactions in a way that children's false-belief understanding predicted how frequently they use mental-states during conversations with friends.

While studies during the preschool period indicated mostly positive associations between ToM and social competence, research in school years mostly focused on individuals with impaired social skills (autism and schizophrenia) and typically developing school-age children have been overlooked (Devine & Hughes, 2013). For this reason, studies that examined the relation between ToM and social competence are limited. Nevertheless, there is support for the positive association between these two constructs. A longitudinal study by Banerjee, Watling, and Caputi (2011) found a bidirectional association between peer rejection and an advanced ToM concept – faux pas. Children who were rejected by peers had some difficulty understanding faux pas in the following year while having problems in faux pas understanding also predicted rejection by peers.

In another study, Devine, White, Ensor, and Hughes (2016) followed school-aged children for 4 years to assess the longitudinal associations between ToM and teacher-reported social competence in the school context. The results revealed that there were both concurrent and longitudinal associations between ToM and social competence. More specifically, children's understanding of ToM predicted their social competence in the following years. However, unlike Banerjee et al.'s (2011) bidirectional links between ToM and social competence, this link was unidirectional. This important difference in the findings can be explained by the difference in the time intervals in the studies. Another

explanation may be that these studies focused on different aspects of social competence: peer-reported peer rejection vs. teacher-reported social behavior at school (Devine et al., 2016). According to Devine and Hughes (2013), besides of ToM, there can be other factors that influence social competence such as age and verbal ability. These findings suggest that although ToM has a significant role in social competence, it is difficult to conclude that it is the only factor related to the development of social competence. In order to gain an understanding about other factors which are relevant to social competence, it is important to conduct more research to examine its relation to other areas of development.

**2.3.2 Theory of Mind and Antisocial Behavior.** Antisocial behavior refers to behaviors that hinder successful social relations and elicit unfavorable social interactions including rejection by peers (Merrell, 1993). According to some researchers, theory of mind skills can be used in both prosocial ways and antisocial ways. Happé and Frith (1996) called the antisocial use of ToM skills "theory of nasty minds" suggesting that children can use their understanding of mental states to display antisocial behaviors such as lying and teasing. Since then, researchers explored the theory of nasty minds and the association between antisocial or aggressive behaviors and ToM in different age groups.

Hughes, White, Sharpen, and Dunn (2000) explored the associations between preschoolers' antisocial behaviors, false-belief understanding and executive function. The participants included both children who were reported to be hard-to-manage by their parents and control children who did not receive such ratings by their parents. The findings revealed that antisocial behavior was not associated with false-belief understanding neither for hard-to-manage nor for control children. On the other hand, one study with preschoolers, found negative association between false-belief understanding and aggressive behaviors rated by teachers (Capage & Watson, 2001). Finally, Renouf et al. (2009) examined preschoolers' aggression in two dimensions which were indirect and physical aggression in relation to ToM. They found that prosocial behaviors moderated the

association between indirect aggression and ToM. There was a positive correlation between ToM and indirect aggression among children who have average or below-average levels of prosocial behavior. However, there was no significant correlation between physical aggression and ToM.

Studies in preschool period were not able to set a conclusion on the link between antisocial behaviors and theory of mind. Can the strength and direction of this association change with age-related improvements in ToM? In school years, children start to develop an understanding of more advanced ToM concepts such as deception, lie and persuasion. One possibility is that these concepts can be positively associated with antisocial behaviors such as manipulation in school-age children. In order to test this possibility, Austin, Bondü, and Elsner (2017) conducted a longitudinal study to explore the link between antisocial behaviors and ToM in school-age children. They investigated cognitive and affective aspects of ToM in relation to proactive and reactive aspects of aggression. Cognitive aspect of ToM referred to understanding thoughts and beliefs, and affective aspect of ToM referred to understanding emotions. Furthermore, reactive aggression referred to aggressive behaviors for defending oneself, proactive aggression referred to aggressive behaviors for reaching personal goals. The results revealed that cognitive and affective ToM negatively predicted later reactive aggression. On the other hand, affective but not cognitive ToM negatively predicted proactive aggression. These findings indicated that there were some negative associations between aggressive behaviors and ToM. It suggested that this study did not provide any support for the prediction about a possible positive association between aggressive behavior and ToM in school-age children.

As discussed here, previous studies reported contradictory findings that resulted in no consensus on the association between antisocial or aggressive behaviors and ToM. It is still not clear whether ToM can be used in a nasty way as suggested by Happé and Frith (1996) and whether the development of advanced concepts of ToM can predict the display

of negative behaviors among school-age children. Future studies are important in order to clarify this link.

**2.4 Mental State Language, Theory of Mind and Social Skills**

Although there are several studies in the literature that investigated the association between mental state language and theory of mind and also the links between theory of mind and social skills, there is not a sufficient number of studies that explored the link between mental state language and social skills. If there is a correlation between mental state language and ToM and a correlation between ToM and social skills, there might be a chance of finding a link between mental state language and social skills too. The only study, to our knowledge, on the associations between mental state language, theory of mind and social skills was conducted by Longobardi, Spataro, and Rossi-Arnaud (2016). In this study, they examined the correlations between second-order false belief understanding, use of mental state language in a narrative and social adjustment in children between the ages of 7 to 12. Social adjustment was measured in three domains: emotional instability (behaviors that reflect problems in self-regulation in social context), prosocial behavior (behaviors that reflect altruism and trust) and aggressiveness (behaviors that reflect a purpose to hurt others). They found that the use of mental state language in a written narrative task was negatively correlated with aggressiveness and emotional instability. However, these two domains of social skills were not correlated with ToM. Furthermore, prosocial behavior was correlated with neither mental state language nor theory of mind. Since it was the only research that we were able to find on the association between mental state language and social skills, there is a clear need for more studies in order to understand its extent to different aspects of social skills.

**2.5 Other Factors on Theory of Mind**

There are individual differences in ToM that cannot be explained by age or developmental history. These possible factors have been examined in the literature and it

was found that there are both cognitive and social factors that can explain the individual differences in ToM (Repacholi & Slaughter, 2003). In this section, three of the most important factors which are general cognitive ability, general linguistic competence and narrative skills will be reviewed.

**2.5.1 General Cognitive Ability.** Whether ToM reflects a domain-specific ability or a more general cognitive ability has been a question that researchers strove to answer (e.g., Wellman, 2002; Moran, 2013). Apart from the fact that understanding mental states reflects a social understanding, it also consists of processes that demand cognitive abilities (Apperly & Butterfill, 2009) such as reasoning (Meinhardt-Injac, Daum, Meinhardt, & Persike, 2018), processing (Moran, 2013) and executive functions (Miller, 2009). These cognitive abilities are found to be significantly related to ToM (Chi, Kim, & Kim, 2018).

Cognitive ability promotes an understanding of emotions, social situations and mental states through influencing self-regulation positively (Cutting & Dunn, 1999). In this sense, having lower cognitive abilities can be related to weaker understanding of mental states since it can make children focus on one aspect and miss out on important cues for emotion and mental state understanding (Chi et al., 2018). In fact, children with higher cognitive abilities are more likely to notice important cues that can guide to understanding of emotions and mind which can be related to better ToM ability. For instance, Boor-Klip, Cillessen, and van Hell (2014) investigated the associations between cognitive ability and ToM by comparing children who are in regular classrooms and high-ability classrooms. The results indicated that compared to children in regular classrooms, children in high-ability classrooms had better performance in ToM. This study provided support for previous research on the relationship between school-age children's cognitive ability and ToM (Bosacki & Astington, 1999).

The association between general cognitive ability and theory of mind has also been the subject of several studies on patients who have cognitive impairments because of their

diseases including Alzheimer's, Parkinson's disease and Williams syndrome (e.g., Laisney, Bon, Guiziou, Daluzeau, Eustache, & Desgranges, 2013; Tager-Flusberg & Sullivan, 2000). These studies showed that having impairment in general cognitive ability is associated with significant impairments in ToM. Also, the researchers stated that as the severity of impairments in ToM increases, cognitive impairments also increases (Bora, Walterfang, & Velakoulis, 2015). The result on the negative correlation between impairment in general cognitive ability and ToM was also evident in patients with Alzheimer's (Laisney et al., 2013).

Taking together the results of studies with different populations, it is clear that there is a significant association between general cognitive ability and ToM. It is important to keep these findings in mind when conducting studies because controlling for general cognitive ability can be critical to understand theory of mind and its correlations with other factors.

**2.5.2 General Linguistic Competence.** Numerous studies investigated the association between general linguistic competence and theory of mind. Although many researchers agreed that there is a correlation between these domains, there has been a debate on the nature of this correlation. According to one view, ToM may be related to verbal skills because many ToM tasks are verbal (Fodor, 1992). In another view, language promotes and predicts the development of ToM over and beyond the linguistic skills that are necessary to complete the ToM tasks (de Villiers, 2005). Hence controlling children's linguistic competence is useful in understanding the nature of the associations between ToM and mental state language.

Since children with autism are known to have difficulties in theory of mind tasks and language acquisition (e.g., Tager-Flusberg, 1993), the studies that examined the links between ToM and language in children with autism are important. In general, they support the possible predictive role of language on theory of mind by finding that having high levels

of verbal ability is related to better performance on ToM tasks among children with autism (e.g., Happé, 1995).

Apart from children with autism, typically developing children were also examined and provided support for the predictive role of language on theory of mind. For instance, Astington and Jenkins (1999) examined the longitudinal links between theory of mind and language competence in terms of receptive language, production of semantics and syntax among 3-year-olds. They found that children's earlier language competence predicted their later performance on two theory of mind tasks, while earlier theory of mind did not have a predictive role in language. These results indicated that language is a predictor of theory of mind.

