The Validity and Reliability Study of The Dokuz Eylül Theory of Mind Index (DEZİKÖ) in Patients with Schizophrenia

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SUMMARY

Objective: Although a lack of a comprehensive theory of mind (ToM) index has been indicated frequently in studies of schizophrenia spectrum disorders, there is no valid and reliable index to assess ToM, which represents the ability to attribute mental states to other people. The purpose of this study is to examine the validity and reliability of the "Dokuz Eylül Theory of Mind Index" (DEZİKÖ) in healthy volunteers and in patients with schizophrenia, which is the first Turkish-language ToM index, developed using examples in the ToM literature.

Method: The study sample consisted of a total of 286 participants, including 89 patients with schizophrenia who had been diagnosed by DSM-IV and 197 healthy volunteers. Demographic data form and DEZİKÖ were administered to all the participants. Empathic Skill Index–B Form (EBÖ-B) and Positive and Negative Syndrome Scale (PANSS) were administered to the patients.

Results: In healthy volunteers, internal consistency coefficient of DEZİKÖ was 0.64; inter-rater reliability was 0.99 ($p<0.0001$) and test-retest reliability was 0.90 ($p<0.01$). The patient group had a positive significant correlation between DEZİKÖ and EBÖ-B ($r=0.43$, $p<0.05$). Furthermore, it was shown that healthy volunteers and patients with schizophrenia can be distinguished by using DEZİKÖ ($t(285)=8.74$, $p<0.01$). The results of factor analysis with principal components analysis in the healthy volunteers group verified that DEZİKÖ has 3 factor groups.

Conclusion: These findings indicated that DEZİKÖ, the first ToM index in the Turkish language, has acceptable validity and reliability values in healthy volunteers and in patients with schizophrenia.

Keywords: Theory of mind, schizophrenia, autistic disorder.

INTRODUCTION

Psychosocial functioning requires social cognitive abilities that provide to notice other individuals' cognitive, emotional, and mental processes and to explain their behaviors accordingly. Theory of mind (ToM), which is a dimension of social cognition, is necessary in the arrangement of social interactions (Beer and Ochsner 2006). ToM was conceptualized first in Premack and Woodruff's article (1978) in which it was claimed that chimpanzees may have the ability to infer their homologues' mental states, and it was defined as explaining other people's behaviors by attributing their mental states. The term mentalizing was also used to explain this ability in some references (Leslie 1987, Frith and Frith 2003).

Baron-Cohen and colleagues (1985), who investigated the development of ToM and its role in psychopathology, have demonstrated that autistic children respond to questions assessing ToM in a discernibly different way and incorrectly; they stated that this failure may not be attributed only to mental retardation. The findings of this unique study were replicated several times, and it was accepted that ToM impairment was the first evidence related to the main cognitive mechanisms that underlie the key behaviors defining autism (Tager-Flusberg 2007).

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After studies of ToM in autism, Frith and Frith (1988) stated that autism and schizophrenia have similarities, and that a similar ToM impairment is responsible for interpersonal relationship difficulties that are among the negative symptoms of schizophrenia. They suggested that failure in ToM leads to anomalies in verbal and nonverbal communication and social interaction. After this proposition until today, many studies and meta-analyses related to ToM and schizophrenia have been conducted (Brüne 2005, Harrington et al. 2005, Sprong et al. 2007, Bora 2009, Bora et al. 2009). It was found that patients with schizophrenia have specific difficulties in inferring other's intentions or how they behave, and that ToM impairment probably affected patients' manner of using language and interpreting speech (Brüne 2005). The previous meta-analysis studies have demonstrated that the mean ToM performances of patients with schizophrenia were significantly lower than healthy controls, and it was suggested that ToM impairment in patients with schizophrenia resulted in impairment in psychosocial functioning (Harrington et al. 2005, Sprong et al. 2007, Bora 2009). Among patients with schizophrenia experiencing acute psychosis, ToM was strongly impaired, while remitted schizophrenia patients had a reduced but still significant ToM impairment (Bora et al. 2009).

