

The Relationship of Theory of Mind and Attachment Characteristics with Disease Severity in Social Anxiety Disorder

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ABSTRACT

Introduction: The aim of our study is to compare the attachment characteristics and the theory of mind abilities measured by the Eyes Test between social anxiety disorder (SAD) patients and healthy controls. Another aim of our study is to investigate the relationship between attachment characteristics, theory of mind abilities and disease severity in patients with SAD.

Method: 47 consecutive patients with SAD and 50 healthy controls were recruited for the study. Sociodemographic data form, SCID-I Structured Clinical Interview form Patient Version, Beck Depression Inventory (BDI), Reading Mind in the Eyes Test (Eye Test), Liebowitz Social Anxiety Scale (LSAS), Experiences in Close Relationship Inventory (ECR) and State-Trait Anxiety Inventory (STAI) were administered to all participants.

Results: The BDI, LSAS anxiety and avoidance, ECR and anxiety and avoidance, STAI state and trait anxiety scores of the SAD group were higher than the controls, but the Eyes Test scores were lower. It was observed that the Eyes Test score difference between the two groups

survived when controlled for BDI and STAI state and trait anxiety scores. In the SAD group, both ECR anxiety and avoidance scores were associated with LSAS anxiety and avoidance scores. Eyes Test scores were associated with LSAS anxiety and avoidance scores. In regression analysis, it was observed that the Eyes Test, ECR anxiety and avoidance scores effected both the LSAS anxiety and the LSAS avoidance scores.

Conclusion: In SAD patients, the theory of mind functions was impaired when compared to healthy controls, and this difference has been found to be independent of anxiety or depression levels. Attachment anxiety and avoidance dimensions have negative effects on SAD disease severity. The fact that the theory of mind ability is inversely related with SAD severity suggests that interventions to improve social cognition might have a potential to decrease the severity of disease in SAD.

Keywords: Social anxiety disorder, attachment, theory of mind, disease severity

Cite this article as: Küçükparlak İ, Karaş H, Kaşer M, Yıldırım EA. The Relationship of Theory of Mind and Attachment Characteristics with Disease Severity in Social Anxiety Disorder. Arch Neuropsychiatry 2021; 58:63-67.

INTRODUCTION

Social Anxiety Disorder (SAD) is characterized by worries of being humiliated or judged by other people, experiencing a significant and constant fear about those issues and avoiding these situations as much as possible (1). It is known that individuals with SAD experience problems in close relationships, especially in romantic relationships and friendships, and have impairment in interpersonal functionality (2). Avoidance of social interaction in order to prevent possible conflict and negative emotions may result in individuals with SAD to establish weaker interpersonal bonds and to be socially isolation (2).

Attachment theory suggests that early experiences lead to schemas regarding oneself and others called "Internal Working Models", and that these schemas determine the expectations of the person for himself and others. Whether the attachment figures are accessible, supportive, and demanding for the person and whether the self is perceived as worthy of support, care and attention determines the attachment characteristics

of the person. Therefore, attachment characteristics play a determining role in interpersonal relationships throughout one's life (3). Although the relationship of attachment with various psychopathologies as well as interpersonal relationships is known, studies on its role in social anxiety disorder and disease severity are limited (4, 5). Studies on attachment in social anxiety disorder have reported that these patients have insecure attachment characteristics, and the high anxiety dimension in these patients, especially in these patients, is associated with high social anxiety (6).

It is known that individuals with SAD perceive social situations more dangerous and exaggerate both the possibility of experiencing and the consequences of negative social events, and evaluation bias negatively affects the social relations of patients (7, 8). It has also been reported that individuals with high social anxiety tend to interpret the situation negatively in socially ambiguous situations and have difficulty in

evaluating positive clues (8, 9). In addition to these biased thinking styles, it has been shown that SAD patients make more mistakes in tests related to predicting what goes on in the minds of others than those without SAD. Theory of Mind (ToM) abilities, which are the ability to predict emotion, thoughts and intentions of others, have been reported to be lower in SAD patients compared to individuals without SAD (10, 11).