However, since there were differences among the size of the correlations that previous studies have reported, Milligan, Astington, and Dack (2007) conducted a meta-analysis in order to clarify the association between language ability and theory of mind. They specifically focused on false-belief understanding and examined 104 studies that included children under the age of 7. They found that there is a moderate to large association between these variables when not controlling for age. When they controlled for age, they still found a significant and moderate correlation. Furthermore, they compared the types of language ability in relation to false-belief understanding and came up with a finding that general language ability had stronger correlation compared to receptive language. The results also provided support for the predictive role of language on false-belief understanding by showing that the correlation was stronger between earlier language ability and later performance on false-belief tasks. All of these findings made an important contribution to the literature on the association between linguistic competence and theory of mind.

Taken all together, previous studies with different populations revealed a clear association between general linguistic competence and theory of mind. Even though there

was some evidence for specific contributions of different aspects of language ability, it is certain that general linguistic competence is associated with ToM. For this reason, it is important to control for the role of general linguistic competence, when investigating the correlations between theory of mind and other factors.

**2.5.3 Narratives.** Narratives are important in terms of theory of mind and social interaction since they provide a context for people to initiate and sustain the involvement of listeners and think about people's emotions and thoughts (Siller, Swanson, Serlin, & Teachworth, 2014). Narrative production usually involves an organizational structure (agent, goal, event) with the use of mental states (feelings, thoughts and motivations) of the characters in the story (Bruner, 1986). Several studies have examined narrative skills of children with a specific concentration on children with autism. A study by Baron-Cohen, Leslie, and Frith (1986) compared children with autism and typically developing primary school children on narratives. Children were presented with a total of five stories and each of them consisted of four pictures showing how the events took place. These stories included two mechanical, two behavioral stories and an intentional story. The first mechanical story depicted a causal link between two objects (e.g., A boy hits the ball standing on the hill and makes it fall into the water), while the other mechanical story was about a causal link between a person and an object. Behavioral stories included either a person or two people that performed daily routines without the use of mental states (e.g., A girl forcibly takes a boy's ice cream and makes him cry). On the other hand, the intentional story depicted people that performed daily routines with the use of mental states (e.g., A girl puts her teddy bear on the floor and turns over to pick a flower. Meanwhile, a boy comes and takes the teddy bear and then disappears. The girl is surprised when she cannot see her teddy bear). After the experimenter presented these stories, they asked children to tell a story based on the pictures. The results revealed that even though children with autism produced narratives including causal and behavioral language, they lagged behind the typically developing

children in producing narratives involving mental state language. This result showed that children with autism have limited narrative production ability since they did not produce narratives involving mental state language. Furthermore, these limitations in narrative skills may be related to impairments in theory of mind.

A later study by Siller et al. (2014) compared children with autism to typically developing children on their narrative production with the focus on internal state language (thoughts and emotions). Seven-year-old children were presented with two wordless books that only consisted of pictures and were asked to tell the story. The books included the cases of deception and thus elicited mental state language to refer to the character's cognitive and emotional states. Children's ToM was also measured to examine the direct relationship between ToM and narrative production. The findings showed that children with autism used fewer utterances, words, unique verbs and adjectives. Also, they mentioned the protagonists' emotions less than the control group and had poorer performance on ToM tasks. On the contrary, typically developing children used more adjectives, words, utterances and emotional terms than children with autism. However, the groups did not significantly differ in the use of cognitive terms. These results pointed to the conclusion that there is an association between the use of emotion terms and performance on ToM tasks in both groups.

Studies revealed that having an understanding of mental states can enrich children's narrative production with reference to mental states and emotions. It shows that there can be an association between narratives and ToM. However, studies on this relationship usually focused on children with autism and overlooked typically developing children (but see also Siller et al., 2014). For this reason, it is important to investigate the associations between narratives and ToM in typically developing children.

**2.6 The Present Study**

Due to the steady development in ToM during the preschool years, the majority of previous research in theory of mind and mental state language focuses on these years. Studies focusing on this period found associations between children's use of mental state terms and performance on false-belief tasks (e.g., Lohmann & Tomasello, 2003). They also found that false-belief understanding is an important predictor of social competence (Razza & Blair, 2009). However, there are fewer studies that examined the links between these concepts in school-age children. Also, some of these studies provided contradictory results raising the need for more research to have a better understanding of these concepts and their associations. Moreover, it is more likely to see the impact of social competence in school-age children, as more communication is established with peers and adults like teachers after the start of elementary school. Therefore, examining ToM, mental state language and social skills among school-age children can provide important findings. Moreover, no studies to our knowledge have examined the links between advanced ToM, use of mental state language and social skills among Turkish school-age children. In order to fill these gaps in the literature, the current study aims to investigate the associations between use of mental state language, theory of mind and social skills in school-age children.

The present study has two main goals. The first goal is to investigate the nature of the association between use of mental state language and theory of mind. Previous studies that examined this association provided significant findings for the link between children's use of mental state language and performance on false-belief tasks in preschool period (e.g., Hughes & Dunn, 1998; Hale & Tager-Flusberg, 2003). Based on these findings, we can expect to find the continuing role of the use of mental state terms on theory of mind in school-age children. Therefore, one possibility is that there will be a strong correlation between mental state language and advanced theory of mind. On the other hand, we should consider the fact that apart from mental state language, there are also other cognitive skills

that develop during elementary school years. These cognitive skills can weaken the role of mental language on theory of mind. For this reason, an alternative possibility is that there may not be a strong correlation between mental state language and theory of mind especially after other factors related to the development of ToM are taken into account. We aim to explore these two possibilities of the link between children's advanced ToM understanding and use of mental state terms. While assessing this association, two important variables that were found to be related to ToM will be controlled. We will explore the link between ToM and use of mental state terms after controlling for general cognitive ability and general linguistic competence.

The second goal is to explore whether the association between ToM and use of mental state language extends to social skills. We want to assess if children's understanding of advanced ToM concepts and use of mental state terms are related to their social skills. To the extent that we find significant associations between them, we want to investigate the mediating role of ToM in the association between mental state language and social skills. We will examine children's social skills in terms of both positive social behavior and antisocial behavior. We make this distinction in terms of social skills because it can help us to understand in what way ToM skills can be used in daily life of children. In our study, we will examine social behaviors in two aspects: social competence and antisocial behavior at school. Since previous work on the association between ToM and social skills provided mixed results and the studies on typically developing school-age children were limited, our second goal will be an exploratory investigation. By exploring this link, we can understand which factors play roles in social skills. It is important to investigate this association since having good relationships with peers is significant for positive development throughout the life.

**CHAPTER 3**

**METHODS**

**3.1 Participants**

Participants were recruited via personal connections with private and public schools in three districts (Üsküdar, Çekmeköy and Sarıyer) of Istanbul, Turkey. The final sample included 80 elementary school students (43 girls, 37 boys) whose ages ranged between 6 years 11 months and 10 years 11 months ($M_{age}$ = 8.48, $SD$ = 1.00). All participants were native speakers of Turkish. None of the children had a teacher reported history of speech-language or other developmental disorders. Data from 13 additional participants were excluded from the analyses due to experimenter error that was caused by asking wrong questions during assessment ($n = 8$), teacher-reported developmental disorders in the participants including attention deficit disorder ($n = 1$), speech-language impairment ($n = 1$) and mild mental retardation ($n = 1$). Children who did not complete more than one task ($n = 1$) and have missing data in more than half of the items in teacher's measures ($n = 1$) were also excluded from the analyses.

**3.2 Materials and Procedure**

A pilot study was carried out with 3 children (1 girl, 2 boys, Mage = 8.66 years) to make sure that the instructions, procedure, materials and questions were clear for participants. After the pilot study, some adjustments in terms of the order of the tasks were made. Children that participated in the pilot study did not participate in the main study.

Data collection began after obtaining the approval of Research Ethics Committee at Özyeğin University. To recruit participants, private and public elementary schools were contacted. Meetings with the principals of the schools were conducted in order to inform them about the study. With the principals that agreed to participate in the study, the classes which were in the study's age range were determined. The teachers of these classes were

also informed about the study. An informative letter was sent to the parents and they had a week to inform the teachers if they would not allow their children to participate in the study.

Data collection was carried out by the author and 6 undergraduate research assistants. Prior to data collection, undergraduate research assistants were trained on how to apply tasks and were given the instructions that were necessary to follow while applying the tasks to participants. During data collection, the tasks were conducted in the following order: Strange Stories Task, a control measure for general cognitive ability (Serial Digit Learning Test) and Narrative Production Test. In addition, the teachers completed a scale on children's social competence and antisocial behaviors (School Social Behavior Scale). The tests were conducted in a quiet room in the schools by the author and trained undergraduate research assistants. One of the experimenters served as the main experimenter and was responsible for giving instructions to the participants and conducting the tests. The second experimenter was responsible for recording participants' responses during Serial Digit Learning Test and also audio recording during Strange Stories Task and Narrative Production Test. The participant and the main experimenter were seated on side by side chairs in front of a table with a laptop and test materials on it. The second experimenter was seated on a chair next to the table.

Narrative Production Task was presented on a laptop, while the other tasks were in paper and pencil form. Strange Stories Task and Narrative Production Test were recorded on a voice recorder for later coding. Serial Digit Learning Test was coded by the second experimenter during the sessions so, it was not voice recorded. The participants completed the tasks for about 20 to 25 minutes in total. The materials and the procedure for each measure are described in detail below.

**3.2.1 Strange Stories Task (Happé, 1994).** Strange Stories Task is commonly used to measure children's advanced ToM skills. It was originally developed by Happé (1994) and later, it was adapted by White et al. (2009). The present study used the Turkish translation of the Strange Stories Task [1] (Girli, 2017).

In this task, children were presented with 8 short mental-state stories assessing double bluff, misunderstanding, while lie and persuasion. There were two stories for each theory of mind concept. First, the experimenter read a short story. For example, in the first story, Sinan steals Can's ball. Can knows that Sinan is a liar and that he hid it somewhere so that Can cannot find. Can asks Sinan if the ball is under the bed or inside the wardrobe. Sinan says that the ball is under the bed (see Appendix A for the full list of stories). Each story was followed by a question (e.g., "Why will Can look in the wardrobe to find the ball?"). After the experimenter read the stories to children, children were asked to tell their answer to the question that was related to each story by explaining a character's behavior.

