ANKARA MEDICAL JOURNAL

Research Article

Ankara Med J, 2025;(2):158-172 // 10.5505/amj.2025.70205

EXAMINATION OF FACIAL EMOTION RECOGNITION SKILLS OF INDIVIDUALS WITH SOCIAL ANXIETY

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Submitted: 14.04.2025 // Accepted: 26.05.2025

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ANKARA MEDICAL JOURNAL

Abstract

Objectives: The ability to figure out emotions very quickly while interacting and reacting appropriately is essential for acceptable social behavior. This study assessed the effect of social anxiety level on emotion recognition in facial expressions in a large cross-sectional case population, without a time limitation to avoid the negative effect of reaction time.

Materials and Methods: The data collection tools involved the sociodemographic characteristics data form, the Brief Fear of Negative Evaluation Scale (BFNE), the Brief Social Phobia Scale (BSPS), and the Emotion Identification Test from Facial Expressions.

Results: A total of 641 university students with a mean age of 21.36 ± 2.98 years participated in the study. There was a positive correlation between the BFNE and BSPS and its subdimensions. The BFNE had a negative relationship with the neutral emotion. There was a positive correlation between the BSPS and the feeling of disgust. There was a significant difference between individuals with high social anxiety and individuals with low social anxiety in recognizing anger and disgust emotions. There was no difference between the socially anxious groups and non-socially anxious groups in the overall misclassification of identifying facial expressions. Individuals with high social anxiety had a significantly higher fear of being negatively evaluated than those with low social anxiety.

Conclusion: Considering that facial expressions convey basic social information, understanding the interpretation of facial expressions is important for understanding social anxiety. Therefore, comprehensively understanding face recognition-oriented biases will guide future intervention strategies through cognitive processing in social anxiety.

Keywords: Social phobia, social anxiety disorder, emotion, face.

Introduction

Social phobia (social anxiety disorder, SAD) is a common disorder characterized by a disproportionate fear and anxiety of social performance and social situations that negatively affect functioning. Individuals with pathological SAD may develop disproportionate fears about the potential danger associated with social interactions and may avoid eye contact and looking at the faces of other individuals.[1] Considering that many of the social clues encountered in everyday life are ambiguous or irrelevant, biases for negatively misinterpreting these clues may serve to maintain anxiety about interacting with the world.

Wells et al. suggest from a cognitive perspective that SAD is characterized by addressing social situations in a negatively biased manner.[2] Individuals with SAD tend to interpret ambiguous and unfavorable social events more negatively or as a sign of disapproval than individuals without anxiety.[2,3] Biased information processing includes biased attention to social threats, excessive attention to internal clues, and negative interpretation of ambiguous social events.[4] Individuals with SAD are assumed to preferentially direct their attention to potential social threats in the environment, in other words, to indicators of being negatively evaluated or rejected. Threat detection occurs at an early stage of information processing, which occurs automatically and involves the unconscious, rapid, and involuntary recognition of stimuli.[5,6] Anxiety causes mild or ambiguous social disapproval to be interpreted as destructive.[3] Studies have found that socially anxious individuals interpret depictions of ambiguous social scenes more negatively or less favorably than individuals without anxiety.[4-7]

Recognizing emotions from facial expressions is particularly important when processing relevant social information. Facial expressions provide an important reference for information about other people's emotions and intentions during social interactions.[8] The ability to figure out emotions very quickly while interacting and reacting appropriately is essential for acceptable social behavior.[9] Facial expressions typically include clues for different categories of emotions and are therefore ambiguous in nature.[10] Because socially anxious individuals tend to interpret social responses as a sign of disapproval, the ambiguity in facial expressions is prone to misinterpretation.[11] Individuals with SAD have a high level of bias in interpreting facial expressions, especially increased sensitivity to facial expressions that evoke a threat or scrutiny.[12,13] Patients with SAD tend to evaluate neutral faces negatively, remember critical faces better, and scan facial expressions with a different eye movement pattern than those without SAD.[1,14,15] People with high SAD who interpret social interactions catastrophically recognize negative expressions more accurately than other expressions and are more likely to categorize a neutral or positive expression as negative.[16]

The issue in recognizing facial expressions is a bias in information processing, and biases in information processing play a central role in the development and maintenance of psychiatric disorders.[17] Considering that facial expressions convey basic social information, understanding the interpretation of facial expressions is

important for understanding SAD. Therefore, comprehensively understanding face recognition-oriented biases will guide future intervention strategies through cognitive processing in SAD. Given that the duration of presentation of facial expressions and emotional intensity vary simultaneously, we cannot determine whether differences across individuals are due to the isolated effect of only one of these variables or their combined effect. This study assessed the effect of SAD level on emotion recognition in facial expressions in a large cross-sectional case population, without a time limitation to avoid the negative effect of reaction time.