"First-order false belief ability", which is the simplest ToM ability, is the ability to understand another individual's belief. Children at the age of 3-4 start to understand that other people may have different, even false, beliefs than themselves (Baron-Cohen et al. 1985, Brüne and Brüne-Cohrs 2006, Stone et al. 1998). "Second-order false belief ability" is the comprehension of the second individual's thoughts about the third individual's thoughts, namely "belief about belief" (Perner and Wimmer 1985). Children between the ages of 6 to 7 start to understand that other people may represent different mental states (Stone et al. 1998). The successful comprehension of a statement is related to understanding other people's thoughts and reading their intentions (Grice 1957, Meltzoff 1999). Thus, the need for mentalization is emphasized in cases of indirect meanings like metaphor and irony (Stone et al. 1998, Frith and Frith 2003, Brüne and Brüne-Cohrs 2006). Comprehension of metaphor includes understanding that the meaning of the word is not what is intended to be stated, but it is the abstraction of the implicit meaning (Fine et al. 2001). A metaphor is not literally true and requires that the listener should infer the intention of the speaker related to the situation rather than the meaning of the word (Norbury 2005). As for irony, it is considered to be an aspect of daily conversation used to convey especially negative feelings in an indirect way (Dews et al. 1996, Shamay-Tsoory et al. 2005a). There are studies demonstrating that children at the age of 5 understand basic levels of metaphors (Vosniadou and Ortony 1983), and that understanding of basic ironic statements occurs between the ages of 5 and 6 (Dews et al. 1996). Comprehension of a faux pas is the most complicated developmental ability. The situation of a faux pas occurs when the speaker says something without considering that the listener may not want to hear or may get offended by what is said (Shamay-Tsoory et al. 2005a). In other words, understanding a faux pas requires two mental states: the cognitive component (understanding that the person says something that he/she should not say) and emotional component (empathic understanding that the listener may feel insulted or hurt) (Bach et al. 2000, Stone et al. 1998, Gallagher et al Frith 2003). In children, this ability has been demonstrated to develop at 9 in girls and at 11 in boys (Baron-Cohen et al. 1999). Although acquisition of the ability to understand other people's beliefs follows the same developmental route in all cultures, it is argued in the literature that in societies where languages other than English are used, the early or late acquisitions observed may be related to cultural and linguistic systems (Wellman et al. 2001). For instance, Aksu-Koç and colleagues (2005) have shown that when false belief questions were asked with the verb "assume", Turkish-speaking children's ToM abilities were found to develop earlier when compared with English speaking children. Furthermore, in the same study it was found that understanding the particles, like "-mış" or "-dır", that report the source of the information may be the predictive factors for ToM acquisition. When this close association between ToM and language is taken into account, the need for language-specific scales becomes obvious.

Based on the idea that ToM is not a unitary ability, there are studies in the literature that attempt to sort ToM into different subtypes. Tager-Flusberg and Sullivan (2000) have sorted ToM into two subtypes. According to the authors, social-cognitive ToM is the ability to make mental inferences by looking at other people's behaviors and requires understanding the mind as a representational system. False belief tests are typical tasks that assess social-cognitive ToM. As for social-perceptual ToM, it is the ability of inferring people's mental states by looking at their facial and bodily expressions. Reading the Mind from the Eyes Test (Eyes Test) (Baron-Cohen et al. 2001), of which the Turkish validity and reliability study was conducted by Yıldırım and colleagues (2011), is one of the most commonly used tests in social-perceptual ToM assessment. Shamay-Tsoory and colleagues (2007) have made a distinction between emotional and cognitive ToM. According to the authors, false belief tests require the test taker to understand the difference between their own beliefs and beliefs of the character in the story and thus by this way assess cognitive ToM. As for irony and faux pas tests, they require empathic appraisal of the emotional status of the person who hears the statements, and they assess emotional ToM (Shamay-Tsoory et al. 2007). Thus, comprehension of irony and faux pas is expected to involve meta-representation ability (Shamay-Tsoory

et al. 2005b). Similarly, Brothers and Ring (1992) made a distinction of ToM as "hot" and "cold".