After the data were collected children's responses were transcribed for coding of the responses. Each response is coded on a 3-point scale. Children received 0 points for incorrect or irrelevant answers (e.g., "Because he looked everywhere else"), 1 point for partially correct answers (e.g., "Because the ball is there") and 2 points if they gave full and explicit answers (e.g., "Because Can knows that Sinan is lying"). The scores that children gained from each question were summed and a total score was obtained. The maximum score for this test was 16, while the minimum score was 0. To assess inter-rater reliability, a second researcher coded 30% of the transcriptions after the original researcher coded all children's performances. The agreement between coders was 91.6%. The discrepancies were discussed to reach an agreement.

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[1] In this study, some word changes were made in the Turkish Translation of the Strange Stories Task in order to make the stories more understandable and clearer.

**3.2.2 Narrative Production Test (Herman et al., 2004***).* This task was used to elicit mental state language from children and to assess children's narrative production, inference-making ability and linguistic complexity. Herman et al. (2004) originally designed the British Sign Language Production Test in order to assess narrative skills of deaf children who use sign language. In this test, each child watched a silent video called Spider Story on a computer. In the video, there were two children who perform some actions without using language. At the beginning of the video, a girl with a tray in her hands enters a living room where a boy watches TV. The girl gets up and takes sweets for herself. The boy demands to get her sweets and she gives to him. This scene repeats a few times with different foods and drinks. Then, she sees a spider and makes a sandwich by putting the spider inside of it. She pretends to eat the sandwich to trick him. He demands the sandwich and, she gives sandwich to him. After the boy eats the sandwich and notices the spider, he chases the girl around the living room and throws the spider at her. Because the video depicts events that involve intentions and deception, it is also suitable for eliciting mental state language from children during narratives.

Children were asked to watch the video carefully to be able to remember it later. After the video ended, the experimenter asked the children to tell what happened in the video. Then, the experimenter asked two questions that assessed comprehension skills ("Why did the boy throw the spider?", "Why did the girl tease the boy?"). Children's descriptions and responses to comprehension questions were recorded and transcribed for later coding (see Coding section below).

**3.2.3 Social skills measure.** Children's social skills were measured with the School Social Behavior Scale (Merrell, 1993). This scale assesses children's social behavior in the school context. In this scale, teachers evaluated their students in terms of social competence and antisocial behavior in academic and social settings. The scale consisted of two subscales

which were social competence and antisocial behavior. Social competence subscale included items about interpersonal relations, self-management skills and academic skills, while antisocial subscale included items about hostile-irritable behaviors, antisocial-aggressive behaviors and demanding-disruptive behaviors. The internal consistencies were high for both social competence ($\alpha = .99$) and antisocial behavior ($\alpha = .98$). The social competence subscale included 31 items, antisocial behavior subscale included 32 items[2] (see Appendix B). Both subscales were evaluated on a 5-point Likert-type scale. Teachers had two weeks to complete the scales. However, because of the fact that some teachers could not complete the scales within the given time, they had a one-week extension. In total, ten different teachers filled out the questionnaire. Each teacher evaluated a maximum of 16 students. The present study used the Turkish adaptation of the scale conducted by Yukay-Yüksel (2009).

**3.2.4. Control measure.** Children's general cognitive processing was assessed with the Serial Digit Learning Test (Zangwill, 1943). This test measures the number of repetitions in order to repeat a serial digit correctly. The test includes two versions that depend on the participant's age. This version is for children between the ages of 6-12. The form consists of a series of 8 digits. Each number can appear in a series only once. The numbers are placed randomly in the series (e.g., $9 - 1 - 8 - 5 - 2 - 6 - 7 - 4$). During the application of the test, the experimenter read each number in the series one by one and asked children to repeat the digits in the same order. When children could not repeat the series correctly, the experimenter read it again and asked the children to repeat the series. When children could repeat it correctly twice in a row, the experimenter ended the trial. Children had a maximum

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[2] School Social Behavior Scale originally had a total of 65 items that consist of 32 social competence items and 33 antisocial behavior items. In the present study, 5th item on social competence subscale ("Grup etkinliklerine ve tartışmalara aktif bir biçimde katılır." and 18th item on antisocial behavior subscale ("Küfür eder ya da argo kullanır.") had to be excluded from the analysis due to a copy-paste error while preparing the paper form of the scale.

of 12 trials to complete the test. Performance is scored according to the number of correct repetitions and the number of the trials that were unapplied after the two times correct repetitions. The maximum score that a child could get in this test is 24. The present study used the Turkish version of the Serial Digit Learning Test included in BİLNOT Battery (Karakaş & Doğutepe Dinçer, 2011).

**3.3 Coding**

Children's descriptions of the video and the responses to the comprehension questions in Narrative Production Test were transcribed by the author and undergraduate research assistants that were native speakers of Turkish. The transcriptions were checked by a second examiner. The transcribers discussed the discrepancies and reached an agreement for all cases. The transcriptions were used for both linguistic complexity coding and narrative skills coding. 30% of the transcripts were selected to be coded by a second researcher to assess inter-rater reliability.

**3.3.1 Linguistic Complexity Coding.** Children's narratives were coded for linguistic complexity following the guidelines by Aktan-Erciyes and Aksu-Koç (2018) which was based on the coding scheme by Berman et al. (1994). First, children's speech was split into clauses. Clause was defined as a unit of grammatical organization that completes the meaning of the main sentence in compound sentences. There were six categories of clauses which were simple clause, infinitival clause, coordination clause, converb clause, subordinate clause and main clause. During coding, clauses were categorized into one of these six clause types. Simple clause referred to a sentence that included only one clause (e.g., "Orada bir böcek *görüyor*"). Infinitival clause appeared in a sentence that included the infinitive form of a verb (e.g., "Ona bir şaka *yapmak* istiyor"). Coordination clause was situated in a sentence where at least two clauses were connected by conjunctions such as *and* or *but* (e.g., "Örümceği gördü *ve* kız çocuğuna kızdı"). Converb clause referred to a

non-finite verb form that signified adverbial subordination. In Turkish, converbs comprise of suffixes such as *-ken, -ıp/ip, -ince* that are added to verbs (e.g., "Abisi *sinirlenince* yine veriyor"). Subordinate clause could be seen in a sentence in which two clauses were put together by a subordinating conjunction. In this study, Turkish suffixes such as *-dığı zaman, -dığı için* were coded as subordinate clauses (e.g., "Herhalde abisi çok aç gözlü *olduğu için* onun her şeyini alıyor"). Lastly, the clauses that were situated in a sentence with an infinitival clause, a converb clause or a subordination clause were coded as main clause (e.g., "Limonatayı içtikten sonra orda bir şey *görüyor*"). The categories except simple clause were considered as complex clauses.

At the final step, children's uses of each clause were summed and each child had scores for six clauses. A linguistic complexity score was calculated for each participant. This score was calculated by dividing the number of complex clauses used by the participant during narrative by the total number of clauses. The agreement between coders for linguistic complexity was 79%.

As a second measure of linguistic complexity, mean length of utterance (MLU) was calculated. MLU was calculated based on word counts for each clause. (e.g., "Bir çocuk televizyon izliyor" (MLU = 4), "O sürekli her şeyi başka kişilerden istiyor" (MLU = 7). Then, a total MLU score was computed by dividing the number of MLU for each clause by the total number of clauses.

**3.3.2 Mental-State Language Coding.** Children's use of mental state language was assessed by coding the use of mental-state terms in narratives. A mental state term refers to cognitive state that is often abstract and may be difficult to understand from the outside. Some of the mental-state verbs are to understand, believe, know, want and realize. In this study, children received 1 point for each of the mental-state terms that they used while describing what happened in the video (e.g., "Yani kardeşinin yine yapacağını *biliyordu*",

"İçinde örümcek olduğunu *anlıyor*"). Since the video included actions that required children to make inferences, it allowed them to use mental-state terms in narratives (see Appendix C for examples). Children also received 1 point if they used the phrase *to pretend* (Türkçe: -*mış gibi yapmak*) because it is very related to understanding of mental states (e.g., "Kendisi *yemiş gibi* yapıyor"). After the scoring, all of the points that a participant gained were summed and each child had a total score for mental-state language. The agreement between coders for mental state language was 96%.

**3.3.3 Narrative Skills Coding.** Children's narratives were coded for narrative content by following the guidelines by Herman et al. (2004). Narrative content referred to the participant's reference to specific information in the narrative. Participants received a point for mentioning each of 15 story episodes. These episodes were important parts of the story (e.g., the girl sees a spider). An additional point was given if the participant mentioned additional information about the story (e.g., "The boy was greedy"). The highest score that a child could get in this test was 16 (see Appendix D for examples). The two coders had 75% agreement for this measure.

Participants' responses to comprehension questions were also coded as a part of the coding of narrative skills. Each of the questions was rated out of two points. The maximum score that a participant could get was 4 in this part of the testing. For the first question, they received 2 points if they mentioned two of the relevant answers (see Appendix D for examples). If they mentioned only one of the relevant answers, they received 1 point. Irrelevant answers were scored for 0 points. For the second question, mentioning any two of the relevant responses was scored for 2 points, while referring to only one of them was worth of 1 point. Irrelevant answers were scored for 0 points. The two coders had 91.6% agreement for this assessment.

**CHAPTER 4**

**RESULTS**

**4.1 Analytical Strategy**

First, we conducted preliminary analyses to guide our way to the main analysis. We tested bivariate correlations among the language, ToM, social skills and general cognitive ability measures. We also investigated the associations of these variables with age and sex through correlations. These investigations guided our strategy for adding age and sex as covariates. After the preliminary analyses, we conducted hierarchical linear regression to test whether or not mental state language continues to predict ToM in middle childhood above and beyond the role of general cognitive ability and linguistic competence. In the final step, we explored the associations between mental state language, ToM and social skills. Analyses were conducted separately for two aspects of social skills (social competence and antisocial behavior). After correlations and regression analyses, we further explored the link between MSL, ToM and social competence through a mediation analysis using bootstrapping for significance testing (Preacher & Hayes, 2004, 2008).

