

ORIGINAL ARTICLE

Theory of Mind Abilities May Predict Treatment Outcomes in Adolescents With Obsessive-Compulsive Disorder: A Follow-Up Study

Tayfun Kara¹  | Pınar Aydoğan Avşar²  | Tacettin Kuru³  | Orhan Kocaman¹ 

¹Faculty of Medicine, Department of Child and Adolescent Psychiatry, Alanya Alaaddin Keykubat University, Antalya, Turkey | ²Department of Child and Adolescent Psychiatry, Alanya Training and Research Hospital, Antalya, Turkey | ³Department of Psychiatry, Alanya Training and Research Hospital, Antalya, Turkey

Correspondence: Tayfun Kara (tayfunkara@hotmail.com)

Received: 7 May 2024 | **Revised:** 8 July 2024 | **Accepted:** 8 August 2024

Funding: The authors received no specific funding for this work.

Keywords: adolescents | cognitive flexibility | OCD | predictors of response | theory of mind

ABSTRACT

Aims: Researchers report varying levels of cognitive flexibility and theory of mind (ToM) deficiencies in adolescents with obsessive-compulsive disorder (OCD). This research set out to investigate the impact of these variables on the disorder's outcomes.

Method: The study involved 39 adolescents with OCD and 40 healthy controls. We assessed the case group at the initial visit to the outpatient clinic and again at the end of the first year of treatment. The Children's Yale-Brown Obsessive-Compulsive Scale (CY-BOCS) was applied to assess OCD symptom distribution and severity. The Reading the Mind in the Eyes of Children Test (RME-CT) was applied to evaluate ToM skills, and the Cognitive Flexibility Scale (CFS) was employed to evaluate cognitive flexibility levels.

Results: Baseline RME-CT and CFS scores were significantly lower in adolescents with OCD compared to the control group ($p = 0.002$ $p = 0.001$, respectively). At the end of the 1-year follow-up, RME-CT and CFS scores increased significantly in the adolescents with OCD ($p < 0.001$, $p = 0.003$, respectively). A significant negative correlation was observed between the initial RME-CT scores and the Y-BOCS scores at the end of the 1-year follow-up ($p < 0.001$). The initial RME-CT score had a significant negative predictive effect on the subsequent severity of OCD ($\beta = -0.711$, $p < 0.001$).

Conclusions: The research revealed poorer long-term prognoses for OCD in adolescents who exhibit low ToM skills. In conclusion, the results indicate that ToM skills may serve as a predictive factor for long-term treatment outcomes among adolescents diagnosed with OCD.

1 | Introduction

Obsessive-compulsive disorder (OCD) is a condition characterised by the presence of obsessions (repetitive and unwanted thoughts or ideas) and/or compulsions (repetitive actions or mental processes performed to alleviate discomfort caused by the obsessions) (APA 2022). The prevalence of OCD in the general population ranges from 1% to 3%, with an estimated

prevalence of 0.25%–4% among children and adolescents (Krebs and Heyman 2015; Cervin 2023; Stiede et al. 2023). It typically occurs during adolescence or early adulthood. Adolescents who suffer from OCD may experience functional impairments in multiple domains, including at home, school and socially, leading to a decrease in their overall quality of life. Without adequate treatment, the condition may persist or worsen over time (Stewart et al. 2004; Stiede et al. 2023).

Theory of mind (ToM) refers to the ability to deduce and anticipate an individual's mental states, allowing one to comprehend and forecast their actions (Yeung, Apperly, and Devine 2023). The results of several studies examining individuals with OCD, including adults and children, and assessing their ToM skills indicate that such individuals possess worse ToM capabilities than healthy controls (Tulaci et al. 2018; Dağdelen and Vural 2019; Yazici and Yazici 2019). The impairments in these cognitive processes related to social interactions in individuals with OCD have a major impact on their social and functional abilities (Jansen, Overgaauw, and De Bruijn 2020; López-Del-Hoyo et al. 2019). A meta-analysis revealed that individuals with OCD had moderate deficits in TOM and demonstrated poorer performance. This probably contributes to the functional impairment observed in individuals with OCD (Bora 2022). Previous research has shown that certain brain regions, such as the medial prefrontal cortex and bilateral temporoparietal junction, play a role in both ToM skills and OCD (Molenberghs et al. 2016; Fineberg et al. 2018). In the light of this shared neuroanatomical connection, it has been suggested that patients with OCD may face challenges with their TOM skills, potentially leading to impaired functioning.

Cognitive flexibility is a core executive function defined as the ability to switch between different mental tasks or strategies and to adjust responses to dynamic environmental circumstances (Bobrowicz and Thibaut 2023). OCD is distinguished by maladaptive patterns of rigid, repetitive thoughts and actions, indicating an absence of cognitive flexibility. Accordingly, several neurocognitive studies of individuals with OCD have identified behavioural and/or neurobiological abnormalities in cognitive flexibility (Gruner and Pittenger 2017). Cognitive flexibility-related issues impact the core symptoms of established OCD. Reports suggest that cognitive flexibility may potentially help patients suppress their compulsive cycles of repeating acts and thoughts. This indicates that cognitive flexibility may constitute a potential point of focus for therapeutic intervention (Chamberlain et al. 2021).

