

## Research Paper

## The Relationship Between Children's Theory of Mind and Anxiety Symptoms

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**ABSTRACT****Objective:** The relationship between preschool children's theory of mind (ToM) and anxiety symptoms is theoretically crucial and practically applicable. While ToM and anxiety play crucial roles in social interactions, their effects are often opposites. This study aims to examine the relationship between ToM skills and anxiety in typically developing preschoolers.**Methods:** Data were collected from the parents of 93 Iranian children (50 boys and 43 girls) aged 4 to 10 between 2022 and 2023. The parents filled out the children's social understanding scale (CSUS) and the parent-version of the Spence children's anxiety scale (SCAS-P).**Results:** The results indicated a significant relationship between some aspects of TOM, such as emotion, perception, belief, knowledge, and anxiety symptoms.**Conclusion:** These elements of TOM were reliable indicators of anxiety symptoms in typically developing preschoolers.**\* Corresponding Author:**

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## Highlights

- Theory of mind (ToM) components were correlated negatively with anxiety in typically developing preschoolers.
- Higher ToM skills were associated with lower levels of anxiety symptoms.
- The belief component of ToM emerged as a significant predictor, explaining 13%-17% of the variance in anxiety symptoms.
- ToM skills may act as a protective factor against childhood anxiety.

## Plain Language Summary

We studied how preschoolers understand others' thoughts and feelings and their anxiety levels. The results showed that children with a better understanding of others' mental states have lower anxiety levels. Specifically, children's ability to understand others' beliefs was the strongest predictor of reduced anxiety symptoms. These results suggest that helping children develop better social understanding skills may effectively prevent or reduce anxiety in early childhood.

## Introduction

Childhood mental disorders remain a global public health challenge (Patel et al., 2007). Anxiety disorders are among the most common mental health challenges in childhood and adolescence. (Beesdo et al., 2009; Caputi & Schoenborn, 2018; Muris et al., 2007). The theoretical model, socio-cognitive deficit theory, emphasizes that socially anxious children often avoid social situations. And the other one argues that excessive sensitivity influences children's social anxiety to the thoughts and opinions of others (Cutting & Dunn, 2002). This avoidance of social situations may be caused by deficits in recognizing other psychological states of individuals (Nikolić et al., 2019). According to the Centers for Disease Control and Prevention (CDC) (CDC, 2022), 9.4% and 4.4% of children aged 3-17 years had been diagnosed with anxiety and depression, respectively, in 2016-2019 (Bosquet & Egeland, 2006; CDC, 2022). In 2020, researchers used data from the national survey of children's health. They showed that 5.6 million children (9.2% of the child population) had been diagnosed with anxiety disorders, and this figure was increasing. (Osorio, 2022).

The relationship between social cognition and mental disorders has been widely studied in the last decades. More precisely, we are constantly mindreading creatures, known as theory of mind (ToM), a subset of social cognition (Korkmaz, 2011). The crucial development of the ability of ToM continues from childhood to adolescence

(Bosacki, 2013; Caputi & Schoenborn, 2018; Sprung et al., 2022). This issue allows for the ascription of mental states to oneself and others (Mitchell, 1997). Predicting and explaining thoughts and feelings (Ziani & Newman, 2018) is crucial for socially adequate behavior (Andreou et al., 2020). What are the substrates of these processes? Two ToM systems exist: A cognitive and an affective system. The cognitive system is responsible for thoughts, and the affective system manages feelings (Sprung et al., 2022). In the last decade, some studies showed ToM impairments in excess of different mental disorders in the child population, for example, anxiety disorders (Caputi & Schoenborn, 2018; Colonnese et al., 2017), autism spectrum disorder (Andreou et al., 2020; Hoogenhout & Malcolm-Smith, 2014; Sadeghi et al., 2021), and depression disorder (Berecz et al., 2016; Inoue et al., 2006; Nestor et al., 2022). Studies have shown that a lower level of ToM (social cognition) is significantly related to high scores in anxiety disorders (social anxiety, separation anxiety) in children (Bosacki, 2015; Colonnese et al., 2017). In a study conducted by Caputi & Schoenborn (2018), with a sample of 318 elementary school children (157 girls), participants with high scores on the ToM task had lower symptoms of separation anxiety. In addition, Colonnese et al. (2017) conducted a study on a 48-month-old sample of 110 children (54 boys) and found that social anxiety symptoms were associated with a lower level of ToM. Moreover, Melfsen and Florin (2002) argued that children with higher levels of social anxiety have significantly longer reaction times in facial affect recognition tasks. Furthermore, Moldovan and Visu-Petra, (2022) reported that the ToM rating

scores were negatively associated with anxiety symptoms. The impact of ToM (social cognition) deficits on anxiety symptoms in children is unknown. The present study aims to investigate the relationship between ToM abilities and anxiety symptoms in preschool children. Based on the previous studies, we hypothesized that ToM abilities are correlated to anxiety symptoms; on the other hand, is this correlation predictive? Finally, we explored components of anxiety symptoms that are influenced by ToM abilities.