Due to the nested structure (children nested in classrooms) of the data, we investigated the need for using multilevel random intercept model in the main analysis. As we collected our data from 9 classrooms, the number of clusters in our study was only 9. For this reason, we did not run our models in multilevel context. In general, minimum recommended number of clusters in educational and psychological research is 30 to have accurate intraclass correlation (ICC), which may suggest enough variability in the second level of a model (Kreft & Leeuw, 1998; Snijders & Bosker, 1993).

**4.2 Preliminary Analyses**

Descriptive statistics for age and tasks for theory of mind, mental state language, social skills, linguistic competence, general cognitive ability and narrative skills are presented

in Table 1. The skewness and kurtosis of the variables were examined to investigate normality

assumptions of the distribution for each variable. Antisocial behavior did not meet the criteria

(±2) for skewness and kurtosis (Gravetter & Wallnau, 2014; Trochim & Donnelly, 2006). For

this reason, inverse transformation was applied for negatively skewed distribution and it was

used for further analyses. Social competence and MLU also did not meet the assumptions of

normality because of their levels of kurtosis (2.43, 2.47). However, since their levels of

skewness (-1.78, 1.46) were in accepted range, they were not transformed for the main

analyses.

Table 1. Descriptive Statistics of Study Variables ($N = 80$)

| Variable | M | SD | Min | Max | Skew | Kurt |
|---|---|---|---|---|---|---|
| Age | 8.48 | 1.00 | 6.98 | 10.93 | | |
| Theory of Mind | 6.56 | 2.81 | 1 | 12 | -.42 | -.81 |
| Mental State Language | 2.55 | 2.15 | 0 | 10 | 1.13 | 1.23 |
| Social Competence | 4.34 | .92 | 1.35 | 5 | -1.78 | 2.43 |
| Antisocial Behavior | 1.40 | .74 | 1 | 4.38 | 2.17 | 4.16 |
| Transformed Antisocial B. | .82 | .24 | .23 | 1 | -1.23 | .08 |
| Serial Digit Learning Test | 11.10 | 7.92 | 0 | 24 | -.21 | -1.41 |
| Linguistic Complexity | .37 | .21 | 0 | .90 | -.04 | -.50 |
| Narrative Skill | 7.77 | 3.65 | 0 | 15 | -.00 | -.64 |
| Comprehension Questions | 1.47 | .90 | 0 | 4 | .82 | .37 |
| Mean Length of Utterance | 3.64 | .83 | 2.44 | 6.50 | 1.46 | 2.47 |

Before examining the main research questions, correlations between study variables

were carried out to decide on which variables will be included in further regression analyses.

Since social competence and antisocial behavior scales consisted of subscales, we

investigated if the subscales should be added separately into the analysis or should be added

as a single aggregate score. Social competence scale included 3 subscales which were

interpersonal skills, self-management skills and academic skills. Since these subscales had

near perfect intercorrelations,[3] we decided to use an aggregate score for social competence. With respect to antisocial behavior scale, it consisted of 3 subscales on hostile-irritable, antisocial-aggressive and demanding-disruptive behaviors. As the subscales also had high intercorrelations[4], an aggregate score for antisocial behavior was used in the analysis.

Table 2 shows the Pearson correlation coefficients of all study variables. ToM was significantly and positively associated with Serial Digit Learning Test, social competence, mental state language, narrative skill and linguistic complexity. Social competence was negatively correlated with antisocial behavior while it was positively correlated with mental state language, narrative skill, comprehension questions and linguistic complexity. Antisocial behavior was positively associated with MLU, while there were negative correlations with other linguistic measures such as mental state language, narrative skill, comprehension questions and linguistic complexity. The correlations also showed that there were significant correlations between the variables that measured linguistic abilities – mental state language and general linguistic abilities. Mental state language had a significant negative correlation with MLU and positive correlations with all other linguistic variables including comprehension questions, linguistic complexity and also narrative skills. Moreover, intercorrelations between age and all other study variables revealed that age was significantly and positively correlated with ToM task score and linguistic complexity.

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[3] A Pearson's r test revealed highly strong correlations among the three aspects of social competence: interpersonal skills and self-management skills (.94), interpersonal skills and academic skills (.94), and self-management skills and academic skills (.93).

[4] A Pearson's r test revealed highly strong correlations among the three aspects of antisocial behavior: hostile-irritable and antisocial-aggressive (.95), hostile-irritable and demanding-disruptive behaviors (.94), and antisocial-aggressive and demanding-disruptive behaviors (.96).

Table 2. The Pearson Correlations of Study Variables

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Sex | — | | | | | | | | | | |
| 2. Age | .01 | — | | | | | | | | | |
| 3. Theory of Mind | .00 | .28$^*$ | — | | | | | | | | |
| 4. Mental State Language | .05 | .12 | .30$^{**}$ | — | | | | | | | |
| 5. Social Competence | .05 | -.21 | .33$^{**}$ | .22$^*$ | — | | | | | | |
| 6. Antisocial Behavior | .05 | .14 | -.13 | -.23$^*$ | -.75** | — | | | | | |
| 7. Serial Digit Learning Test | .20 | .16 | .38$^{**}$ | .34$^{**}$ | .22* | -.04 | — | | | | |
| 8. Linguistic Complexity | .08 | . 29$^{**}$ | .27$^*$ | .29$^{**}$ | .27* | -.18 | .34** | — | | | |
| 9. Mean Length of Utterance | .18 | .15 | -.04 | -.26$^*$ | -.19 | .25* | .11 | -.01 | — | | |
| 10. Narrative Skills | -.00 | -.06 | .26$^*$ | .54$^{**}$ | .44** | -.31** | .23* | .22* | -.48** | — | |
| 11. Comprehension Questions | .24$^*$ | -.00 | .21 | .20 | .33** | -.22* | .10 | .17 | .10 | .21 | — |

*Note.* Sex was calculated on binary values (0 = boys, 1 = girls)

*p < .05. **p < .01

**4.3 Main Analyses**

**4.3.1 The Association Between Mental State Language and Theory of Mind**

To address the first research question, we conducted hierarchical linear regression in order to test the predictive associations between mental state language and theory of mind. Based on prior work with preschoolers, we expected that mental state language would predict ToM. In order to test the uniqueness of mental state language in explaining variation in ToM development, we also considered the possible role of other cognitive factors such as general cognitive ability and general linguistic competence that might relate to ToM skills. Therefore, we tested the possibility that these cognitive abilities can weaken the role of mental state language on ToM. Before carrying out the regression analysis, we needed to decide on including which of the variables into the model. Since correlation analyses showed that our main variable of interest (ToM) was only correlated with linguistic complexity among two of the general linguistic competence measures, we only selected linguistic complexity for further analysis. Also, because of the significant correlations between mental state language measures (use of mental state language, comprehension questions and narrative skills), we only chose the better predictor for other study variables which is the use of mental state language[5]. Lastly, multicollinearity between independent variables was assessed in order to see whether the data met the assumption of collinearity. The tolerance values were in between .81 and .98 which indicated that there was no concern for multicollinearity in the data (Pallant, 2011).

Age was entered in the regression model in the first step and explained 8.2% of the variance in ToM ($F$ (1, 78) = 6.97, $p$ = .01) (see Table 3). In the second step, use of mental state language was introduced in the model and it further contributed to the prediction of ToM by explaining additional 7.6% of the variance in ToM ($F$ (2, 77) = 7.24, $p$ = .00). This indicated that use of mental state language explained ToM even after accounting for age.

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[5] Instead of using an aggregate score, we only chose using mental state language for further analysis because all of the mental state language codings were based on the narratives.

Next, linguistic complexity was entered and explained 1.7% of the variance in ToM ($F$ (3, 76) = 5.37, $p$ = .00). At this step, age became a non-significant predictor of ToM, while mental state language continued to significantly predict ToM. In the final step, general cognitive ability was entered in the model and it explained additional 6% of the variance in ToM ($F$ (4, 75) = 5.76, $p$ = .00). This indicated that general cognitive ability significantly predicted ToM. However, mental state language did not predict ToM anymore. The total model explained 23.5% of the variance in ToM. These results show that mental state language predicted theory of mind after controlling for age. However, variation in ToM is not uniquely accounted for by mental state language. In fact, general cognitive ability accounted for the predictive role of mental state language on ToM.

Table 3. Hierarchical Regression Analysis for Variables Predicting Theory of Mind

| Variables | Step 1 | | | Step 2 | | | Step 3 | | | Step 4 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *B* | *SE* | *β* | *B* | *SE* | *β* | *B* | *SE* | *β* | *B* | *SE* | *β* |
| Age | .79 | .30 | .28** | .70 | .29 | .25* | .60 | .30 | .21 | .55 | .29 | .20 |
| Mental State Language | | | | .36 | .13 | .27** | .31 | .14 | .24* | .22 | .14 | .16 |
| Linguistic Complexity | | | | | | | 1.80 | 1.45 | .14 | .93 | 1.45 | .07 |
| General Cognitive Ability | | | | | | | | | | .09 | .04 | .27* |
| Adjusted $R^2$ | .07 | | | .13 | | | .14 | | | .19 | | |
| F for change in $R^2$ | 6.97** | | | 6.97* | | | 1.52 | | | 5.90* | | |

*p < .05. **p < .01

**4.3.2 The Associations Between Mental State Language, Theory of Mind and Social Skills**

Turning to our second question, we explored the associations between mental state language, theory of mind and social skills. Social skills included two different aspects which were social competence and antisocial behavior. We separately investigated the associations between the three social skills variables and the predictor variables. Since each of these variables measures a different dimension of social skills, these dimensions can be associated with mental state language and theory of mind in different ways.