In the literature, the diversity and variety of ToM tests that are used in studies investigating ToM in schizophrenia patients attract attention. In accordance with the content of the study, in some tests only one dimension of ToM is assessed; some tests consist of only story tasks; in some tests there are only visual tasks. However, in a large majority of studies, item numbers of ToM tests and variety in the forms as well as lack of an approach towards psychometric properties of tests are criticized (Harrington et al. 2005, Bora et al. 2009); the importance of developing psychometrically standardized tests is reported (Harrington et al. 2005, Sprong et al. 2007, Bora 2009).

The aim of this study is to develop a multidimensional and wide ranging ToM scale that assesses different dimensions of ToM in the same scale, and is adapted to Turkish culture, life style, and language; and to establish the validity and reliability of this scale.

METHOD

By reviewing previous examples in literature, we created an 18-item scale consisting of story and visual tasks that assess ToM abilities (1st order false belief, 2nd order false belief, irony, metaphor and faux pas) and that assess empathic ability; the scale was called "Dokuz Eylül Theory of Mind Index" (DEZIKÖ). For first-order false belief tasks, tasks developed by Wimmer and Perner (1983), Baron-Cohen and colleagues (1985) and Pickup and Frith (2001); for second-order false belief tasks, Perner and Wimmer (1985), Stone and colleagues (1998) and Pickup and Frith (2001); for metaphor and irony tasks, Happé (1993); for faux pas tasks, Stone and colleagues (1998); for visual tasks for false belief tasks, Sarfati and colleagues (1997); and for empathic comprehension task, Völlm and colleagues (2006) were reviewed to make use of examples. The stories in these studies were examined carefully for their utilization of ToM abilities. During the formation of stories, we adhered to the structure of language, degree of difficulty, and the pattern of event sequencing of the stories in the literature. As for the content of the stories, we attempted to depict and narrate events that are compatible with Turkish societal life. Special attention was paid to the names of the characters, the places that the events occured and the words used to include examples of daily life. For instance, in Perner and Wimmer's task of second-order false belief (1985), the story of an ice-cream man passing through the street was used; however, as this event is rarely applicable in our country, a story that took place in a hospital between a nurse and doctor was composed. Once more, while Happé (1993) used a conversation between three friends going to the cinema in an irony and metaphor comprehension task, DEZIKÖ utilized a story of a married couple.

Sample

Between the dates of January 2007 and May 2008, 197 healthy volunteers in the field, who were randomly selected and did not report any psychiatric diagnosis were included in the study, together with 89 patients who either came to the Polyclinic of Schizophrenia and Other Psychotic Disorders in Dokuz Eylül University Medical Faculty or were inpatients in the psychiatry service who had a schizophrenia diagnosis according to the diagnostic criteria of DSM-IV, who could cooperate for the interview, who did not have psychotic relapse, and whose clinical condition was stable. As there are studies in literature that demonstrated age-related decline in ToM performance, for all participants, the age range was determined to be between 18 and 60 years. Furthermore, inclusion criteria were: all participants needed to be at least primary school graduates and not be addicted to any drugs or substances; healthy volunteers could not have a past or current history of a psychiatric treatment, and not be using a medication that may affect brain functions for at least one month; patients with schizophrenia could not have a comorbid psychiatric diagnosis. Oral and written informed consent was obtained from patients with schizophrenia and healthy volunteers. The Ethical Committee of Dokuz Eylül University Medical Faculty approved the study.

Measurement Tools

Demographic data form: All participants were administered a demographic form that included questions about age, gender, educational status, substance use, mental disorder diagnosis, and medications used. Additionally, the schizophrenia patients' information about clinical characteristics including onset age and duration of the illness were recorded in the data form.

Dokuz Eylül Theory of Mind Scale (DEZIKÖ): At the beginning of administration, the participant was read the instructions, and then the administration was started. The scale consists of seven stories and three visual tasks. In story tasks, the participant was first asked to listen to the story and then to answer the related question. Five of the stories assess only a single ability; after the story is completed, the participant is posed the related question. As for the remaining two stories, questions are asked within the story, and more than one ToM ability was assessed. Visual tasks consist of three pictures numbered as 1-2-3; the participant is asked to choose the upcoming fourth picture between two alternatives presented as a and b that fits the story. One of the visual tasks assesses First order false belief ability, one assesses second order false belief ability, and the last one assesses the empathic comprehension

ability. Scoring is done by using a pre-established key including the right answers and giving "1" point for the right and "0" for the wrong answer. The total score that can be obtained is in the range between 0-18.