## Materials and Methods

This cross-sectional study included 93 young children (43 girls) aged 4–10 (Mean±SD 5.90±2.31 years). They were recruited through public kindergartens and elementary schools in Tehran City, Iran. The parents were sent online information letters about the study, and those who signed up received the survey link in a Google form. Out of 690 parents, 93 agreed to complete the questionnaire.

The inclusion criteria included the age between 4 and 10 years, attending regular kindergarten or primary school, and having no history of psychiatric disorders. The exclusion criteria included the presence of neurodevelopmental disorders (e.g. autism spectrum disorder, attention deficit hyperactivity disorder [ADHD]), current psychological or psychiatric treatment, mental retardation or learning disabilities, regular use of any psychotropic medication, major physical illness or disability, missing more than 10% of questionnaire items, and parental unwillingness to participate in the study. The inclusion and exclusion criteria were assessed via a demographic questionnaire completed by parents as part of the online survey.

The parents completed the children's social understanding scale (CSUS) and the Spence children's anxiety scale-parent (SCAS-P) questionnaire online. The parents were highly educated; 88% graduated from university and 12% from high school. Ninety-seven percent of fathers and twenty percent of mothers were employed. The Ethics Committee of [Shahid Beheshti University](#), Tehran City approved the study.

## Measures

### Measuring children's ToM

**CSUS:** The CSUS is a reliable and valid parent-report measure of children's ToM. This scale has a complete and short version; the full version has 42-item, seven items related to belief (e.g. "Is it good at playing tricks

on others?"), seven items related to knowledge (e.g. "using words that express uncertainty"), seven items related to perception (e.g. "thinking you can still see an object even if you are looking in the opposite direction"), seven items related to desire (e.g. "talking about differences in what people like or want"), seven items related to intention (e.g. "understanding when she/he is being teased or made fun for"), seven items related to emotion (e.g. "trying to understand the emotions of other people"). Each item has five-point Likert-type ratings (1=definitely untrue, 4=definitely true and 5=don't know). The internal consistency of current samples is high at 0.91 and 0.81, respectively ([Tahiroglu et al., 2014](#)).

### Measuring children's anxiety (SCAS)

**SCAS-P:** The SCAS-P is a widely used instrument to assess symptoms of anxiety disorders among 6-18-year-old clinical (anxiety-disordered children) and non-clinical children. The SCAS-P consists of 38 items rated on a four-point Likert scale (1=never, 4=always) and one open-ended question, which was divided into six subscales, panic attack and agoraphobia, separation anxiety, physical injury fears, social phobia, obsessive-compulsive, and generalized anxiety disorder. The alpha for scales was high (0.89), which indicated the appropriate reliability of this scale ([Nauta et al., 2004](#)) that corresponded with the child self-report as well as with the classification of anxiety disorders by diagnostic and statistical manual of mental disorders, 4th edition (DSM-IV) (namely separation anxiety, generalized anxiety, social phobia, panic/agoraphobia, obsessive-compulsive disorder, and fear of physical injuries).

## Results

The relationship between ToM and children's anxiety symptoms was first examined using Pearson's correlation analysis ([Table 1](#)).

The analysis revealed that knowledge scores showed negative correlations with panic attacks and agoraphobia ( $r=-0.24$ ,  $P\leq 0.05$ ), separation anxiety ( $r=-0.26$ ,  $P\leq 0.05$ ), social phobia ( $r=-0.24$ ,  $P\leq 0.05$ ), and the SCAS-P score ( $r=-0.24$ ,  $P\leq 0.05$ ). The perception scores were negatively correlated with panic attack and agoraphobia ( $r=-0.25$ ,  $P\leq 0.05$ ), separation anxiety ( $r=-0.29$ ,  $P\leq 0.01$ ), obsessive-compulsive ( $r=-0.23$ ,  $P\leq 0.05$ ), generalized anxiety scores ( $r=-0.25$ ,  $P\leq 0.05$ ), and also score of the SCAS-P ( $r=-0.25$ ,  $P\leq 0.05$ ). Desire scores were negatively correlated with separation anxiety scores ( $r=-0.26$ ,  $P\leq 0.05$ ). Intention scores were negatively correlated with panic attack and agoraphobia ( $r=-0.22$ ,  $P\leq 0.01$ ), separation