As seen in Table 2, there were bi-variate correlations between mental state language, ToM and social competence. These correlations led us search for a possible indirect link between mental state language and social competence through ToM after controlling for age. The mediating effect of ToM on the association between mental state language and social competence was examined by using SPSS Process Macro (Hayes, 2017). Figure 1 presents the conceptual model and the unstandardized regression coefficients and significance levels of the mediating effects. The results revealed that the association between mental state language and social competence ($B = .10$, $SE = .04$, $p = .02$, 95% Cl [.01, .20]) diminished when ToM was added to the model ($B = .06$, $SE = .04$, $p = .17$, 95% Cl [-.02, .15]). A 95% bias-corrected confidence interval based on 5000 bootstrap samples indicated that the indirect effect of mental state language ($ab = .04$) on social competence through theory of mind was above zero and statistically significant, Cl [.00 - .09]. The results suggested that the association between mental state language and social competence was mediated by ToM after controlling for age.

The other variable for social skills which was antisocial behavior was significantly and negatively correlated with mental state language but not with ToM. For this reason, we did not further analyze the associations between mental state language, ToM and antisocial behavior through mediation analysis.
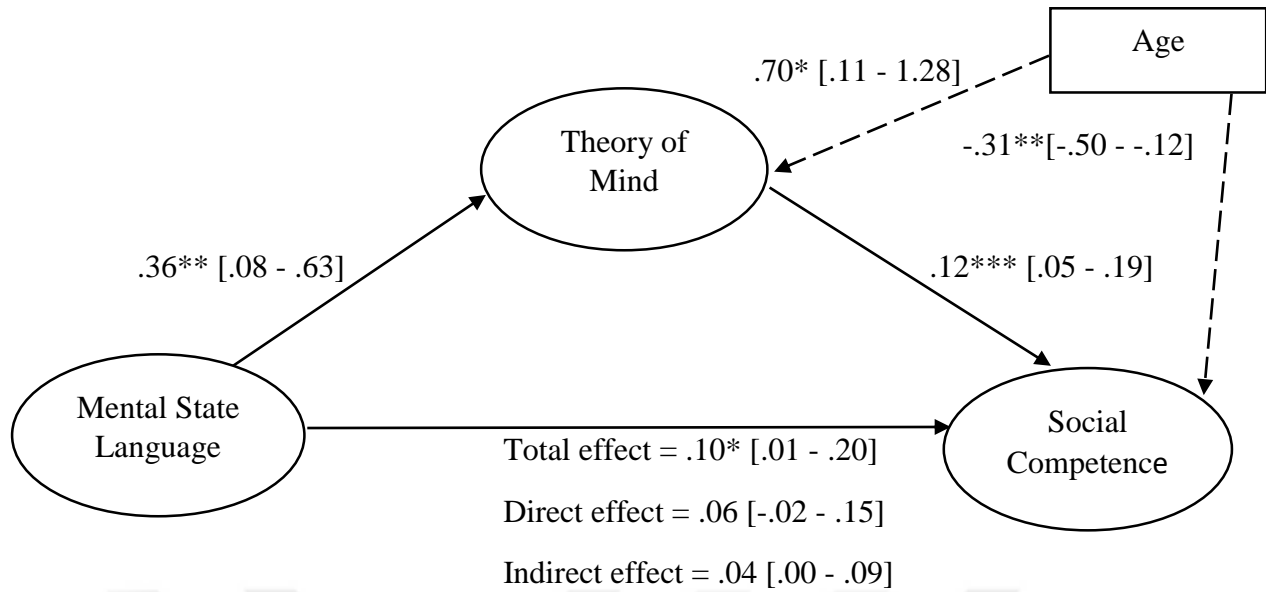
Figure 1. The Mediation Model for Social Competence.

*Note.* The model shows that the association between mental state language and social competence is mediated by

theory of mind, after controlling for age. The numbers in the brackets indicate the CIs at 95%.

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

**CHAPTER 5**

**DISCUSSION**

**5.1 General Discussion**

Understanding mental states and using terms that express mental states are considered to be important for social interaction (Hofmann et al., 2011; Astington, 2003). Language is also considered to be important for positive social interactions since it provides a tool for children to express themselves in prosocial behaviors (Cassidy, Werner, Rourke, Zubernis, & Balaraman, 2003). Prior work that investigated the associations between language - specifically mental state language, theory of mind and social skills, has been mostly carried on among preschoolers (Longobardi, Spataro, & Renna, 2014). Studies that investigated preschoolers are important for our understanding of the development of mental state language, ToM and social skills and the links between them. They lead the way in indicating that there is an association between mental state language and theory of mind in the early years (e.g., Hughes & Dunn, 1998). However, based on prior work, little was known with respect to the development of these concepts beyond the preschool period. Studying the associations between mental state language, theory of mind and social skills in school-age children can provide information about how stable these associations are. Also, children start to engage in more interactions with peers which makes it important to examine children's understanding of other people and mental states in order to understand the individual differences in peer relationships (Hughes, 2016). This study aimed to investigate the associations between use of mental state language, theory of mind and two dimensions of social skills which are social competence and antisocial behaviors among school-age children. In the following sections, we will discuss our findings with regards to first the specific associations between mental state language and ToM and then, their extent to social skills.

**5.2 The Nature of the Association Between Mental State Language and Theory of Mind**

In our first research question, we aimed to understand the nature of the association between mental state language and theory of mind in middle childhood, specifically whether or not language has a unique contribution to ToM. For this reason, we investigated if the use of mental state language in a narrative would be associated with advanced theory of mind skills. We tested two possibilities in order to explain the links between mental state terms and ToM. According to the first possibility, mental state language may be uniquely correlated with ToM in middle childhood, since there were significant correlations among them in preschool period. According to the other possibility, the development of other cognitive abilities such as executive functions and linguistic competence may weaken the importance of language in explaining ToM in middle childhood. For this first research question, we carried out analysis in order to test these two possibilities.

As a first step, we investigated how different measures of language and ToM were correlated. We found that narrative skills were positively correlated with the use of mental state language and ToM. This finding was expected since the measure that we used to assess narrative skills encouraged children to interpret other people's mental states and use terms that refer these mental states. This finding is also consistent with the findings of previous research with preschoolers (Baron-Cohen et al., 1986) and school-age children. For instance, Longobardi et al. (2014) also found that school-age children's use of narrative categories was correlated with their use of mental state terms and ToM skills. Furthermore, we found significant positive correlations between linguistic complexity, mental state language and ToM. In the present study, children's linguistic complexity was assessed in terms of expressive language. Previous studies investigated the relation between ToM and different aspects of language such as receptive and expressive language, semantics and syntax (see Milligan et al., 2007 for a meta-analysis). Expressive language is considered to be an

important correlator of ToM since it provides a way for children to link emotions and mental states to language. In this way, children can express their own emotions and thoughts and also infer other people's mental states (Brock, Kim, Gutshall & Grissmer, 2018). Our finding on the positive correlation between linguistic complexity and ToM supported this explanation and was consistent with previous research (e.g., Brock et al. 2018; Milligan et al., 2007).

With respect to the primary purpose of our research question on the nature of the association between mental state language and ToM, our results supported the second possibility which suggested the importance of not only language but also other cognitive abilities to explain the development of theory of mind. Specifically, we found that mental state language explained ToM, nevertheless, their association was no longer apparent when general cognitive ability was controlled for. This suggests that cognitive skills including the use of mental state terms and general cognitive ability were amongst the predictors of ToM. It suggests that children's ability to understand mental states can be explained by their use of mental state language and cognitive ability. Although mental state language helps the development of ToM, it does not seem to be the *only* factor contributing to the development of ToM. Instead, mental state language seems to be one of the many factors that do so since general cognitive ability is also one of the predictors of ToM.

Viewed within the broader literature on the relation between language and ToM, our findings are consistent with the findings of studies that investigated the unique role of language in ToM skills. For instance, training studies with preschoolers showed that in addition to the trainings that focused on language, trainings that focused on other aspects of false belief such as deception can also improve children's false-belief understanding (Hale & Tager-Flusberg, 2003; Lohmann & Tomasello, 2003). Furthermore, Dungan, and Saxe (2012) assessed adults' false-belief reasoning while they were given a secondary task that either disrupted the participant's ability to use linguistic encoding (verbal interference) or not (non-

verbal interference). The two tasks were matched at their difficulty in terms of working memory. Participants performed similarly on false-belief reasoning under both verbal and non-verbal interference. This suggests that not being able to linguistically encode during a false-belief task did not *specifically* diminish participants' reasoning on false-belief and thus linguistic resources did not have a unique contribution to false-belief reasoning. Finally, patients of agrammatic aphasia, who are known to have impairments in grammar that result in very limited production and comprehension of words and not being able to use embedded sentences perform well on false-belief tasks regardless of their impairments in linguistic abilities (Apperly, Samson, Carroll, Hussain, & Humphreys, 2006). Overall, these results suggested that language may help but is not a necessity to have an understanding of false-beliefs. Our findings in the present study converge with these studies with adults by showing that language is one of many but not a unique contributor to ToM development. This study provides a bridge between preschool period and adulthood in terms of the association between language and ToM. Since directly comparing preschoolers to adults would be speculative, it is important to work on other developmental periods as well in order to understand the change during development (Hughes, 2016). By focusing on school-years, we investigated whether the role of language on ToM changes in between preschool period and adulthood. Our findings showed that language continues to be one of many predictors of ToM in school-years as it is also in preschool period and adulthood.