Empathic Skill Index–B Form (EBÖ-B): Empathic Skill Index- B Form was chosen for the purpose of evaluating the correlation of DEZIKÖ in validity estimates because of the affiliation between ToM ability and empathic ability. The scale was developed by Dökmen (1988) as A and B forms to assess empathic ability of the individual; the marking and scoring system was modified and with this version, reliability and validity study was conducted by Dökmen (1990). In this study, the latest scoring system was used. In EBÖ-B, there are 6 problems presented briefly by imaginary individuals. For each problem, there are 12 statements that may be told to that individual. For each condition, participants are asked to choose 4 statements to tell the individual experiencing the problem. Thus, a total of 24 statements should be chosen. In each question, one of the 12 statements is irrelevant to the condition, and any irrelevant statement that is found in scoring is interpreted as the scale was not responded to carefully and the aforementioned question is taken out of evaluation. Other than the irrelevant statements, each statement has a corresponding score. In scoring, empathic ability score is calculated by summing up score values of the 24 responses given to 6 problems. Higher score corresponds to higher empathic ability (Dökmen 1990).

Positive and Negative Syndrome Scale (PANSS): The scale, which was developed by Kay and colleagues (1987), consists of 3 subscales and a total of 30 items assessing positive and negative symptoms of schizophrenia and general psychopathology. In each item, evaluation is made according to symptom severity as ranging from 1 (none) - 7 (very severe). The Turkish adaptation was developed by Kostakoğlu and colleagues (1999).

Statistical Analysis

All statistical analyses were performed using SPSS 15.0. To compare patients with schizophrenia and healthy volunteers, independent-samples t-test was used for age and total years of education, and chi-square test was used for gender. In reliability analyses, Kuder-Richardson 20 coefficient (KR-20) of whole scale score and factor scores for internal consistency, Kendall's coefficient of concordance (Kendall's W[a]) value of interviewer ratings for inter-rater reliability, and Pearson product-moment correlation coefficient for test-retest reliability of the scale were conducted. The scale was administered to a group of 40 individuals that represent a healthy volunteer group in the presence of another researcher to evaluate the inter-rater reliability. Answers were recorded by two researchers independently and also were scored independently. The scale was administered again after 4 weeks to 40 healthy volunteers by the same researcher to evaluate test-retest reliability. In validity analyses, the relationship between the total score of DEZIKÖ and factors of DEZIKÖ was estimated with the method of Pearson product-moment correlation. The relationship between the total DEZIKÖ score and EBÖ-B total score was tested with Pearson correlation coefficient in patients with schizophrenia to test the concurrent validity. DEZIKÖ and total factor scores of the schizophrenia and healthy volunteer groups were compared with independent-samples t-test to show the discriminative value of the scale. With principal component analysis, 7 factors with eigenvalues greater than 1 were determined, and then varimax rotation with 3 factors was conducted. The reliability coefficients of factors within themselves were estimated by KR-20 analysis. Lastly, independent-samples t-test was used to see whether total DEZIKÖ scores showed differences in terms of gender groups; one-way ANOVA was used to see whether there were differences in terms of age and education groups, and Tukey test was used to clarify intergroup differences.

RESULTS

Demographic and Clinical Characteristics

The study was conducted with a group of 286 people, 197 of whom were healthy volunteers and 89 of whom were patients with schizophrenia. While there was no statistically significant difference between healthy volunteers and patients with schizophrenia with regards to age and total education years, it was found that there was a significant difference between healthy volunteers and patients with schizophrenia with regards to gender ($\chi 2$ (1) = 7.2, $p<0.05$). Demographic and clinical characteristics of the sample are indicated in Table 1.