Cognitive flexibility is believed to have a significant impact on ToM capacity in many populations, including both healthy individuals and those with various clinical conditions. Researchers suggest that these two concepts share a similar neural structure to some extent (Champagne-Lavau et al. 2012; Sami et al. 2023). Executive function skills, including cognitive flexibility, have been shown to be involved in the development of ToM abilities in children (Carlson, Claxton, and Moses 2015). Cognitive flexibility is also thought to impact on ToM abilities in mental disorders such as schizophrenia (Champagne-Lavau et al. 2012). To summarise, there seems to be a correlation between cognitive flexibility and ToM capabilities, suggesting that a good level of cognitive flexibility has a favourable impact on ToM abilities, particularly in the context of mental disorders.

Researchers have previously studied ToM capacities and cognitive flexibility in adolescents diagnosed with OCD. However, the literature involving longitudinal studies and their impact on treatment results is limited. The purpose of this research was to evaluate the initial severity of the disorder

in the context of the ToM and determine its ability to predict treatment outcomes in a sample of adolescents diagnosed with OCD. The 'Reading the Mind in the Eyes' test is a widely used ToM assessment (Greenberg et al. 2023). Based on the conceptual considerations described above and prior research, we anticipated that adolescents with OCD would achieve lower scores on the Reading the Mind in the Eyes of Children Test (RME-CT) and Cognitive Flexibility Scale (CFS) at baseline compared to their healthy peers. Additionally, we hypothesised that decreased RME-CT and CFS baseline values would serve as a prospective predictor of the severity of OCD symptoms following treatment.

2 | Methods

2.1 | Study Design and Participants

This research involved a longitudinal prospective design. The case group consisted of adolescents aged 12–18 first diagnosed with OCD between November 2022 and March 2024. The participant selection process followed the order of admission to the child and adolescent psychiatry outpatient clinic. Follow-up evaluations were conducted 1 year later for all participants diagnosed with OCD in the case group, again in the order of their admission. The latest evaluation took place in mid-March 2024.

The case group consisted of individuals who met the diagnostic criteria for OCD and scored 16 or higher on the Children's Yale-Brown Obsessive-Compulsive Scale (CY-BOCS) during evaluation. Case selection was randomised based on the order of presentation to the outpatient clinic. The research commenced with a cohort of 47 individuals diagnosed with OCD in the case group. Forty adolescents with no mental diagnosis were enlisted as the control group. Adolescents who had been diagnosed with chronic disorders such as neurological, genetic or metabolic conditions were not included. During the follow-up assessments, seven patients who did not receive the intervention as per the standard treatment protocol were excluded from the research. One participant was dropped from the research due to non-compliance with the follow-up protocol. Thirty-nine adolescents with OCD were eventually included in the case group at the end of the investigation. Child and adolescent psychiatry specialists developed a sociodemographic information form consisting of structured multiple-choice questions in order to determine the participants' sociodemographic and clinical characteristics. Table 1 presents the sociodemographic characteristics of the participants comprising the case group. Table 2 presents the distribution of obsessions and compulsions.

2.2 | Treatment

No intervention was applied for the case group other than the routine treatment practises in our clinic. The interventions implemented in our clinic were designed following The Practice Parameter for the Assessment and Treatment of Children and Adolescents with OCD (AAPC 2012), which is consistently employed for the treatment of OCD. The research design involved no intervention, and the patients' standard treatment was not subjected to alteration. Either cognitive behavioural therapy

TABLE 1 | The sociodemographic and clinical characteristics of the case group.

		N	%
Sex of child	Female	18	46.2
	Male	21	53.8
Paternal education level	Primary	15	38.5
	High school	14	35.9
	University or higher	10	25.6
Maternal education level	Primary	23	59.0
	High school	6	15.4
	University or higher	10	25.6
Paternal employment status	Unemployed	3	7.7
	Self-employed	24	61.5
	Corporate employee	12	30.8
Maternal employment status	Housewife	24	61.5
	Self-employed	8	20.5
	Corporate employee	7	17.9
Family income	Less than 2MW	19	48.7
	3 MW or more	20	51.3
Main drug	SSRIs	21	53.8
	TCA	18	46.2
Augmentation	Yes	16	41.0
	No	23	59.0
Severity scores	Moderate	16	41.1
	Severe	17	43.6
	Extremely severe	6	15.4

Abbreviations: MW, minimum wage; SSRIs, selective serotonin reuptake inhibitors; TCAs, tricyclic antidepressants.

TABLE 2 | Distribution of symptom dimensions among the participants with OCD.