Unlike studies with preschoolers (for a review, see Symons, 2004), studies focusing on middle childhood revealed contradictory evidence on the association between mental state language and theory of mind skills. Thus, our findings seem to be at odds with the findings of some studies (Longobardi et al., 2014; Meins et al., 2006) that found no associations between use of mental state language and theory of mind among school-age children. This discrepancy can be due to methodological differences such as how mental state language was coded,

sample sizes and tasks used to measure ToM. While we coded only cognitive and desire verbs and also the verb "to pretend" as mental state terms, Meins et al. (2006) and Longobardi et al. (2014) included emotional and moral terms too. Moreover, since Meins et al. (2006) and some earlier studies such as Charman and Shmueli-Goetz (1998) included small sample sizes, it can be said that these studies provided preliminary findings. On the other hand, Longobardi et al. (2014) and Grazzani and Ornaghi (2012) used false-belief understanding tasks to measure theory of mind in middle childhood. Since false-belief tasks were designed to assess preschoolers' understanding of mental states, it can be an easy task that can result in little-to-no variation among school-age children. For this reason, we used Strange Stories Task to assess children's advanced ToM skills. We believe that it is a more suitable tool to measure ToM in middle childhood than false-belief tasks. Including a larger sample size and using a more convenient measure for ToM can explain the discrepancy in our study and previous studies.

Finally, our results revealed that age was positively correlated with ToM. This finding provided support for many studies that investigated ToM in middle childhood. Happé (1994) found that children's performance on Strange Stories increased with their age. Grazzani & Ornaghi (2012) found that older children performed better on second-order false belief tasks. These results suggest that since theory of mind continues to develop as children age, it is crucial to investigate its development and associations with other abilities in middle childhood.

## 5.3 The Extent of the Association Between Mental State Language and Theory of Mind

The second goal of the present study was to investigate the links between mental state language, ToM and social skills. As the findings of our previous research question suggested specific associations between language and ToM, we aimed to further investigate if they can extend to social skills. Looking into the extent of language and ToM to social skills was

important since previous studies did not study these three different aspects of social-cognitive development together. Moreover, because of the fact that limited studies provided findings for the association between mental state language and ToM in school-age children (e.g., Charman and Shmueli-Goetz, 1998; Meins et al., 2006) and contradictory findings for ToM and social skills (e.g., Capage & Watson, 2001; Renouf et al., 2009), our investigation was exploratory and we did not have specific predictions for this research question.

For this exploratory investigation, first of all, we assessed the correlations between mental state language, theory of mind and social competence. We found that social competence was correlated with both mental state language and ToM. This finding led us to search for the role of the ToM as a mediator, since we found intercorrelations between these three variables. The results revealed that ToM mediated the association between mental state language and social competence after controlling for age. In other words, children's use of mental state terms improves their understanding of mental states in which fosters social competence. Even though we could not come across with any other study that investigated the role of ToM as a mediator in this association, there are some studies that were in line with our findings on the separate associations among ToM and social competence. The positive association between ToM and social competence was also found by Devine et al. (2016). In their study, there were both concurrent and longitudinal correlations among ToM and social competence of school-age children. Our findings broaden the extent of these associations by showing that there is an association between mental state language and social competence through ToM.

One aspect of language that may be claimed to have an important role in social and socio-cognitive skills is pragmatics (Fernández, 2011). Pragmatics includes adjusting informativeness of utterances based on the listener's knowledge during language production and inferring the meanings intended to be communicated by a speaker during language

comprehension (see Grigoroglou & Papafragou, 2017 for an overview). Scholars have claimed that these skills are closely associated with theory of mind and mental state verbs (e.g., Harris, De Rasnay, & Pons, 2005). Mental state terms can be related to pragmatics since they can refer unobservable events, link verbs to knowledge, give hints about speaker's attitude and mental states (Spanoudis, Natsopoulos, & Panayiotou, 2007). Also, pragmatics require people to take perspective of the other person and understand his/her knowledge (Bates, 1976). In order for perspective-taking and for considering the listener's knowledge, people need to have an understanding of mental states. This characteristic connects pragmatics and theory of mind. An inability in perspective-taking and inferring the meanings of a speaker can be seen in people who have difficulty in maintaining a conversation and interacting with others (Toro, 2008). It suggests that pragmatic language skills are important in order to be socially competent in a way that having pragmatic skills can foster theory of mind and social skills such as social competence. Considering the role of pragmatics when explaining the associations between language, theory of mind and social competence would be a fruitful approach for future research.

As a negative dimension of social skills, we assessed antisocial behavior in association with mental state language and ToM. The findings revealed a significant and negative correlation between mental state language and antisocial behaviors, while no significant correlation was found with ToM. In line with this finding, Longobardi et al. (2014) also found that aggression was negatively associated with MSL but not with ToM in middle childhood. One explanation for this finding might be that there can be indirect associations between ToM and antisocial behaviors. For instance, Renouf et al. (2009) found that prosocial behavior moderated the associations between ToM and relational (indirect) aggression among preschoolers. In order to understand the possible indirect associations between ToM and antisocial behaviors in school-age children, further research is needed.

**5.4 Implications of the Study**

This study has important implications for both future research and practical settings. As stated above, previous researchers put little effort to examine the links between mental state language, theory of mind and social skills in school-age children (Longobardi et al., 2016). The present study expanded our understanding on the nature of the association between mental state terms and ToM in school-years and its extent to social behavior by showing that mental state language continues to be associated with ToM in school-years and it even extends to positive aspects of social skills (social competence). However, our findings also indicated that apart from using mental state terms, general cognitive ability also predicts ToM. This suggests that even though mental state language is important for ToM and social competence, it may not be the only factor that promotes these socio-cognitive and social skills. With that in mind, our findings also suggest that language-based trainings rather than ToM trainings may be a more fruitful first-step for future work aiming to improve social skills in school-aged children. This possibility is supported by the fact that while ToM mediated the association between mental state language and social competence, but not vice versa. In other words, mental state language did not mediate the association between ToM and social competence in our sample.

Our findings also have important implications for interpreting findings of conversation-based trainings aiming to improve ToM. For instance, a training study by Lecce et al. (2014) showed that receiving a training through the use of mental state language during conversations resulted in improved ToM in school-age children. However, it is not clear which aspect of the training fostered ToM, since it consisted of not just the use of mental state terms, but also conversations, group interactions and stories that included the understanding of mental states. In our study, we examined only one of these aspects which was use of mental state language. We found that mental state language, along with general cognitive ability, is

one of the many factors that help the development of ToM skills in school-years. To this respect, one may hypothesize that using mental state language only may not be enough to promote ToM because even though it can be necessary for ToM, it is not sufficient. Future research is needed to make a distinction between the aspects of a training in order to understand which specific aspect promotes ToM in school-age children. It is then can be possible to design effective intervention programs that can foster children's ToM and social competence.

**5.5 Limitations and Future Directions**

Even though this study made unique contributions to understand the nature and extent of the associations between use of mental state language, theory of mind and social skills in middle childhood, it also has some limitations that can give insight for future research. First open question is whether and how the associations between mental state language, theory of mind and social skills change across different family characteristics such as SES, parental education level and number of siblings. Since previous research found that these family characteristics can also predict theory of mind (e.g., Pears & Moses, 2003), future studies can investigate the possible roles of these factors on mental state language, theory of mind and social skills.

Another direction open for future research is whether the nature and the extent of associations between language, ToM and social skills remain stable across broader definitions of mental state language or across different aspects of language. In the present study, while coding mental state verbs that children used in narratives, we only coded cognitive mental state verbs such as *to think* and *to know* and also the verb *to pretend*. However, Lecce, Zocchi, Pagnin, Palladino, and Taumoepeau (2010) categorized mental state terms into four types which are cognitive (e.g., to understand), emotional (e.g., to be happy), morality (e.g., to regret) and desire (e.g., to decide) terms. Some other researchers have also used this

classification while coding mental state terms in their studies (e.g., Longobardi et al., 2016).

Taking these categories into consideration, what we included in our coding were cognitive

and desire verbs. Since the task which we used to assess mental state language was not

suitable to elicit emotional and moral terms, we decided to code only cognitive and desire

terms. Future studies can examine children's use of all types of mental state terms (cognitive,

emotional, moral and desire) by using a task that allows children to use these mental state

terms. In this way, we can understand if our findings on the nature and extend of the link

between mental state language and ToM would remain the same or change depending on the

types of mental state terms.

Relatedly, the possible role of pragmatics on social, linguistic and cognitive abilities

was mentioned previously in this thesis. Even though our study still provided important

findings that provided an insight into the nature and extent of the associations between use of

mental state language, theory of mind and social skills, we did not include a measure of

pragmatics skills in the study. Future studies can investigate how pragmatics can help to

explain the links between mental state language, ToM and social skills among children.

In terms of social competence and antisocial behaviors, our data were only based on

teacher-report. It suggested that our results can be bounded up with teachers' perception of

children. Even though teachers have opportunity to observe children's peer relationships,

having multi-informant for children's behaviors can be beneficial to understand if there is a

difference between teachers' perception and other informants' perception of children.

Lastly, in the present study, we evaluated children's antisocial behavior in terms of

aggressive-antisocial behaviors, hostile-irritable behaviors and demanding-disruptive

behaviors. The scale that we used to measure antisocial behavior did not make a distinction

between the types of aggression. There are two main types of aggression which are physical

and relational aggression. Physical aggression consists of overt behaviors that can cause harm

in other people, while relational aggression refers to behaviors such as spreading rumors and excluding someone from a group intentionally (Crick & Grotpeter, 1995). Some researchers suggested that children can use advanced theory of mind skills maliciously that it can appear in forms of relational aggression (e.g., Happé & Frith, 1996). The reason behind this claim is that children in middle childhood learn bluff, deception and persuasion with the development of advanced theory of mind. Children can use these behaviors to turn a situation into his/her own advantage in a social environment (Shahaeian, Razmjoee, Wang, Elliott, & Hughes, 2017). Some findings supported this view by showing that relational aggression but not physical aggression was associated with higher performance on theory of mind tasks (e.g., Shahaeian et al., 2017). Even though we could not find any association between ToM and antisocial behaviors, investigating its association with specific aggressive behaviors including physical aggression and relational aggression can make unique contributions. In this way, future studies can help us to understand if there are differences between physical and relational aggression in terms of their associations with mental state language and ToM.