Although high insecure attachment levels and impaired ToM in SAD patients have been reported, data on the relationship between attachment characteristics, theory of mind abilities, and disease severity in these patients are quite limited. The first aim of our study is to compare the ToM ability and attachment styles measured by the Eyes Test in patients with social anxiety disorder with healthy controls. The second aim of our study is to investigate the relationships between attachment characteristics, ToM ability and disease severity in patients with social anxiety disorder.

METHODS

Study Population

53 consecutive patients between the ages of 18 and 60 who were continuing their treatment with a diagnosis of SAD and who agreed to participate in the study in Bakirkoy Mental Health and Neurological Diseases Training and Research Hospital Secondary Care Psychotherapy Unit were included. Three patients were excluded in initial assessment due to failure to comply with the instructions while submitting the forms, and three patients were excluded for unconfirmation of the diagnosis of SAD by the SCID-I interview. A total of 47 patients were included in the study. Exclusion criteria were determined as severe depression, psychotic disorders and bipolar disorder, alcohol and substance use disorder.

Severe depression was defined as 29 points and above in the Beck Depression Inventory (BDI) in the literature, and the same value was applied as an exclusion criterion in our study (12). Other exclusion criteria were severe visual impairment, history of severe head trauma accompanied by loss of consciousness that could affect cognitive functions, epilepsy, clinically detected mental retardation, and less than 5 years of education. Fifty healthy volunteers who were similar in age and education level to the patient groups and who did not receive a psychiatric diagnosis during the by SCID-I interview were included as the control group. Participants in the control group consist of people who agreed to participate in the study among the hospital staff and their relatives. All participants were allowed to read the information text and their informed consent was obtained. Ethical approval was obtained from the Ethics Committee of Bakirkoy Mental Health and Neurological Diseases Training and Research Hospital for the study.

Sociodemographic Data Form: A detailed interview form, evaluating the psychological development, clinical diagnosis process, including questions about the patients' clinical status and sociodemographic characteristics related to their social anxiety and life history was obtained.

Structured Clinical Interview for DSM-IV Axis I Disorders - (SCID-I): Structured Clinical Interview for DSM IV-TR Axis I Disorders SCID-I was developed by First et al. was used (13). The Turkish validity and reliability study was performed by Çorapçioğlu et al. (14). It was controlled whether the study group diagnosed with SAD had another concurrent psychiatric disorder and whether the control group had any psychiatric axis-I diagnosis by applying SCID-I.

Beck Depression Inventory (BDI): It is a self-report scale developed by Beck in 1961 (15). BDI consists of 21 items scored between 0 and 3, so it is scored between 0 and 63. Total scores between 0 and 13 are considered to be minimally depressed, 14-19 mildly depressed, 20-28 moderately

depressed, and 29-63 severely depressed. The Turkish version of the inventory is available and a validity and reliability study has been conducted (16).

State-Trait Anxiety Inventory (STAI): STAI was developed by Spielberger et al. and Turkish validity and reliability study was conducted in 1985 (17, 18). It consists of state anxiety and trait anxiety scales both twenty-items. The total score obtained from both scales varies between 20 and 80. High scores indicate higher anxiety level.

Liebowitz Social Anxiety Scale (LSAS): It is a scale developed by Liebowitz to evaluate the severity of fear and avoidance experienced in social situations and situations requiring performance (19). It consists of a total of 24 questions, 11 of which evaluate social situations and 13 questions that evaluate situations that require performance. The scale administered by the clinician provides 6 subscale scores showing the severity of fear experienced in social situations, the severity of fear experienced in situations requiring performance, the severity of avoiding social situations, the severity of avoiding situations requiring performance, total fear severity, and total avoidance severity. The validity and reliability study of the Turkish version of LSAS was conducted Dilbaz et al. (20).

Experiences in Close Relationships (ECR): It was developed by Brennan, Clark and Shaver to determine attachment styles in close relationships (21). Attachment is examined in two dimensions, namely anxiety and avoidance. ECR is a dimensional scale and enables the individual to evaluate through the scores from both dimensions, not by assigning an individual to a group. In this direction, it provides opportunity for regression and correlation analysis. Avoidance dimension refers to the tendency of the individual to avoid close interpersonal relationships, and anxiety dimension refers to the anxiety of the individual about separating from close ones. The scale consists of 36 Likert-type questions and each item is rated between 1 to 7. The scale was adapted to Turkish by Sümer et al. (22).