	Obsessions	N (%)	Compulsions	N (%)
Dimensions	Contamination	27 (69.2)	Cleaning/washing	20 (51.3)
	Hoarding/saving	2 (5.1)	Checking	26 (66.7)
	Sexual	8 (20.5)	Repeating	13 (33.3)
	Religious	19 (48.7)	Caunting	8 (20.5)
	Aggressive	12 (30.1)	Ordering/arranging	2 (5.1)
	Symmetry	5 (12.8)	Collecting	4 (10.3)
	Other	5 (12.8)	Other	18 (46.2)
	None	3 (7.7)	None	1 (2.6)

(CBT) or serotonin reuptake inhibitors (SRIs) alone were administered for moderate OCD, while CBT combined with SRIs was used for severe OCD. Exposure and response prevention, a form of CBT, was employed for psychotherapy. Food and Drug Administration-approved medicines for paediatric OCD,

sertraline (n:11), fluoxetine (n:6), fluvoxamine (n:4) and clomipramine (n:18), were administered to the patients in this study. Atypical antipsychotics (aripiprazole [n:7] and risperidone [n:4]) were added to the regimen in cases exhibiting only a partial response to treatment.

2.3 | Ethical Considerations

This study was approved by the Alanya Alaaddin Keykubat University clinical research ethical committee, Türkiye (no. 07-05) on 07 October 2022. Written and verbal consents were obtained from the participants and their families.

2.4 | Measurement Tools

All participating adolescents in the study were administered the CY-BOCS to assess OCD symptom distribution and severity. Their ToM skills were determined using the RME-CT. The CFS was used to evaluate the degree of cognitive flexibility. CY-BOCS, RME-CT and CFS were re-administered at the end of the first-year follow-up in the same sequence as in the initial visit to the outpatient clinic. A child and adolescent psychiatrist conducted all the evaluations in person for each participant.

2.4.1 | Cognitive Flexibility Scale

Martin and Rubin (1995) developed the CFS, which consists of 12 items and one dimension. The CFS is a six-point Likert-type measurement tool, 1 representing 'strongly disagree' and 6 representing 'strongly agree'. Items 2, 3, 6 and 10 are reverse-scored. It assesses three aspects of cognitive flexibility, (a) awareness of the availability of options and alternatives in any given situation, (b) willingness to be flexible and adapt to the situation and (c) self-efficacy in being flexible. High scores indicate a high level of cognitive flexibility. Turkish validity and reliability studies have been conducted (Çelikkaleli 2014).

2.4.2 | Children's Yale-Brown Obsessive-Compulsive Scale

This semi-structured scale is based on clinical interviews and was developed by Goodman et al. (1989). CY-BOCS is a modified version of Y-BOCS. Yucelen et al. (2006) conducted the Turkish reliability study in 2017. CY-BOCS is a clinician-rated, semi-structured instrument designed to assess OCD symptom severity in the previous week. Possible scale scores range from 0 to 40. A score of 0–7 indicate subclinical severity of obsessions and compulsions, 8–15 points mild severity, 16–23 points moderate severity, 24–31 points severe symptoms and 32–40 points extreme severity of symptoms.

2.4.3 | Reading the Mind in the Eyes of Children Test

Baron-Cohen et al. (2001) developed the RME-CT, a scale consisting of 28 questions. The scale measures the individual's ability to make inferences concerning mental processes and emotions by looking at the expression in another person's eyes and surroundings. Participants are shown four black-and-white pictures, one of which is true and three are misleading. Participants are asked to select the picture that accurately reflects the stated emotions and thoughts. Higher scores indicate better emotion reading and ToM skills. The Turkish validity and reliability study of the scale was conducted by Girli (2014) in children and adolescents.

2.5 | Statistical Analysis

The study results were reported as mean plus standard deviation for continuous data. Normality of distribution was examined with kurtosis-skewness values, and values in the range of ± 2 were interpreted as representing no deviation from normal distribution. The difference between the control and case groups in terms of study parameters was analysed using an independent sample *t*-test. The difference between the values measured in the study before and after treatment in the case group as evaluated using a paired sample *t*-test. A hierarchical regression model was tested in which post-treatment Y-BOCS values constituted the dependent variable and baseline Y-BOCS, GT and BME scores the independent variables. The first step of the model included baseline Y-BOCS values for control purposes. We checked the assumptions (normality, multicollinearity and independence) before examining the model. *p* values < 0.05 were considered significant.

3 | Results

The study involved 79 participants, 45.6% of whom were girls ($n = 36$). The participants' mean age was $14.11 (\pm 1.57)$. Thirty-nine individuals (49.4%) in the case group received a diagnosis of OCD. The first year of follow-up revealed that 46.2% ($n = 18$) of the case group were taking selective serotonin reuptake inhibitors (SSRIs) while 53.8% ($n = 21$) were using tricyclic antidepressants (TCAs). There was no statistically significant gender difference between the control group (male, $n = 22$, 55%) and the case group (male, $n = 21$, 53.8%) ($p = 0.918$). The control group had significantly higher baseline RME-CT scores ($M = 21.60$, $SD = 1.865$) than the case group ($M = 20.05$, $SD = 2.416$) ($p = 0.002$). Comparably, the control group registered higher baseline CFS scores ($p = 0.001$) than the case group. There was no statistically significant age difference between the two groups ($p = 0.937$) (Table 3).