**Table 1.** Correlations between ToM components and children's anxiety symptoms

Variables	Mean±SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Belief	21.49±5.2	1													
2. Knowledge	22.67±4.72	0.73**	1												
3. Perception	19.68±4.86	0.6**	0.68**	1											
4. Desire	21.68±4.84	0.72**	0.74**	0.71**	1										
5. Intention	21.6±5.65	0.82**	0.75**	0.68**	0.73**	1									
6. Emotion	22.38±4.43	0.78**	0.77**	0.69**	0.73**	0.79**	1								
7. Total score	129.49±26.15	0.89**	0.88**	0.83**	0.88**	0.91**	0.89**	1							
The CSUS sub-scales															
8. Panic attack and agoraphobia	1.23±4.06	-0.09	-0.24*	-0.25*	-0.18	-0.22**	-0.3*	-0.24*	1						
9. Separation anxiety	12.46±3.76	-0.12	-0.26*	-0.29**	-0.26*	-0.28**	-0.24*	-0.27**	0.56**	1					
10. Physical injury fears	9.64±2.99	-0.03	-0.09	-0.03	-0.03	-0.18	-0.17	-0.1	0.59**	0.6**	1				
11. Social phobia	10.04±3.73	-0.02	-0.24*	-0.17	-0.13	-0.13	-0.15	-0.16	0.7**	0.64**	0.58**	1			
12. Obsessive compulsive	7.20±3	-0.04	-0.16	-0.23*	-0.17	-0.19	-0.24*	-0.19	0.83**	0.56**	0.51**	0.64**	1		
13. Generalized anxiety	9.8±3.3	-0.05	-0.2	-0.25*	-0.19	-0.16	-0.26*	-0.21*	0.77**	0.69**	0.55**	0.73**	0.75**	1	
14. Total score	62.16±18.61	-0.07	-0.24*	0.25*	-0.2	-0.23*	-0.27**	-0.24*	0.89**	0.8**	0.74**	0.86**	0.84**	0.89**	1
The SCAS-P sub-scale															

CSUS: Children's social understanding scale; SCAS-P: Spence children's anxiety scale-parent.

\*Correlation is significant at the 0.05 level; \*\*Correlation is significant at the 0.01 level.

**Table 2.** Linear regression for variables predicting children’s symptoms of anxiety

Variables		R <sup>2</sup>	B	SE B	β	F
Dependent	Predictor					
Panic attack and agoraphobia	Belief	0.17	0.53	0.25	0.68	2.94*
Separation anxiety	Belief	0.15	0.56	0.23	0.77	2.57*
Obsessive-compulsive	Belief	0.13	0.42	0.18	0.73	2.31*
Generalized anxiety	Belief	0.15	0.35	0.2	0.56	2.59*
Children’s anxiety total score	Belief	0.16	2.86	1.14	0.8	2.57*

SE: Standard error.

\*P<0.05, \*\*P<0.01.

anxiety scores ( $r=-0.28$ ,  $P<0.01$ ) and also score of the SCAS-P ( $r=-0.23$ ,  $P<0.05$ ). Emotion scores were negatively correlated with panic attack and agoraphobia ( $r=-0.30$ ,  $P<0.01$ ), separation anxiety ( $r=-0.24$ ,  $P<0.05$ ), obsessive-compulsive ( $r=-0.24$ ,  $P<0.05$ ), generalized anxiety scores ( $r=-0.26$ ,  $P<0.05$ ), and also score of the SCAS-P ( $r=-0.27$ ,  $P<0.01$ ). The score of CSUS was negatively correlated with panic attack and agoraphobia ( $r=-0.24$ ,  $P<0.05$ ), separation anxiety ( $r=-0.27$ ,  $P<0.01$ ), generalized anxiety scores ( $r=-0.21$ ,  $P<0.05$ ) and also score of the SCAS-P ( $r=-0.24$ ,  $P<0.05$ ).

To better understand children’s anxiety symptoms, a multiple regression analysis was conducted with ToM abilities as predictors.

As shown in Table 2, higher belief scores accounted for 17% of the variance in panic attacks and agoraphobia symptoms. Similarly, these scores explained 15% of the variance in separation anxiety and 13% of the variance in obsessive-compulsive disorder. In the case of generalized anxiety, belief scores explained 15% of the variance, while belief also explained 16% of the variance in the children’s anxiety score. These results showed that belief, a key aspect of the ToM, plays a crucial role in predicting and alleviating anxiety symptoms in pre-school children.