Table 1. Demographic Characteristics of Sample and Clinical Characteristics of Patient Group

Demographic characteristics	**Healthy Volunteers (n=197)**	**Schizophrenia (n=89)**
Age	**M (SD)**	**M (SD)**
	36.98 (11.14)	36.33 (11.19)
Total education years	**M (SD)**	**M (SD)**
	11.39 (3.84)	10.87 (3.77)
Gender	n (%)	n (%)
Female	110 (55.8%)	33 (37.1%)
Male	87 (44.2%)	56 (62.9%)
Clinical characteristics		M (SD)
Age at illness onset	-	22.74 (7.79)
Number of hospitalization	-	2.37 (2.89)
PANSS positive	-	16.83 (7.94)
PANSS negative	-	20.76 (6.43)
PANSS general psychopathology	-	35.89 (12.59)
PANSS total	-	74.11 (22.78)

M: Mean
SD: Standard Deviation
PANSS: Positive and Negative Syndrome Scale

Table 2. DEZIKÖ Rotated Factor Matrix in Healthy Volunteers

Scale items	Factor 1 (Representation)	Factor 2 (Meta-representation)	Factor 3 (Empathy)
1 (1. OFB story-1)	0.55		
16 (2. OFB story-2)	0.55		
2 (1. OFB visual)	0.53		
10 (1. OFB story-2)	0.52		
14 (1. OFB story-3)	0.49		
6 (Metaphor story-1)	0.43		
4 (2. OFB visual)	0.41		
7 (Empathy visual)	0.40		
3 (2. OFB story-1)	0.36		
15 (Metaphor story)	0.29		
11 (Empathy story-3)	0.12	-0.25	-0.23
13 (Irony story-3)		0.71	
12 (Irony story-2)		0.66	
5 (Irony story-1)		0.62	
17 (Faux pas story)		0.45	
8 (Empathy story-1)			0.62
9 (Empathy story-2)			0.62
18 (Faux pas story-empathy)			0.46

OFB: Order False Belief

Validity

Factor structure: In Kaiser-Meyer-Olkin (KMO) test, the coefficient for the sampling adequacy was found to be 0.63 ($p<0.0001$), indicating a moderate level. After the analysis, 7 factors with eigenvalues greater than 1 were obtained and represented 58.3% of total variance. When the graphical distribution of factor eigenvalues was examined (scree plot), it was observed that the point on which the slope changed and started to decline was after 3 factors. Therefore, as a result of varimax rotation with 3 factors, these 3 factors represented 31.7% of total variance. The rotated factor matrix for the items that have loadings from the factors is presented in Table 2. First factor is the representation factor. All stories and visual tasks related to comprehension of false belief, all of the stories related to comprehension of metaphors, and a visual and a story question related to empathic comprehension are under this factor. KR-20 reliability coefficient of the factor items is 0.59. The only item that increases reliability coefficient when extracted is the empathy story, and when it is extracted, the coefficient increases to 0.60. Second factor is the meta-representation factor. All of the irony comprehension stories and comprehension of faux pas story are under this factor. KR-20 reliability coefficient of the factor items is 0.55. Third factor is the empathy factor. Three of the stories related to empathic comprehension are under this factor. KR-20 reliability coefficient of the factor items is 0.66.

Table 3. Mean Scores of Total DEZIKÖ and Factors in Healthy Volunteers and Patients with Schizophrenia

Total scores	Healthy Volunteers (n=197)	Schizophrenia (n=89)
Representation factor	7.90±2.02	4.15±2.17
Meta-representation factor	2.44±1.15	1.73±1.18
Empathy factor	2.74±0.49	1.79±0.35
Total DEZIKÖ	13.14±2.70	9.61±4.01

The correlation between the total score of DEZIKÖ and the factors of DEZIKÖ: In the patients with schizophrenia group, statistically significant correlations between DEZIKÖ total score and the representation factor ($r=0.90$, $p<0.01$), the meta-representation factor ($r=0.68$, $p<0.01$), and the empathy factor ($r=0.84$, $p<0.01$) were found.

The comparison of the total DEZIKÖ and the factor scores of patients with schizophrenia and healthy volunteers: There were statistically significant differences between healthy volunteers and patients with schizophrenia in terms of the representation factor ($t(285) = 14.25$, $p<0.01$), the meta-representation factor ($t(285) = 4.81$, $p<0.01$), the empathy factor ($t(285) = 7.75$, $p<0.01$), and the total scores of DEZIKÖ ($t(285) = 8.74$, $p<0.01$). Factor scores and total scores obtained from DEZIKÖ of healthy and schizophrenia groups are presented in Table 3.