A paired sample *t*-test was conducted to compare the severity of OCD at baseline (CY-BOCS = 25.21 ± 6.53) and at 1-year follow-up (follow-up CY-BOCS = 13.51 ± 8.85). The *t*-test indicated a statistically significant difference between the initial and follow-up levels of OCD severity ($p < 0.001$). CY-BOCS scores exhibited a decline after the interventions for OCD. A significant difference was observed between the initial and follow-up scores for both RME-CT and CFS, with statistical significances of $p < 0.001$ and $p = 0.003$, respectively. RME-CT and CFS scores increased after treatment, as shown in Table 4.

Unexpectedly, baseline CY-BOCS scores were not associated with either baseline CFS scores ($p = 0.501$) or baseline RME-CT scores ($p = 0.446$). Follow-up CY-BOCS scores exhibited a significant positive association with baseline CY-BOCS scores ($p = 0.039$) and a significant negative association with baseline RME-CT scores ($p < 0.001$). As baseline RME-CT scores increased, Follow-up CY-BOCS scores decreased as baseline RME-CT scores increased. No statistically significant relationship was determined between baseline CFS scores and post-treatment CY-BOCS scores ($p = 0.163$) (Table 5).

We tested a hierarchical regression model to determine how well baseline RME-CT and baseline CFS scores were able to

TABLE 3 | A comparison of the case and control groups' scale scores.

	<i>N</i>	Mean $\pm$ SD	<i>t</i>	<i>p</i>	Mean difference	95% CI		Cohen's <i>d</i>
						Lower	Upper	
Age	Control (40)	14.10 $\pm$ 1.499						
	OCD (39)	14.13 $\pm$ 1.657	−0.079	0.937	−0.028	−0.736	0.679	−0.018
Baseline RME-CT	Control (40)	21.60 $\pm$ 1.865						
	OCD (39)	20.05 $\pm$ 2.416	3.184	0.002	1.549	0.579	2.519	0.719
Baseline CFS	Control (40)	54.80 $\pm$ 6.525						
	OCD (39)	49.23 $\pm$ 8.119	3.365	0.001	5.569	2.273	8.865	0.757

Note: Independent samples *t*-test. Bold indicate statistical significance *p* values.

Abbreviations: CFS, Cognitive Flexibility Scale; CI, confidence interval; CY-BOCS, Children's Yale-Brown Obsessive-Compulsive Scale; OCD, obsessive-compulsive disorder; RME-CT, Reading the Mind in the Eyes of Children Test.

TABLE 4 | A comparison of baseline and follow-up scale scores.

	Mean	SD	SE mean	Paired <i>t</i> -test		
				<i>t</i>	df	<i>p</i>
Baseline CY-BOCS	25.21	6.530	1.046	8.037	38	<0.001
Post-treatment CY-BOCS	13.51	8.846	1.417			
Baseline CFS	49.23	8.119	1.300	−3.192	38	0.003
Post-treatment CFS	51.82	8.571	1.373			
Baseline RME-CT	20.05	2.416	0.387	−5.184	38	<0.001
Post-treatment RME-CT	21.36	2.367	0.379			

Note: Bold indicate statistical significance *p* values.

Abbreviations: CFS, Cognitive Flexibility Scale; CY-BOCS, Children's Yale-Brown Obsessive-Compulsive Scale; RME-CT, Reading the Mind in the Eyes of Children Test.

predict follow-up CY-BOCS scores above and beyond baseline OCD severity. In the first step, we included baseline CY-BOCS scores in the model to control for baseline OCD severity. That baseline OCD severity significantly predicted follow-up OCD severity in a positive direction ($\beta = 0.332$, $p = 0.039$). In this first step, the model was significant, with approximately 11% of the variance in follow-up OCD severity being explained by baseline OCD severity ($F(1,37) = 4.585$, $p = 0.039$). The model was also significant in step 2 when baseline RME-CT and CFS were added to it ($F(3,35) = 20.892$, $p < 0.001$). A significant additional variance was explained in this second step ($F(2,35) = 25.953$, $p < 0.001$) (R^2 change = 0.53, $p < 0.001$). The independent variables in this second step explained 54% of the additional variance in follow-up OCD severity. Baseline RME-CT exhibited a significant negative predictive effect on follow-up OCD severity ($\beta = -0.711$, $p < 0.001$). However, baseline CFS follow-up had no significant predictive effect on OCD severity ($\beta = -0.144$, $p = 0.167$) (Table 6).

4 | Discussion

To the best of our knowledge, this is the first longitudinal study to evaluate the effect of ToM skills on therapeutic outcomes in adolescent OCD patients receiving treatment. As expected, baseline RME-CT and CFS scores were significantly lower in

adolescents with OCD compared to the control group. Our hypothesis that lower baseline ToM and cognitive flexibility levels would prospectively predict OCD symptom severity after treatment was confirmed by the baseline RME-CT scores only. The long-term disorder trajectory was negatively affected in adolescents with lower ToM skills.