**5.6 Conclusion**

The present study assessed the links between use of mental state language, advanced theory of mind skills and social skills among school-age children. Since previous studies did not provide clear findings on the associations between mental state language, ToM and social skills, this study aimed to explore the nature of the links between language and ToM and examine whether these links could extend to social skills. Our results showed that although the use of mental state language predicted ToM skills, other cognitive skills weakened its predictive role. This suggested that mental state language is one of the predictors of ToM nevertheless it was not the only predictive factor. Moreover, the analyses for the links between mental state language, ToM and social skills provided complex results. An important finding came from the analysis for mental state language, ToM and social competence. ToM

mediated the association between mental state language and social competence after controlling for age. On the other hand, antisocial behaviors were associated with mental state language, but not with ToM. Our study informs future studies on the important links between use of mental state verbs, understanding of mental states and social skills in middle childhood by showing that mental state language is one of the predictors of ToM and that the association between language and ToM can extend to children's social competence.

**APPENDIX A**

**Strange Stories Task**

**Hikâye 1:** Sinan çok yalancı birisidir. Sinan'ın kardeşi Can, Sinan'ın asla doğruyu söylemeyeceğini bilir! Dün Sinan, Can'ın topunu çaldı. Can, topu bulamaması için Sinan'ın onu bir yerlere sakladığını biliyordu. Can çok kızmıştı. Bu yüzden Sinan'ı bulup şöyle dedi "Topum nerede? Ya dolaba ya da yatağının altına saklamış olmalısın. Çünkü geri kalan her yere baktım. Nerede, dolapta mı yoksa yatağının altında mı?" Sinan ona topun yatağının altında olduğunu söyledi.

**Soru:** Can topu bulmak için neden dolaba bakacak?


**Hikâye 2:** Savaş sırasında kırmızı ordu, mavi ordunun bir askerini esir aldı. Askerin onlara mavi ordunun tanklarının nerede olduğunu söylemesini istediler. Kırmızı ordu tankların ya deniz kenarında ya da dağlarda olduğunu biliyordu. Ancak, askerin onlara tankların yerini söylemek istemeyeceğini de biliyorlardı. Asker kendi ordusunu kurtarmak istiyordu, yani onlara kesinlikle yalan söyleyecekti. Asker çok cesur ve çok akıllıydı, kırmızı ordunun tanklarını bulmasına izin vermeyecekti. Tanklar gerçekte dağlardaydı. Şimdi, kırmızı ordu askere tankların nerede olduğunu sorduğunda "Tanklar dağlarda." dedi.

**Soru:** Asker neden bunu söyledi?


**Hikâye 3:** Berk her zaman çok aç olur. Bugün okulda en sevdiği yemek vardı; sosis ve makarna. Berk çok aç gözlü bir çocuktu, eve döndüğünde annesi ona çok güzel bir yemek hazırlayacak olsa da herkesten fazla sosis almak istiyordu! Fakat okulda her çocuğun en fazla iki sosis almasına izin veriliyordu, daha fazla değil. Berk servis sırası geldiğinde şöyle dedi; "4 sosis alabilir miyim? Çünkü eve döndüğümde akşam yemeği yemeyeceğim."

**Soru:** Berk neden böyle söyledi?

**Hikâye 4:** Ayşe Teyze kedi yavrularını çok seviyordu ve onların başına bir şey gelmesini istemiyordu.

Komşusu Jale de bir kedi yavrusu almak istiyordu. Bu yüzden evinde birçok kedi besleyen Ayşe Teyze'ye gitti. Ayşe Teyze daha fazla onlara bakmak istemiyordu çünkü hepsini de kendi başına besleyemezdi. Jale, dişi kedi almak istiyordu. Ayşe Teyze'nin kedilerinden birini istediğinden emin değildi çünkü onun kedilerinin hepsi erkekti. Ayşe Teyze, Jale'ye "Eğer kimse kedi yavrusu satın almazsa onları sokağa atmak zorunda kalacağım!" dedi.

**Soru:** Ayşe Teyze neden böyle bir şey söyledi?

**Hikâye 5:** Bir gün Murat'ın teyzesi Emel onu ziyarete geldi. Murat, teyzesini çok seviyor. Fakat bugün Emel teyzesi yeni bir şapka takmıştı ve Murat aslında şapkanın çok çirkin olduğunu düşünüyordu. Murat, teyzesinin şapkayla komik göründüğünü ve eski şapkasıyla çok daha güzel göründüğünü düşünüyordu. Ancak, teyzesi: "Yeni şapkam nasıl?" diye Murat'a sorduğunda; Murat: "Çok güzel" dedi.

**Soru:** Murat neden böyle söyledi?

**Hikâye 6**: Hale bütün bir yıl boyunca yılbaşını bekledi, çünkü yılbaşında ailesinden hediye olarak bir tavşan isteyebileceğini biliyordu. Hale, tavşanı dünyadaki her şeyden daha çok istiyordu. Yılbaşı günü geldi ve ailesi Hale'ye hediyesini verdi. Hale hediye paketinin içinden küçük bir tavşan çıkacağına emindi. Fakat paketi açtığında hediyenin sadece sıkıcı ansiklopediler olduğunu gördü, ki Hale bunları hiç istemiyordu! Yine de ailesi Hale'ye hediyesini beğenip beğenmediğini sorduğunda Hale "Çok güzel teşekkür ederim, tam istediğim şey" dedi.

**Soru:** Hale neden böyle söyledi?

**Hikâye 7:** Bir gece geç vakit, yaşlı Perihan Hanım evine yürüyordu. Karanlıkta eve yalnız yürümekten hoşlanmıyordu. Çünkü her zaman birinin ona saldıracağından ve onu soyacağından korkuyordu. Gerçekten çok kaygılı bir insandı! Birden sokağın karanlık tarafından bir adam çıktı. Ve Perihan hanıma saatin kaç olduğunu sormak istedi ve ona doğru yürüdü. Perihan Hanım kendine doğru gelen adamı görünce titremeye başladı ve "Cüzdanımı al, bana zarar verme lütfen!" dedi.

**Soru:** Perihan Hanım neden böyle söyledi?

**Hikâye 8**: Bir hırsız az önce bir dükkân soymuştu ve kaçıyordu. Evine doğru koşarken bir polis onun eldivenini düşürdüğünü gördü. Polis, onun hırsız olduğunu bilmiyordu, sadece eldivenini düşürdüğünü söylemek istemişti. Fakat polis, hırsıza "Hey sen! Dur!" diye bağırınca hırsız arkasına döndü ve polisi gördüğünde kendisini ele verdi. Ellerini yukarı kaldırıp dükkânı soyduğunu itiraf etti.

**Soru:** Hırsız neden böyle bir şey yaptı?

## Appendix B

**School Social Behavior Scale**

| 1<br>Hiçbir Zaman | 2<br>Nadiren | 3<br>Bazen | 4<br>Sıklıkla | 5<br>Her Zaman |
|---|---|---|---|---|

| Sosyal Yeterlilik | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1- Çeşitli durumlarda diğer öğrencilerle iş birliği yapar. | | | | | |
| 2- Değişik sınıf etkinliklerine geçişte zorlanmaz. | | | | | |
| 3- Masa başı etkinliklerini uyarılmaya gerek kalmaksızın tamamlar. | | | | | |
| 4- İhtiyaçları olduğunda diğer öğrencilere yardım eder. | | | | | |
| 5- Grup etkinliklerine ve tartışmalara aktif bir biçimde katılır. | | | | | |
| 6- Diğer öğrencilerin problemlerini ve ihtiyaçlarını anlar. | | | | | |
| 7- Herhangi bir sorun ortaya çıktığında sakin kalabilir. | | | | | |
| 8- Öğretmenlerini dinler ve onların isteklerini yerine getirir. | | | | | |
| 9- Diğer öğrencileri etkinliklere katılmaya çağırır. | | | | | |
| 10- Uygun bir tavırla, anlamadığı talimatların açıklanmasını ister. | | | | | |
| 11- Yaşıtları tarafından beğenilen beceri ya da yetenekleri vardır. | | | | | |
| 12- Diğer öğrencileri kabul edici bir tutum içindedir. | | | | | |
| 13- Ev ödevlerini ve diğer görevlerini bağımsız olarak yapar. | | | | | |
| 14- Verilen ödevleri zamanında tamamlar. | | | | | |
| 15- Gerekli durumlarda akranları ile uzlaşma gayreti gösterir. | | | | | |
| 16- Sınıf kurallarına uyar. | | | | | |
| 17- Okuldaki değişik durumlara uygun davranışlar yapar. | | | | | |
| 18- İhtiyacı olduğu takdirde uygun bir dille yardım ister. | | | | | |
| 19- Değişik özelliğe sahip çok sayıda akranı ile etkileşim hâlindedir. | | | | | |