Reading Mind in the Eyes Test (RMET): The Mind Reading Test from the Eyes was developed by Baron-Cohen et al. to evaluate emotion recognition abilities, and consists of photographic images including exclusively the eye region of various individuals (23). Participants were asked to choose one of the four items presented to them that describes the person's mental state best. The Turkish adaptation study of the test was conducted by Yıldırım et al. (24).

Statistical Analysis

The data were evaluated using IBM SPSS v.22.0 statistics program. Distribution properties of variables were evaluated with skewness-kurtosis statistics and indexes. Categorical data of both groups were compared with Chi-square (χ^2) test. Since test scores showed normal distribution, Independent Sample t test was used to compare numerical data of two groups. Pearson correlation analysis was conducted for assessing possible correlations between data of study group. Multivariate Linear Regression analysis was conducted to evaluate the effect of determined data on other numerical data. Below 0.05 at 95% confidence interval values were considered statistically significant for analysis.

RESULTS

The Chi-Square Independence test was applied to determine whether the individuals in the SAD group and the control group differ in terms of their demographic characteristics. There was no significant difference between the study and the control group in terms of gender ($\chi^2_{(1, N = 97)} = 0.563, p > 0.05$) and occupation ($\chi^2_{(1, N = 97)} = 0.394, p > 0.05$). According to the findings, it was determined that there was a significant difference in terms of marital status ($\chi^2_{(1, N = 97)} = 20.830, p < 0.01$) and education level ($\chi^2_{(2, N = 97)} = 8.702, p < 0.05$). The study group had a lower marriage rate and higher average education level than the control group (Table 1).

Table 1. SAD group and control group in terms of sociodemographic variables

Demographic Characteristics		SAD	Control	χ^2
		n (%)	n (%)	
Gender	Male	28 (60)	26 (52)	0.563
	Female	19 (40)	24 (48)	
Marital Status	Single	34 (72)	13 (26)	20.830**
	Married	13 (28)	37 (74)	
Place of Birth	Rural	16 (34)	6 (12)	38.744**
	Town	5 (11)	12 (24)	
	City	2 (4)	26 (52)	
	Metropolitan	24 (51)	6 (12)	
Education Levels	Primary Education	14 (30)	20 (40)	8.702*
	Secondary Education	14 (30)	23 (46)	
	Bachelors Degree or Higher	19 (40)	7 (14)	
Occupational Status	Unemployed	15 (32)	19 (38)	0.394
	Employed	32 (68)	31 (62)	

As a result of the Independent Sample t test summarized in Table 2; BDI of individuals in the SAD group and control group ($t_{(63.996)} = 5.168, p < 0.001$), STAI-S ($t_{(68.179)} = 3.134, p < 0.01$), STAI-T ($t_{(81.6359)} = 10.511, p < 0.001$), LSAS Anxiety ($t_{(78.477)} = 11.487, p < 0.001$), LSAS Avoidance ($t_{(70.708)} = 9.316, p < 0.001$), ECR Avoidance ($t_{(95)} = 2.484, p < 0.05$), ECR Anxiety ($t_{(95)} = 3.820, p < 0.001$) and scale scores were higher. People with SAD scored lower mean scores in the Eyes Test than the control group ($t_{(95)} = -3.036, p < 0.01$).

Table 2. Comparison of the mean scores of the SAD and the control group in BDI, STAI-S, STAI-T, LSAS anxiety, LSAS avoidance, ECR avoidance, ECR

	SAD	Control	sd	t
	Mean. \pm SS	Mean. \pm SS		
BDI	16.28 \pm 11.52	6.76 \pm 5.34	63.996	5.168***
STAI-S	40.57 \pm 9.44	35.74 \pm 4.91	68.179	3.134**
STAI-T	52.87 \pm 8.47	37.20 \pm 5.90	81.635	10.511***
LSAS Anxiety	59.43 \pm 11.00	37.60 \pm 7.19	78.477	11.487***
LSAS Avoidance	52.26 \pm 11.00	35.30 \pm 6.08	70.708	9.316***
ECR Avoidance	63.15 \pm 19.98	53.88 \pm 16.71	95	2.484*
ECR Anxiety	76.55 \pm 19.58	62.16 \pm 17.52	95	3.820***
Eyes Test	20.68 \pm 4.34	23.12 \pm 3.55	95	-3.036**