Uhre et al. (2023) observed that adolescents with OCD exhibited decreased cognitive flexibility compared to healthy controls. Another study demonstrated notably poorer cognitive flexibility in individuals in early adulthood diagnosed with OCD. Nevertheless, that research found no correlation between lower cognitive flexibility and increased severity of OCD symptoms (Francazio and Flessner 2015). Consistent with findings from prior research, the present study revealed a lower level of cognitive flexibility in adolescents diagnosed with OCD than in the healthy controls. Furthermore, and consistent with Francazio et al., we determined no associations between the severity of the disorder and cognitive flexibility (Francazio and Flessner 2015). Studies examining children's ToM skills have described these as significantly lower in individuals with OCD compared to healthy controls (Dağdelen and Vural 2019; Yazici and Yazici 2019). In the present research, adolescents with OCD exhibited poorer levels of cognitive flexibility and ToM abilities than the healthy controls. Furthermore, similarly to this study, Yazıcı et al. reported

TABLE 5 | Correlation analyses of the scale scores.

		1	2	3	Mean $\pm$ SD (min–max)	Skew	Kurt
1. Follow-up CY-BOCS	<i>r</i>	—			13.51 $\pm$ 8.85	0.169	–1.239
	<i>p</i>				(0–31)		
2. Baseline CY-BOCS	<i>r</i>	0.332*	—		25.21 $\pm$ 6.53	0.035	–0.706
	<i>p</i>	0.039			(12–37)		
3 Baseline CFS	<i>r</i>	–0.228	–0.111	—	49.23 $\pm$ 8.12	0.162	–0.046
	<i>p</i>	0.163	0.501		(33–68)		
4. Baseline RME-CT	<i>r</i>	–0.751**	–0.126	0.083	20.05 $\pm$ 2.42	–0.358	–0.993
	<i>p</i>	<0.001	0.446	0.617	(16–24)		

Note: Bold indicate statistical significance *p* values.

Abbreviations: CFS, Cognitive Flexibility Scale; CY-BOCS, Reading the Mind in the Eyes of Children Test; Kurt, Kurtosis; *r*, Pearson correlation coefficient; RME-CT, Children's Yale-Brown Obsessive-Compulsive Scale; Skew, skewness.

* *p* < 0.05; ** *p* < 0.001.

TABLE 6 | Hierarchical regression results for follow-up Y-BOCS scores.

		95% CI							
	<i>B</i>	LB	UB	SE _B	β	<i>t</i>	<i>p</i>	<i>R</i> ²	ΔR ²
Step 1								0.11	0.11
Baseline CY-BOCS	0.450	0.024	0.875	0.210	0.332	2.141	0.039		
Step 2								0.64	0.53
Baseline CY-BOCS	0.307	0.025	0.589	0.139	0.227	2.211	0.034		
Baseline RME-CT	–2.601	–3.361	–1.841	0.374	–0.711	–6.950	<0.001		
Baseline CFS	–0.157	–0.383	0.069	0.111	–0.144	–1.410	0.167		

Note: Bold indicate statistical significance *p* values.

Abbreviations: β , standardised regression coefficients; *B*, unstandardised regression coefficients; CFS, Cognitive Flexibility Scale; CI, confidence interval; CY-BOCS, Reading the Mind in the Eyes of Children Test; LB, lower bound; RME-CT, Children's Yale-Brown Obsessive-Compulsive Scale; UB, upper bound.

lower RME-CT scores in healthy controls. Research including adult participants with OCD has revealed a negative correlation between the severity of OCD symptoms and performance on ToM tasks (Pino et al. 2016). Another study demonstrated a correlation between more severe OCD symptoms and lower ToM skills (Grisham et al. 2010). In a cross-sectional study of adolescents, a significant negative correlational relationship was observed between the RME-CT score and CY-BOCS scores at the time of evaluation (Yazici and Yazici 2019). Although Öztürk et al. reported a negative correlation between ToM skills and severity of OCD, this was not statistically significant (Öztürk et al. 2023). However, a number of studies have published data suggesting no correlation between ToM skills and OCD symptom severity. A cross-sectional study conducted on adolescents diagnosed with OCD determined no relationship between RME-CT scores and disorder severity (Dağdelen and Vural 2019). In the present study, no significant relationship was observed between baseline CY-BOCS scores and RME-CT or CFS scores. The baseline data of this study revealed no direct, significant relationship between ToM skills and disease severity. A study of adult patients with OCD reported that other conditions, such as memory impairments, can explain the deterioration in ToM skills (Sayin et al. 2010). Our finding

can be interpreted as showing that low ToM skills in OCD cannot be explained in terms of symptom severity. In addition, only adolescents diagnosed with OCD with no history of treatment or psychiatric comorbidity were included in this study. We think that this is important in terms of excluding the possible effects of comorbid psychiatric disorders or previous treatment on ToM skills and thus of increasing the reliability of the study.