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 20- Yetenek düzeyine uygun iş üretir. | | | | | |
| 21- Yaşıtları ile konuşmaya başlamakta ya da sohbetlere katılma konusunda yeteneklidir. | | | | | |
| 22- Diğer öğrencilerin duygularına karşı duyarlıdır. | | | | | |
| 23- Davranışlarının, öğretmenleri tarafından düzeltilmesi istendiğinde uyum sağlar. | | | | | |
| 24- Öfkelendiği zaman duygularını kontrol eder. | | | | | |
| 25- Yaşıtlarının sürdürdüğü bir etkinliğe katılır ve o etkinliğe uyum sağlar. | | | | | |
| 26- Liderlik yeteneği güçlüdür. | | | | | |
| 27- Okulda değişik ortamlarda kendinden beklenen davranışlara uyum sağlar. | | | | | |
| 28- Diğerlerinin olumlu özelliklerini över. | | | | | |
| 29- Gerektiğinde hakkını arar. | | | | | |
| 30- Akranları tarafından etkinliklere katılmak için aranır. | | | | | |
| 31- Kendini denetler. | | | | | |
| 32- Akranları kendisine saygı duyar. | | | | | |

| Olumsuz Sosyal Davranışlar | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1- Yaşadığı sorunlar için diğer öğrencileri suçlar. | | | | | |
| 2- Başkalarının eşyalarını alır. | | | | | |
| 3- Öğretmenlere ya da diğer çalışanlara karşı koyar. | | | | | |
| 4- Okul ödevlerinde ya da oyunlarda hile yapar. | | | | | |
| 5- Kavgalara girer. | | | | | |
| 6- Öğretmenlere ya da diğer çalışanlara yalan söyler. | | | | | |
| 7- Diğer öğrencilere sataşır ve onlarla alay eder. | | | | | |
| 8- Saygısız ve yüzsüzdür. | | | | | |
| 9- Kolay kışkırtılır ve aniden patlar. | | | | | |
| 10- Öğretmenleri ve diğer çalışanları önemsemez. | | | | | |

| | | | | |
|---|---|---|---|---|
| 11- Herkesten daha iyi rol yapar. | | | | |
| 12- Okul eşyalarına zarar verir ve parçalar. | | | | |
| 13- Diğer öğrencilerle paylaşmaz. | | | | |
| 14- Öfkesi, patlaması veya nöbetleri vardır. | | | | |
| 15- Diğer öğrencilerin duygu ve ihtiyaçlarını dikkate almaz. | | | | |
| 16- Öğretmenin ilgisinin devamlı olarak kendi üzerinde olmasını ister. | | | | |
| 17- Diğer öğrencileri tehdit eder, sözel saldırganlık gösterir. | | | | |
| 18- Küfür eder ya da argo kullanır. | | | | |
| 19- Fiziksel olarak saldırgandır. | | | | |
| 20- Yaşıtlarına hakaret eder. | | | | |
| 21- Sızlanır veya şikâyet eder. | | | | |
| 22- Akranlarıyla tartışır veya ağız kavgası yapar. | | | | |
| 23- Kontrol edilmesi zordur. | | | | |
| 24- Diğer öğrencileri tedirgin ve rahatsız eder. | | | | |
| 25- Okulda başını derde sokar. | | | | |
| 26- Devam etmekte olan etkinlikleri bozar. | | | | |
| 27- Palavracıdır ve kendini övmeye bayılır. | | | | |
| 28- Güvenilmezdir. | | | | |
| 29- Diğer öğrencilere karşı zalimdir. | | | | |
| 30- Düşünmeden, fevri hareket eder. | | | | |
| 31- Üretken değildir, çok az iş başarır. | | | | |
| 32- Kolayca sinirlendirilebilir. | | | | |
| 33- Diğer öğrencilerden her işinde yardım talep eder. | | | | |

**APPENDIX C**

**Mental State Language Coding**

**Examples:**

1) **10 yıl 4 aylık erkek katılımcı**

**Zihinsel Terim Kullanım Puanı: 9**

"Bir çocuk, kız çocuğu elinde tepsiyle geldi. Sonra oradan bir şeker aldı. Tam yiyecekken oradaki erkek çocuk ondan şekeri <u>istedi</u>. Hayır dedi. O zorla <u>istedi</u>, verdi. Sonra gitti bir tane kek aldı. Keki tam yiyecekken erkek çocuk gene <u>istedi</u>. Vermeyeceğim dedi, kafasını salladı. Ama o zorla <u>isteyince</u> kız çocuğu gene verdi. Limonata aldı, doldurdu bardağı. Tam içecekken erkek çocuk gene <u>istedi</u>. Hayır dedi. Erkek çocuk zorla <u>istedi</u>. Verdi. Sonra yerdeki örümceği gördü kız çocuk. Sonra erkeğe görünmeden yerdeki örümceği alıp ekmeklerle sandviç yapıp örümceği de sandviçin içine koydu. Tam yiyecekken <u>yemiş gibi yaptı</u>. Erkek çocuğu gene <u>istedi</u>. Verdi. Sonra yedi. Ağzında bir şey olduğunu <u>fark etti</u>. Çıkarınca örümceği gördü ve kız çocuğuna kızdı. Sonra kovalamaya başladı. Sonra örümceği ona attı."

2) **9 yıl 6 aylık kız katılımcı**

**Zihinsel Terim Kullanım Puanı: 4**

"Orada bir çocuk televizyon izliyordu. Sonra başka bir çocuk geldi. Bir tepsiyle elinde yiyecek, meyve suyu filan getirmişti. Herhalde kendine getirdi <u>bilmiyorum</u> artık. Onları yiyecekken çocuk bakıyor. Böyle yapıyor. Elini uzatıyor. "Bana ver" diyor onu. <u>Anladığım</u> kadarıyla öyle. Sonra her şeyi öyle öyle yapıyor. Çocuk da sinirlenip yerde bir örümcek görüyor. Onu alıyor. Ekmek de getirmişti. Ekmeğin arasına koyuyor. Kapatıyor ekmeğin üstüne. Sonra <u>yiyormuş gibi yaparken</u> çocuk yine <u>istiyor</u> onu. Sonra ona veriyor. O ısırıyor. Ağzından örümceği çıkartıyor. Birbirlerini sandalye etrafında kovalıyorlar.

**APPENDIX D**

**Narrative Coding**

| Hikâye Bölümleri | |
|---|---|
| 1 | Kız çocuk bir tepside yiyecek ve içecek getiriyor |
| 2 | Erkek çocuk televizyon izliyor |
| 3 | Kız çocuk kendisine şeker alıyor. Erkek çocuk şekerleri istiyor (kolunu uzatarak ve ısrarlı bir yüz ifadesi kullanarak) ve kız ona veriyor |
| 4 | 3. bölüm bu sefer bir kek ile tekrarlanıyor |
| 5 | 3. bölüm bu sefer bir içecek ile tekrarlanıyor |
| 6 | Kız çocuk bir örümcek görüyor |
| 7 | Erkek çocuk televizyon izlemeye devam ederken kız çocuk parmak ucunda yürüyerek örümceği alıyor |
| 8 | Kız çocuk örümceği iki dilim ekmeğin arasına koyarak bir sandviç yapıyor |
| 9 | Kız çocuk sandviçi yemiş gibi yapıyor |
| 10 | Erkek çocuk sandviçi istiyor |
| 11 | Kız çocuk sandviçi erkek çocuğa uzatıyor |
| 12 | Erkek çocuk sandviçi ısırıyor (ve içinde örümcek olduğunu fark ediyor) |
| 13 | Erkek çocuk örümceği ağzından çıkarıyor |
| 14 | Erkek çocuk kızı odanın etrafında kovalıyor |
| 15 | Erkek çocuk örümceği kıza fırlatıyor |
| 16 | Hikâye ile ilgili ek bilgi vermek (Örneğin; "Erkek çocuk tembeldi" ya da "Örümcek çok çirkindi" |

**Narrative Coding Examples:**

1) **9 yıl 9 aylık kız katılımcı**

**Hikâye anlatımı puanı: 14/16 (13 hikâye bölümü + 1 ek bilgi)**

"Şimdi bir tane erkek çocuk koltukta oturuyor. Oradan kız çocuk da elinde tepsi ile geliyor. Sonra tepsiyi masanın üstüne bırakıyor. Bir tane şeker alıyor. Koltuğa oturup yiyecekti. Açtı yiyecekti ama orada ki çocuk istedi. Kız ona verdi. Ondan sonra sinirlendi. Gitti. Şey neydi onun adı böyle? Kek gibi bir şey aldı. Onu yiyecekti. Yine çocuk istedi. Sonra yine ona verdi. Şimdi gitti limonatayı şey bardağa koyup onu içecekti. Onu da yine erkek çocuk istedi ve ona yine verdi. Kız sinirlendi. Sonra yerde bir böcek gördü. O böceği alıp ekmeğin içine koydu. Sonra aldı onu. Oturdu. Yemiş numarası yaptı ve erkek çocuk yine istedi. Onu ekmeği erkek çocuğa verdi. Erkek çocuğa verdi. O da yedi ve ağzından böcek çıktı. Sonra kızı kovalamaya başladı."

2) **8 yıl 1 aylık erkek katılımcı**

**Hikâye anlatımı puanı: 7/16 (7 hikâye bölümü)**

"Bir tane kız önce şeker gibi bir şey alıyordu. O erkek çocuk da hep böyle böyle yapıyordu. O da veriyordu. En sonunda da böcek geldi. Onu aldı. Sandviçin içine koydu. Bir ısırdı. Ondan sonra ağzından bir çıkardı. Bağırdı. Kızı kovalamaya başladı. Ondan sonra attı."

**Examples for Comprehension Questions:**

**Soru 1:** Erkek çocuk örümceği neden fırlattı?

(Her bir doğru cevap için 1 puan. En fazla 2 puan alınabilir)

 **Doğru cevaplara örnekler:**

- Çünkü kızmıştı

- İntikam almak istedi

- Örümcekleri sevmiyordu

- Ağzında örümcek vardı

- Kız çocuk sandviçin için örümcek koydu

- Kız çocuk erkek çocuğa şaka yaptı

 **Yanlış cevaplara örnekler:**

- Örümceklerden korkuyordu

- Karnı açtı/üzgündü

- Örümcek tehlikeliydi

**Soru 2:** Kız çocuk erkek çocuğu neden kızdırdı?

(Her bir doğru cevap için 1 puan. En fazla 2 puan alınabilir)

 **Doğru cevaplara örnekler:**

- Erkek çocuk kızın bütün yiyeceklerini aldı

- Kız çocuk erkek çocuğu şaşırtmak istedi

- Erkek çocuk kendi yemeğini kendi almalıydı

- Erkek çocuk açgözlüydü/bencildi/tembeldi

 **Yanlış cevaplara örnekler:**

- Kız çocuğun karnı açtı/mutluydu

- Çünkü erkek çocuk örümceği yedi

- Kız çocuk erkek çocuğa güldü

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