BDI, Beck Depression Inventory; STAI-S, State and Trait Anxiety Inventory-State, STAI-T, State and Trait Anxiety Inventory-Trait; LSAS, Liebowitz Social Anxiety Scale; ECR, Experience in Close Relationships; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

MANCOVA analysis was applied to determine whether there was a significant difference between the Eyes Test scale scores of the individuals in the SAD group and the control group when the effect of the scores obtained from the BDI, DSKE-D and DSKE-S scales was controlled. As a result of the MANCOVA analysis summarized in Table 3; It was determined that BDI, STAI-S, and STAI-T scores did not have a significant effect on Eyes Test scale scores ($F(1.92) = 6.956, p < 0.01$). Therefore, it was

Table 3. MANCOVA analysis of Eise Scores of the SAD and the control group, controlled by the effect of BDI, STAI-S and STAI-T scores.

Source	Type III Sum of Squares	sd	Square Mean	F
Corrected Model	208.391	4	52.098	3.372
Cut-off Point	438.726	1	438.726	28.400
Group	107.455	1	107.455	6.956**
BDI	32.011	1	32.011	2.072
STAI-S	35.182	1	35.182	2.277
STAI-S	14.335	1	14.335	0.928
Error	1421.238	92	15.448	
Total	48314.000	97		
Corrected Total	1629.629	96		

BDI, Beck Depression Inventory; STAI-S, State and Trait Anxiety Inventory-State, STAI-T, State and Trait Anxiety Inventory-Trait; Dependent variable Eyes Test $R^2=0,13$ ($AR^2=0,09$); * $p < 0,05$, ** $p < 0,01$, *** $p < 0,001$.

determined that the difference in Eyes Test scores between two groups was not affected by the BDI, STAI-S, and STAI-T scores.

In correlation analysis, in the SAD group, the BDI scores and STAI-S ($r=0.44, p < 0.001$), STAI-T ($r=0.66, p < 0.001$), LSAS anxiety ($r=0.47, p < 0.001$), LSAS avoidance ($r=0.48, p < 0.001$) and ECR anxiety ($r=0.28, p < 0.001$) scores were found to be statistically significantly correlated. Furthermore, a statistically significant correlation was detected between STAI-S scores and STAI-T ($r=0.44, p < 0.001$), LSAS anxiety ($r=0.41, p < 0.001$), LSAS avoidance ($r=0.46, p < 0.001$) and ECR avoidance ($r=0.33, p < 0.001$) scores. Moreover, there was a statistically significant relationship between the STAI-T, LSAS anxiety ($r=0.64, p < 0.001$), LSAS avoidance ($r=0.62, p < 0.001$), ECR avoidance ($r=0.28, p < 0.001$) and ECR anxiety ($r=0.48, p < 0.001$) scores. Again, a statistically significant relationship was found between the scores of the LSAS anxiety score and LSAS avoidance ($r=0.91, p < 0.001$), ECR avoidance ($r=0.34, p < 0.001$), ECR anxiety ($r=0.35, p < 0.001$) and Eyes test ($r=-0.28, p < 0.001$). Furthermore, a statistically significant relationship was found between LSAS avoidance, ECR avoidance ($r=0.38, p < 0.001$), ECR anxiety ($r=0.26, p < 0.001$) and Eyes Test ($r=-0.34, p < 0.001$) scores (Table 4).

As a result of Multivariate Linear Regression analysis summarized in Table 5; it was determined that ECR avoidance ($\beta=0.35, p < 0.001$), ECR anxiety ($\beta=0.19, p < 0.05$) and Eyes Test ($\beta=-0.30, p < 0.01$) scores, had a significant effect on LSAS avoidance scores ($F(3.93)=12.451, p < 0.001, R^2=0.29$). As a result of Multivariate Linear Regression analysis summarized in Table 6; it was determined that ECR avoidance ($\beta=0.30, p < 0.01$), ECR Anxiety ($\beta=0.29, p < 0.01$), and Eyes Test ($\beta=-0.23, p < 0.05$) scores had a significant effect on LSAS Anxiety scores ($F(3.93)=11.312, p < 0.001, R^2=0.27$).