Our scan of the literature identified no studies investigating the impact of cognitive flexibility and ToM skills on the course of OCD. A longitudinal study involving children diagnosed with attention deficit hyperactivity disorder examined the simultaneous and longitudinal relationships between cognitive flexibility, ToM skills and hyperactivity/inattention. The findings revealed that cognitive flexibility at the initial stage of the study strongly predicted hyperactivity scores 1 year later (Farrant et al. 2014). A study involving adolescents diagnosed with anorexia nervosa revealed that reduced activity in the brain network responsible for sustaining ToM abilities was linked to poor outcomes at 1-year follow-up (Schulte-Rüther et al. 2012). Patients with major depressive episodes and low ToM abilities at baseline exhibited worse outcomes at the

end of the first year (Yamada, Inoue, and Kanba 2015). In the present study, we determined a negative, but statistically insignificant, weak correlation between cognitive flexibility and disease outcomes. However, we also found that RME-CT scores, which we used to assess ToM skills, predicted disease severity at the end of the first year.

Poorer long-term treatment outcomes were observed in adolescents with poor ToM skills in this study. However, the absence of a longitudinal design in previous studies of OCD in this area makes it difficult to interpret our findings. Nonetheless, the results of the current investigation may have important implications for interventions targeting OCD in adolescents. Researchers have previously suggested that treatments targeting ToM abilities may improve deficits associated with poor outcomes in schizophrenia (Ng, Fish, and Granholm 2015). In conjunction with prior research, our findings demonstrate the significance of ToM in determining prognosis in cases of OCD. ToM capabilities may potentially serve as a target for positive outcomes in OCD.

The main limitation of this study was the small sample size. However, the research was longitudinal in design and adhered to stringent diagnostic standards. Only adolescents with clinically observed OCD were included. We think that these strengths enhance the significance of the findings. This research was conducted as a single-centre investigation at a tertiary healthcare institution. This raises the possibility that patients with more severe symptoms and greater resistance to therapy may have been included. Future multicentre studies may help to overcome these limitations. Drug therapies are thought to be capable of affecting ToM skills (Mizrahi et al. 2007). Due to the nature of the therapeutic process, it was not possible for all the participants to be treated with the same psychopharmacological agents. We think that this represents a limitation of the present study, and also of previous research.

5 | Conclusion

In conclusion, adolescents with OCD exhibited poorer cognitive flexibility and ToM skills at baseline compared to healthy controls. However, the study findings showed that cognitive flexibility and ToM skills improved in adolescents with OCD by the end of the first year of treatment. We determined a significant negative correlation between follow-up Y-BOCS scores and baseline RME-CT scores, and that baseline RME-CT scores predicted follow-up OCD severity in a negative direction. The research revealed that poor ToM skills in adolescents adversely affect the long-term course of OCD. ToM skills can be used as a factor capable of predicting recovery outcomes in adolescents with OCD. Our findings will be useful in predicting the prognosis of children with OCD. Addressing ToM difficulties may contribute to positive outcomes when planning treatment for adolescents with OCD. Further research in this area is now needed to replicate the present results and determine prognosis in the early stages.

Ethics Statement

This study was approved by the Alanya Alaaddin Keykubat University clinical research ethical committee (approval no. 07-05) on 07 October 2022. Consent was obtained for all participants.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

References

- American Psychiatric Association (APA). 2022. *Diagnostic and Statistical Manual of Mental Disorders*. 5th ed. text rev. ed. Arlington, VA: American Psychiatric Publishing. <https://doi.org/10.1176/appi.books.9780890425787>.
- Baron-Cohen, S., S. Wheelwright, J. Hill, Y. Raste, and I. Plumb. 2001. "The 'Reading the Mind in the Eyes' Test Revised Version: A Study With Normal Adults, and Adults With Asperger Syndrome or High-Functioning Autism." *Journal of Child Psychology and Psychiatry, and Allied Disciplines* 42, no. 2: 241–251. <https://doi.org/10.1111/1469-7610.00715>.
- Bobrowicz, K., and J. P. Thibaut. 2023. "The Development of Flexible Problem Solving: An Integrative Approach." *Journal of Intelligence* 11, no. 6: 119. <https://doi.org/10.3390/jintelligence11060119>.
- Bora, E. 2022. "Social Cognition and Empathy in Adults With Obsessive Compulsive Disorder: A Meta-Analysis." *Psychiatry Research* 316: 114752. <https://doi.org/10.1016/j.psychres.2022.114752>.
- Carlson, S. M., L. J. Claxton, and L. J. Moses. 2015. "The Relation Between Executive Function and Theory of Mind Is More Than Skin Deep." *Journal of Cognition and Development* 16, no. 1: 186–197. <https://doi.org/10.1080/15248372.2013.824883>.
- Çelikkaleli, Ö. 2014. "The Validity and Reliability of the Cognitive Flexibility Scale." *Education and Science* 39, no. 176: 339–346. <https://doi.org/10.15390/EB.2014.3466>.
- Cervin, M. 2023. "Obsessive-Compulsive Disorder: Diagnosis, Clinical Features, Nosology, and Epidemiology." *The Psychiatric Clinics of North America* 46, no. 1: 1–16. <https://doi.org/10.1016/j.psc.2022.10.006>.
- Chamberlain, S. R., J. E. Solly, R. W. Hook, M. M. Vaghi, and T. W. Robbins. 2021. "Cognitive Inflexibility in OCD and Related Disorders." *Current Topics in Behavioral Neurosciences* 49: 125–145. https://doi.org/10.1007/7854_2020_198.
- Champagne-Lavau, M., A. Charest, K. Anselmo, J. P. Rodriguez, and G. Blouin. 2012. "Theory of Mind and Context Processing in Schizophrenia: The Role of Cognitive Flexibility." *Psychiatry Research* 200, no. 2–3: 184–192. <https://doi.org/10.1016/j.psychres.2012.06.011>.
- Dağdelen, F., and A. P. Vural. 2019. "Theory of Mind Skills in Adolescents With Obsessive Compulsive Disorder." *Psychiatry and Behavioral Sciences* 9, no. 4: 172–178. <https://doi.org/10.5455/PBS.20181101045321>.
- Farrant, B. M., J. Fletcher, and M. T. Maybery. 2014. "Cognitive Flexibility, Theory of Mind, and Hyperactivity/Inattention." *Child Development Research* 2014: 741543. <https://doi.org/10.1155/2014/741543>.
- Fineberg, N. A., A. M. Apergis-Schoute, M. M. Vaghi, et al. 2018. "Mapping Compulsivity in the DSM-5 Obsessive Compulsive and Related Disorders: Cognitive Domains, Neural Circuitry, and Treatment." *International Journal of Neuropsychopharmacology* 21, no. 1: 42–58. <https://doi.org/10.1093/ijnp/pyx088>.
- Francazio, S. K., and C. A. Flessner. 2015. "Cognitive Flexibility Differentiates Young Adults Exhibiting Obsessive-Compulsive Behaviors From Controls." *Psychiatry Research* 228, no. 2: 185–190. <https://doi.org/10.1016/j.psychres.2015.04.038>.
- Girli, A. 2014. "Psychometric Properties of the Turkish Child and Adult Form of 'Reading the Mind in the Eyes Test'." *Psychology* 5, no. 11: 1321–1337. <https://doi.org/10.4236/psych.2014.511143>.