The correlation between the total scores of DEZIKÖ and the total scores of EBÖ-B: A statistically significant correlation was found between DEZIKÖ and EBÖ-B total scores ($r=0.43$, $p<0.05$) in patients with schizophrenia group. Furthermore, statistically significant correlations were obtained between EBÖ-B and the representation factor ($r=0.35$, $p<0.01$), the meta-representation factor ($r=0.31$, $p<0.01$), and the empathy factor ($r=0.40$, $p<0.01$) of DEZIKÖ.

Reliability

Internal consistency: KR-20 coefficient for the whole scale was estimated to be 0.64 in the healthy volunteer group. The internal consistency coefficients of the factors were presented under the title of validity.

Interrater reliability: Kendall's W[a] value between interviewers for DEZIKÖ total score was found to be 0.99 ($p<0.0001$).

Test-retest reliability: Test-retest reliability correlation coefficient for DEZIKÖ total score was estimated as $r=0.90$ ($p<0.01$).

The Relationship between the Total Scores of DEZIKÖ and Demographic Characteristics

An independent-samples t-test was conducted to compare gender differences in terms of DEZIKÖ total scores in healthy volunteers group. It was found that there was no significant difference between females (M= 12.72, SE= 0.32) and males (M= 13.42, SE= 0.23) in terms of DEZIKÖ total scores ($p>0.05$).

A one-way ANOVA was conducted to compare three age groups' (18-30 years, 31-45 years, 46-60 years) total scores of DEZIKÖ. The results showed that at least one of the differences between total scores was statistically significant, F (2, 194) = 5.32, $p<0.05$, $\eta^2 = 0.05$. Tukey's test was conducted to clarify which age group was responsible for this significant difference, and it was found that the 18-30 age group's mean score was significantly different than the 46-60 age group's (MD= 1.52, $p<0.05$).

A one-way ANOVA was conducted to compare three education groups' (1-8 years, 9-12 years, 13 years and above) total scores of DEZIKÖ. The results showed that at least one of the differences in total scores was significantly different, F (2, 194) = 41.58, $p<0.05$, $\eta^2 = 0.30$. Tukey's test was conducted to find the source of this significant difference, and it was found that 13 years and above group's mean score was significantly different than the 1-8 years group's (MD= 3.61, $p<0.05$).

There were no statistically significant differences found between age and gender groups in terms of DEZIKÖ mean scores in the patients with schizophrenia group. A one-way ANOVA was conducted to compare total DEZIKÖ scores of the three education groups (1-8 years, 9-12 years, 13 years and above) and the results showed that at least one of the differences in total scores was statistically significant, F (2, 86) = 6.37, $p<0.05$, $\eta^2 = 0.13$. Tukey's test was conducted to clarify which education group was responsible for this significant difference, and it was found that 13 years and above group's mean score was significantly different than the 1-8-year group's in terms of DEZIKÖ total scores (MD= 3.44, $p<0.05$).