In brief, both ECR anxiety and ECR avoidance scores were found to be higher in the SAD group compared to the control group in our study. Eyes Test scores were found to be significantly lower in the SAD group compared to the control group. In correlation analysis, a relationship was found between LSAS anxiety scores and ECR anxiety, ECR avoidance and Eyes Test scores. Similarly, a relationship was found between LSAS avoidance score and ECR anxiety, ECR avoidance and Eyes Test scores. In the regression analysis, it was determined that the ECR avoidance, ECR anxiety and Eyes Test scores had an effect on both LSAS anxiety and LSAS avoidance scores.

Table 4. Relationship between BDI, STAI-S, STAI-T, LSAS anxiety, LSAS avoidance, ECR avoidance, ECR anxiety, and Eyes Test scores in the SAD group

	1.	2.	3.	4.	5.	6.	7.	8.
1. BDI	-							
2. STAI-S	0.44***	-						
3. STAI-T	0.66***	0.44***	-					
4. LSAS Anxiety	0.47***	0.41***	0.64***	-				
5. LSAS Avoidance	0.48***	0.46***	0.62***	0.91***	-			
6. ECR Avoidance	0.18	0.33***	0.28***	0.34***	0.38***	-		
7. ECR Anxiety	0.28***	0.05	0.48***	0.35***	0.26***	0.09	-	
8. Eyes Test	-0.19	0.04	-0.17	-0.28***	-0.34***	-0.04	-0.12	-

ECR, Experience in Close Relationships; LSAS, Liebowitz Social Anxiety Scale; Dependent variable: LSAS Anxiety; *p<0.05, **p<0.01, ***p<0.001.

Table 5. Effects of ECR avoidance, ECR anxiety, and Eyes Test scores on LSAS avoidance scores

	b	t	F	R ²	AR ²
			12.451***	0.29	0.26
ECR Avoidance	0.352	4.001***			
ECR Anxiety	0.193	2.175*			
Eyes Test	-0.300	-3.404**			

ECR, Experience in Close Relationships; LSAS, Liebowitz Social Anxiety Scale; Dependent variable: LSAS Avoidance; *p<0.05, **p<0.01, ***p<0.001.

Table 6. Effects of ECR avoidance, ECR anxiety and Eyes Test scores on LSAS anxiety scores

	b	t	F	R ²	AR ²
			11.312***	0.27	0.24
ECR Avoidance	0.300	3.359**			
ECR Anxiety	0.293	3.261**			
Eyes Test	-0.231	-2.584*			

ECR, Experience in Close Relationships; LSAS, Liebowitz Social Anxiety Scale; Dependent variable: LSAS Anxiety; *p<0.05, **p<0.01, ***p<0.001.

DISCUSSION

This is the first study to show the effect of ToM ability on disease severity in patients with SAD to our knowledge. The higher levels of both anxiety and avoidance in attachment in SAD patients compared to controls are consistent with previous studies (6). The presence of this difference in our sample with a low level of depression indicates that, regardless of the effect of depression, attachment styles are more anxious and avoidant in SAD patients compared to healthy controls. A recent study by Adams et al., showed that patients with SAD and depression comorbidity showed more anxious and avoidant attachment styles than those with only depression (4). SAD seems to be associated with higher anxiety and avoidance dimensions in attachment, independent of depression levels.

Various studies have shown that attachment styles, which are categorically evaluated in SAD, have an effect on the severity of the disorder (4, 5). In addition to this literature data, our study revealed that attachment affects the severity of social anxiety in SAD patients also at a dimensional level. A recent study by Read et al. found that both anxiety and avoidance dimensions of attachment were associated with social anxiety severity on non-clinical sample. Our study showed that the anxiety and avoidance dimensions of attachment had an effect on the severity of social anxiety in the SAD group. Unlike the study of Read et al., the effect of attachment on social anxiety severity was evaluated in terms of both anxiety and avoidance dimensions in our study (25). While the ECR anxiety dimension had a highly significant effect on both dimensions of social anxiety, the effect of the ECR avoidance dimension on the avoidance dimension of social anxiety was significant, and its effect on the anxiety dimension was highly significant. High anxiety and avoidance dimensions in attachment may disrupt emotion regulation strategies and lead to increased social anxiety (25).