## Discussion

This study was conducted to examine how ToM abilities are related to anxiety symptoms in preschool children. The Pearson correlation analysis revealed a significant negative relationship between several components of ToM, such as knowledge, perception, desire, intention, and emotion, and various anxiety symptoms. The results indicated that more potent ToM abilities are

associated with fewer anxiety symptoms, particularly in emotional aspects. The multiple regression analysis highlighted belief as the most significant predictor of anxiety symptoms. Higher belief scores showed a 17% variance in panic attacks and agoraphobia, 15% in separation anxiety, 13% in obsessive-compulsive disorder, 15% in generalized anxiety, and 16% in the children’s anxiety score. This issue means that a child’s skill to know others’ beliefs, a crucial part of ToM, is closely linked to lower anxiety levels. These results are consistent with previous research (Bosacki, 2015; Colonnesi et al., 2017) that identified the relationships between higher ToM abilities and lower anxiety in children. The fact that belief as the most significant predictor aligns with socio-cognitive deficit theory, which proposes that children who struggle to understand others’ mental states may face more social difficulties that can be associated with higher anxiety (Nikolić et al., 2019).

Although belief emerged as the key predictor in this study, other components of ToM, such as emotion and perception, which were significant in the correlation analysis, did not have the same predictive power in the regression models. This suggests that, while different aspects of ToM are crucial, belief may play a more prominent role in anxiety symptoms. Children who can better grasp others’ beliefs may experience fewer social challenges, which can be associated with reduced anxiety.

Contrary to some previous research suggesting that higher ToM abilities may be associated with increased anxiety due to greater social awareness, this study found no evidence to support that idea. Instead, the results highlight the possibility that more potent ToM abilities, especially Belief, may play a protective role in anxiety symptoms. The current study has several noteworthy strengths. First, it provides valuable insights into the

relationship between ToM and anxiety symptoms in Iranian preschool children. Second, our comprehensive analysis examined multiple components of ToM and their relationship with different types of anxiety symptoms. Finally, our focus on typically developing children helps establish how social cognition and anxiety interact during normal development.

These results contribute to the expanding body of research linking socio-cognitive development with emotional well-being in early childhood. Furthermore, these results indicated the potential efficacy of interventions designed to enhance ToM abilities, particularly for children who may be at risk for developing anxiety symptoms.

## Conclusion

The research reveals a significant relationship between children's ability to understand others' thoughts and feelings (ToM) and their anxiety levels. We found that children who better understand what others think and believe feel less anxious. This issue tells us a crucial point: Helping children develop their social understanding skills may protect them from experiencing anxiety in their early years. These results suggest that when we help children better understand how others think and feel, we may also help them manage their worries and fears. For parents, teachers, and therapists working with young children, activities and programs that improve social understanding can be valuable tools in supporting children's emotional well-being.

## Limitation and future studies

While the result suggests that ToM ability can predict anxiety symptoms in non-clinical preschool children, this study has limitations. First, a cross-sectional correlation between two variables cannot provide causality or directionality. To be confident that children's ToM ability affects anxiety symptoms, an experiment to manipulate ToM is needed. Then, in this study, data were obtained from a sample of children without clinical disorders, and these data cannot be generalized to children with anxiety disorders. For future studies, it would be best first to consider the neurocognitive functions of ToM and how these functions may predict anxiety symptoms in clinical and subclinical children because these factors may affect this outcome. Then longitudinal studies are needed to examine how ToM and anxiety symptoms co-evolve over time, from early childhood through adolescence, and experimental studies investigating ToM training programs can help establish causal relationships between ToM

skills and anxiety reduction. Finally, from a practical perspective, mental health professionals and educators can develop and implement ToM-based anxiety prevention interventions in preschool settings.

## Ethical Considerations

### Compliance with ethical guidelines

This study was approved by the Ethics Committee of the [Shahid Beheshti University](#) (Code: SBU.ICBS 96/1020). To comply with the ethical principles of voluntary participation, written informed consent was obtained from the participants. The participants were also reassured of the confidentiality of their information.

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### Authors' contributions

Conceptualization, study design, material preparation: Saeid Sadeghi; Data collection: Amir Hossein Rabei; Formal analysis: Sajad Ayoubi; Writing the original draft, review, editing and final approval: Saeid Sadeghi and Sajad Ayoubi.

### Conflict of interest

The authors declared no conflict of interest.

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