DISCUSSION

As a result of our study, it was found that all but two of the items of DEZIKÖ have a good factor structure in accordance with the literature. There are a few criteria to decide which factors are important in factor extraction after factor analysis. In one of these techniques, a scree plot is drawn in which each eigenvalue (Y-axis) corresponds to the related factor (X-axis) (Cattell 1966). According to Cattell (1966), the cutoff point should be the point where the two lines summarizing vertical and horizontal parts of the graph intersect. Cattell (1966) suggested determining the number of factors by including the factor at the intersection point. When the graph that was obtained after principal component analysis and that shows the eigenvalues of 7 factors is examined, horizontal and vertical lines that were drawn in accordance with Cattell's suggestion were found to intersect at the third factor. Furthermore, by taking into account both the propositions in literature that ToM has two components— cognitive (false belief tasks) and emotional (irony and faux pas tasks) — and also that DEZIKÖ includes empathy tasks, it was foreseen that DEZIKÖ had three factors, and factor analysis was conducted. After the analysis, when the items which had loadings from the first factor were examined, it was found that all false belief and metaphor tasks and a visual and story task related to empathy had loadings from this factor. It was suggested that interpreting the metaphor requires understanding intentions and a first-order false belief (Happé 1993). Likewise, Langdon and colleagues (2002) also reported that understanding statements that involve metaphor requires appreciating that the speaker has the ability of having thoughts about the world, and it requires the abilities that are assessed by typical ToM tasks. Based on this perspective, comprehension of metaphor does not require any emotional inference. Thus, it is compatible with literature that metaphor tasks have loadings from the same factor that the false belief tasks have. By taking into account the contents of the tasks in this factor and as suggested by Tager-Flusberg and Sullivan (2000), this factor was chosen as the representation factor. Internal consistency of factor items was found to be at a moderate level. It was found that the empathy story, which had the lowest factor loading in this factor, had lower even negative loadings from the other factors, and when this item was extracted, internal consistency of the factor increased. Another empathy task that had loadings from this factor is the visual empathy task. In a study by Völlm and colleagues (2006) that was reviewed for making use of example, it was suggested that some empathy tasks that they used represented obedience to social rules more than empathy; the empathic response partly underlies socially desirable behavior, and it is difficult to discriminate these two processes. In the visual task related to empathy in our study, two cars crashing into each other and a pedestrian seeing this accident was depicted. The subject was asked what the pedestrian would do by choosing between two pictures. In one of the pictures, the pedestrian helps the driver in the car; in the other, he walks away without paying any attention. As mentioned by Völlm and colleagues (2006), this story also includes a social rule; the answer may have been the

result of the participant's representation of thoughts rather than emotions. Thus, this task may have been involved in the representation factor related to people's thoughts instead of the empathy dimension. Because these two tasks, which were composed to assess empathy, are involved in the representation factor instead of the empathy factor, it was indicated that they are not valid items. The items that had loadings from the second factor were all of the irony tasks and comprehension of faux pas task, so this factor was called the meta-representation factor as suggested by Shamay-Tsoory and colleagues (2005b). Internal consistency of the factor items was found to be at moderate levels. When the items that had loadings from the last factor were examined, the factor was called the empathy factor, as three tasks related to empathic comprehension were involved under this factor. The internal consistency of the factor was found to be at a moderate level.

In patients with schizophrenia, it was found that all the factors of DEZIKÖ had higher correlations with the total scale score. This finding also supports that DEZIKÖ has a valid factor structure.

The mean scores of the total scale and the factor scores of the healthy volunteer and patients with schizophrenia groups were compared to evaluate the discriminative value of DEZIKÖ. Patients with schizophrenia were found to have significantly lower scores than healthy volunteers in terms of the factor and the total scale scores. In review studies, it was stated that the tasks used in schizophrenia studies evaluating different aspects of ToM were found to discriminate schizophrenia and non-schizophrenia samples (Harrington et al. 2005). In this study, it was demonstrated that DEZIKÖ had a discriminative value on schizophrenia and non-schizophrenia samples in agreement with the literature.

As there is no gold standard ToM scale, of which reliability and validity study had been conducted until the time of our study, the correlation with EBÖ-B, which assesses empathic ability, was examined to evaluate the validity of DEZIKÖ. ToM ability and empathic comprehension ability are used synonymously in daily life as in the literature, because both refer to considering the other person's perspective, mentally and emotionally. Empathic ability is defined as inferring and sharing others' emotional states (Gallese 2003). According to another definition, empathy is an emotional response of an observer to another person's emotional state (Blair 2007). It is also suggested that for an empathic response to occur, the ability to comprehend other's mental states should have developed (Batson et al. 1987). Some authors define ToM as "cognitive" empathy (Blair 2007), while others propose that "cognitive empathy" is very similar to ToM (Bora et al. 2008). In one of the brain imaging studies investigating the relationship between ToM and empathy, it was found that in healthy volunteers, ToM and empathy were related to the activation of temporal and prefrontal regions. Consequently, it was suggested that both ToM and empathy are based on similar brain networks that are related to social perception, and these regions have roles in making inferences about other's mental states (Völlm et al. 2006). In our study, a significant relationship was found between ToM and empathic ability in patients with schizophrenia. Once more, it was confirmed that among the factors of ToM, the empathy factor had the highest correlation with EBÖ-B. This relationship found between empathic ability and ToM ability in patients with schizophrenia supports the arguments that ToM ability is necessary for empathic ability (Batson et al. 1987, Bora et al. 2008). Under these circumstances, it is assumed that when ToM ability is impaired, empathic ability would also be impaired in patients with schizophrenia; therefore, in patients who have intact ToM ability, empathic ability would also be intact.