Eyes Test mean scores was lower in SAD group than controls. This finding is consistent with the results of the study in which Hezel and

McNally reported impaired Eyes Test performance in SAD patients (10). Washburn et al. also reported impaired Eyes Test performance in SAD patients without comorbid depression (11). The fact that the depression levels of the patients in our study were relatively low and the difference in Eyes Test scores between the two groups remained after controlling depression levels are consistent with the findings of Washburn et al. In addition to these data, our study showed that even when trait and state anxiety levels were controlled, Eyes Test performance was impaired in SAD. According to our literature knowledge, a ToM comparison has still not been made by controlling the anxiety levels in SAD patients. Since the level of trait and state anxiety -which can be high in SAD patients- might also affect social cognition, it was notable to confirm that the difference still continues when those confounding effects are excluded in terms of discussing whether the ToM disability is one of the a primary features of SAD (26). In addition, the education level of people with SAD in our sample is higher than the control group. Considering the effect of education level on Eyes Test performance, the low ToM performance in the SAD group might suggest a specific feature of SAD.

The importance of ToM skills in children in terms of establishing social relationships, especially peer relationships has been emphasized (27). In a recent study, it was revealed that social anxiety mediates the effect of ToM ability on peer relationships (28). Another study conducted by Öztürk et al. found that ToM abilities in the adolescent SAD patients were impaired comparing to the control group and this impairment was correlated with SAD severity (29). Studies investigating the ToM ability in patients with SAD mostly focused on the effect of social anxiety on ToM (10, 11). Our study also showed that eye reading ability plays a determinant role on the anxiety and avoidance symptoms of social anxiety in adult SAD patients. Although it is difficult to establish causality regarding the cross-sectional nature of the study, it can be speculated that the impairment in mind-reading ability might lead to aggravation of social anxiety by increasing the sensitivity to rejection (30).

One of the limitations of our study is non-exclusion of psychiatric comorbidities other than bipolar disorder and psychotic disorders. Since the Eyes Test evaluates the affective component of ToM, cognitive component of ToM abilities could not be adequately evaluated in our study. Another limitation of our study is the sociodemographic difference between the patient group and the control group in terms of educational status and marital status. On the other hand, although anxiety disorders were not excluded by diagnostic interview, making a comparison by controlling the level of trait and state anxiety overcomes this limitation of our study to some extent. One of the strengths of our study is to exclude a possible diagnosis of depression with the BDI cut-off value.

In conclusion, our study revealed that anxiety and avoidance dimensions of attachment are higher than healthy controls despite lower depression levels and when state anxiety is controlled. Similarly, ToM abilities were found to be lower in our sample compared to controls, and this difference was found to be independent of state anxiety. In addition, it was observed that attachment dimensions and ToM abilities affected the severity of the disease. The results of our study may indicate that attachment-based approaches might be beneficial in psychotherapy of SAD patients. In addition, the evaluation of ToM abilities in which social cognition is evaluated visually in patients with SAD reveals the importance of evaluating social cognition and developing patient-specific approaches in the treatment of these patients. There is a need for studies with larger samples with excluded comorbidities that evaluate both affective and cognitive components of ToM abilities in SAD patients.

Acknowledgment: We thank to Kübra Ersoy for her support in statistical analysis.

Ethics Committee Approval: Ethics committee approval was obtained from Bakırköy Mental Health and Neurological Diseases Training and Research Hospital Ethics Committee.

Informed Consent: All participants read the information text and provided informed consent.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept- İK; Design-İK, EAY; Supervision-İK; Resource-İK, EAY; Materials-İK; Data Collection and/or Processing- İK, EAY; Analysis and/or Interpretation- İK, HK, MK, EAY; Literature Search- İK, HK; Writing- İK, HK, MK; Critical Reviews- İK, HK, MK.

Conflict of Interest: The author declare that they have no conflict of interest.

Financial Disclosure: The authors declare that there are no financial conflicts of interest to disclose.

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