- Goodman, W. K., L. H. Price, S. A. Rasmussen, et al. 1989. "The Yale-Brown Obsessive Compulsive Scale. I. Development, Use, and Reliability." *Archives of General Psychiatry* 46, no. 11: 1006–1011. <https://doi.org/10.1001/archpsyc.1989.01810110048007>.
- Greenberg, D. M., V. Warrier, A. Abu-Akel, et al. 2023. "Sex and Age Differences in 'Theory of Mind' Across 57 Countries Using the English Version of the 'Reading the Mind in the Eyes' Test." *Proceedings of the National Academy of Sciences of the United States of America* 120, no. 1: e2022385119. <https://doi.org/10.1073/pnas.2022385119>.
- Grisham, J. R., J. D. Henry, A. D. Williams, and P. E. Bailey. 2010. "Socioemotional Deficits Associated With Obsessive-Compulsive Symptomatology." *Psychiatry Research* 175, no. 3: 256–259. <https://doi.org/10.1016/j.psychres.2009.01.028>.
- Gruner, P., and C. Pittenger. 2017. "Cognitive Inflexibility in Obsessive-Compulsive Disorder." *Neuroscience* 345: 243–255. <https://doi.org/10.1016/j.neuroscience.2016.07.030>.
- Jansen, M., S. Overgaauw, and E. R. A. De Bruijn. 2020. "Social Cognition and Obsessive-Compulsive Disorder: A Review of Subdomains of Social Functioning." *Frontiers in Psychiatry* 11: 118. <https://doi.org/10.3389/fpsyt.2020.00118>.
2012. "Practice Parameter for the Assessment and Treatment of Children and Adolescents With Obsessive-Compulsive Disorder." *Journal of the American Academy of Child and Adolescent Psychiatry* 51, no. 1: 98–113. <https://doi.org/10.1016/j.jaac.2011.09.019>.
- Krebs, G., and I. Heyman. 2015. "Obsessive-Compulsive Disorder in Children and Adolescents." *Archives of Disease in Childhood* 100, no. 5: 495–499. <https://doi.org/10.1136/archdischild-2014-306934>.
- López-Del-Hoyo, Y., M. G. Panzano, G. Lahera, et al. 2019. "Differences Between Individuals With Schizophrenia or Obsessive-Compulsive Disorder and Healthy Controls in Social Cognition and Mindfulness Skills: A Controlled Study." *PLoS One* 14, no. 12: e0225608. <https://doi.org/10.1371/journal.pone.0225608>.
- Martin, M. M., and R. B. Rubin. 1995. "A New Measure of Cognitive Flexibility." *Psychological Reports* 76, no. 2: 623–626. <https://doi.org/10.2466/pr0.1995.76.2.623>.
- Mizrahi, R., M. Korostil, S. E. Starkstein, R. B. Zipursky, and S. Kapur. 2007. "The Effect of Antipsychotic Treatment on Theory of Mind." *Psychological Medicine* 37, no. 4: 595–601. <https://doi.org/10.1017/S0033291706009342>.
- Molenberghs, P., H. Johnson, J. D. Henry, and J. B. Mattingley. 2016. "Understanding the Minds of Others: A Neuroimaging Meta-Analysis." *Neuroscience and Biobehavioral Reviews* 65: 276–291. <https://doi.org/10.1016/j.neubiorev.2016.03.020>.
- Ng, R., S. Fish, and E. Granholm. 2015. "Insight and Theory of Mind in Schizophrenia." *Psychiatry Research* 225, no. 1–2: 169–174. <https://doi.org/10.1016/j.psychres.2014.11.010>.
- Öztürk, Y., G. Özyurt, S. Turan, A. E. Tufan, and A. P. Akay. 2023. "Emotion Dysregulation and Social Communication Problems but Not ToM Properties May Predict Obsessive-Compulsive Disorder Symptom Severity." *Nordic Journal of Psychiatry* 77, no. 8: 778–787. <https://doi.org/10.1080/08039488.2023.2251953>.