In the internal consistency analysis conducted to evaluate reliability, Kuder-Richardson 20 analysis (Cronbach 1951, Cortina 1993) was used. It is the most convenient method to evaluate the scale's and the factors' internal consistency because responses are rated as "1" and "0" in DEZIKÖ scoring. It was found that the whole scale's and the factors' internal consistency coefficients were moderate, and that the scale had a good internal consistency. Furthermore, DEZIKÖ's inter-rater reliability and test-retest test correlations were determined to be quite high.

It was also investigated whether DEZIKÖ scores differed with respect to demographic characteristics like gender, age, and education. In the healthy volunteer group, ToM performance was found to decline with increasing age. It was reported that there are contradictory findings related to changes in ToM performance in the life cycle of adults (Brüne and Brüne-Cohrs 2006). Happé and colleagues (1998) conducted the first study in the literature about ToM performance in clinically normal adults and demonstrated that in healthy older individuals, ToM performance was intact and was even higher than in young participants. In partial agreement with this finding, Slessor and colleagues (2007) found that in visual presentations of ToM, there was an age-related impairment but not in story tasks. In contrast to these findings, Maylor and colleagues (2002) determined a decline in ToM ability with increasing age. Similarly, Duval and colleagues (2011) demonstrated specific effects of increasing age on different ToM aspects and have suggested that ToM is a complex ability that is sensitive to age. They further argued that these contradictory findings in the literature may have resulted from methodological limitations including small samples and the administration of different tasks related to ToM. The finding of age-related performance decline in ToM by evaluating all dimensions in a large sample seems to support the idea that ToM is sensitive to age. When considered with respect to educational status, both in the healthy volunteer group and the patients with schizophrenia group, ToM ability was found to

increase as the educational level increased. As for gender, no significant difference was found between males and females in both of the groups. There was no finding related to the effect of educational status on ToM in the literature. As for differences in gender, it was mentioned that it has not been investigated systematically (Brüne and Brüne-Cohrs 2006). The findings obtained in this study, which has a large sample of adult individuals, provide important information concerning the effects of demographic factors like gender, age, and education on ToM ability.

Limitations of the Study

The study has some limitations. Because there is no ToM scale, of which reliability and validity study had been conducted in our country until the time of this study, the Empathic Skill Index, which assesses empathy ability, which is thought to be related to ToM, and for which a reliability and validity study has been conducted, was used. It is a limitation to not use a ToM scale as a gold standard. Although we attempted to include tasks that assess all dimensions of ToM, no homogeneity was achieved in the distribution of tasks. It would be better to have equal numbers of items per ability. In the reliability analysis of the scale, it was found that one of the empathy stories did not function. It was also found that the visual task that assesses empathy took place under the representation factor instead of the empathy factor, as a socially accepted behavior. We suggest that the non-functioning empathy story (11. item) and visual task (7. item) should not be used in studies that will use the scale. Furthermore, both polyclinic and the service patients were included in the patients with schizophrenia group in the study. Although it is considered that this situation redounds to the severity of symptoms, this approach was used to reach a larger sample. However, patients who could cooperate with the interview, who were clinically stable, and who were not in a psychotic relapse were included the study to compensate for this limitation.

CONCLUSION

This study is the first study that covers all abilities of ToM and that aims to develop a ToM scale that is specific to the Turkish language. The findings of our study show that DEZİKÖ is a reliable and valid scale that can assess ToM-related impairments, especially in schizophrenia. The scale can be used as a measurement tool in studies that investigate ToM impairment in patients with schizophrenia or in the assessment of patients' social functioning.

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