- Pino, M. C., D. De Berardis, M. Mariano, et al. 2016. "Two Systems for Empathy in Obsessive-Compulsive Disorder: Mentalizing and Experience Sharing." *Revista Brasileira de Psiquiatria (Sao Paulo, Brazil: 1999)* 38, no. 4: 307–313. <https://doi.org/10.1590/1516-4446-2015-1679>.
- Sami, H., S. Tei, H. Takahashi, and J. Fujino. 2023. "Association of Cognitive Flexibility With Neural Activation During the Theory of Mind Processing." *Behavioural Brain Research* 443: 114332. <https://doi.org/10.1016/j.bbr.2023.114332>.
- Sayin, A., N. Oral, C. Utku, E. Baysak, and S. Candansayar. 2010. "Theory of Mind in Obsessive-Compulsive Disorder: Comparison With Healthy Controls." *European Psychiatry: The Journal of the Association of European Psychiatrists* 25, no. 2: 116–122. <https://doi.org/10.1016/j.eurpsy.2009.09.002>.
- Schulte-Rüther, M., V. Mainz, G. R. Fink, B. Herpertz-Dahlmann, and K. Konrad. 2012. "Theory of Mind and the Brain in Anorexia Nervosa: Relation to Treatment Outcome." *Journal of the American Academy of Child and Adolescent Psychiatry* 51, no. 8: 832–841. <https://doi.org/10.1016/j.jaac.2012.06.007>.
- Stewart, S. E., D. A. Geller, M. Jenike, et al. 2004. "Long-Term Outcome of Pediatric Obsessive-Compulsive Disorder: A Meta-Analysis and Qualitative Review of the Literature." *Acta Psychiatrica Scandinavica* 110, no. 1: 4–13. <https://doi.org/10.1111/j.1600-0447.2004.00302.x>.
- Stiede, J. T., S. D. Spencer, O. Onyeka, et al. 2023. "Obsessive-Compulsive Disorder in Children and Adolescents." *Annual Review of Clinical Psychology* 20: 355–380. <https://doi.org/10.1146/annurev-clinpsy-080822-043910>.
- Tulacı, R. G., E. Ş. Cankurtaran, K. Özdel, N. Öztürk, E. Kuru, and İ. Özdemir. 2018. "The Relationship Between Theory of Mind and Insight in Obsessive-Compulsive Disorder." *Nordic Journal of Psychiatry* 72, no. 4: 273–280. <https://doi.org/10.1080/08039488.2018.1436724>.
- Uhre, C. F., M. Ritter, J. R. M. Jepsen, et al. 2023. "Atypical Neurocognitive Functioning in Children and Adolescents With Obsessive-Compulsive Disorder (OCD)." *European Child & Adolescent Psychiatry* 33: 2291–2300. <https://doi.org/10.1007/s00787-023-02301-w>.
- Yamada, K., Y. Inoue, and S. Kanba. 2015. "Theory of Mind Ability Predicts Prognosis of Outpatients With Major Depressive Disorder." *Psychiatry Research* 230, no. 2: 604–608. <https://doi.org/10.1016/j.psychres.2015.10.011>.
- Yazici, K. U., and I. P. Yazici. 2019. "Decreased Theory of Mind Skills, Increased Emotion Dysregulation and Insight Levels in Adolescents Diagnosed With Obsessive Compulsive Disorder." *Nordic Journal of Psychiatry* 73, no. 7: 462–469. <https://doi.org/10.1080/08039488.2019.1652341>.
- Yeung, E. K. L., I. A. Apperly, and R. T. Devine. 2023. "Measures of Individual Differences in Adult Theory of Mind: A Systematic Review." *Neuroscience and Biobehavioral Reviews* 157: 105481. <https://doi.org/10.1016/j.neubiorev.2023.105481>.
- Yucelen, A. G., A. Rodopman-Arman, V. Topcuoglu, M. Y. Yazgan, and G. Fisek. 2006. "Interrater Reliability and Clinical Efficacy of Children's Yale-Brown Obsessive-Compulsive Scale in an Outpatient Setting." *Comprehensive Psychiatry* 47, no. 1: 48–53. <https://doi.org/10.1016/j.comppsy.2005.04.005>.