Study hypotheses

There is a positive relationship between the SAD scores and the fear of being negatively evaluated.

The performance in the identification of facial expressions of emotions differs between socially anxious groups and non-anxious groups.

There is a positive relationship between SAD scores and facial expressions showing threatening emotions (i.e., anger, fear, or disgust).

Materials and Methods

This study was conducted in two universities in Turkey between April 01 and June 01, 2024. The total number of students enrolled in these two universities is 35471. The estimated sample size was 381 based on the population sample calculation (alpha = 0.05, confidence interval = 95%). Of the university students, 641 participated in the study. The sample included undergraduate students who responded to self-report questionnaires. For the social anxiety group, we used the following clinical cut-off score: ≥20 on the BSPS. The criteria for participation in the study included being a university student, being 18 years of age or older, having access to the internet, and volunteering for the study. Participants who gave incomplete responses to the study scales were excluded.

The study was granted ethical approval by the Ankara Yıldırım Beyazıt University (03-612) and was conducted following the Declaration of Helsinki.

Procedure

All data were collected via Google Forms, an online survey site. The study link was sent to the e-mail addresses of the students by the Information Technology units of the departments where they were studying. Upon accessing the link with a self-report questionnaire, participants were shown an informed consent form. The data collection tools covered the variables studied, including the Sociodemographic Characteristics Data Form,

the Brief Fear of Negative Evaluation Scale (BFNE), the Brief Social Phobia Scale (BSPS), and the Emotion Identification Test from Facial Expressions of Healthy Individuals in Turkish Society (EITTS). Each participant was presented with 70 color images of emotional expressions. Participants had to identify the emotions depicted by each face. To avoid habituation, a participant was presented with each person displaying each of the seven emotions (happiness, sadness, surprise, fear, disgust, anger, and neutral) only once. Completion of the questionnaires took approximately 15 to 30 minutes. The study was approved by the Ethics Committee (Date: 21.03.2024; No: 03-612) and conducted following the Declaration of Helsinki. The principles of "Confidentiality and Protection of Privacy" and "Respect for Autonomy" were adopted. Participation in the study was voluntary, and no incentives were offered.

Measurements

Sociodemographic Characteristics Data Form: This form included questions to collect information about the participants' age, sex, education, marital status, socio-economic status, and where and with whom they live.

The Brief Fear of Negative Evaluation Scale: The twelve-item scale was developed by Leary (1983). It was adapted to Turkish culture by Çetin et al.[18] It is a self-report scale measuring an individual's tolerance to negative or hostile evaluations by others. The responses to statements are rated on a 5-point Likert scale, ranging from 1 (Not at all characteristic of me) to 5 (Extremely characteristic of me). In the adaptation process, 1 item with a factor load value below the acceptable level was removed, the analyses were repeated, and an 11-item measurement tool was obtained. There are three reverse items on the scale. Cronbach alpha internal consistency coefficient, split-half reliability, and test-retest reliability were tested for the scale's reliability. The internal consistency coefficient of the scale was 0.84, and the split-half reliability coefficient was 0.83. The test-retest procedure was performed at an interval of two weeks, and the test-retest reliability coefficient was reported as 0.82. Factor loads ranged from 0.34 to 0.74.[18] The Cronbach Alpha coefficient of the scale was calculated at 0.90 for the current study.

Brief Social Phobia Scale: The BSPS, which is administered by the clinician, evaluates the fear and avoidance associated with the seven social situations and the severity of the four physiological manifestations. It was developed by JR Davidson in 1991. It was adapted to Turkish culture by Cengiz et al.[19] In the first chapter, the clinician questions the severity of fear and avoidance within the past week with a Likert-type scale between 0 and 4 points. Scores range from 20–72. This accorded with a total score of 20 has been judged to reflect social phobia symptoms severe enough to warrant treatment. If people have not experienced any fear and avoidance within the past week, they are asked to respond by thinking about how they would feel if they encountered such a situation. In the second part, the physical signs are scored again in the same way. Thus, a total of three

scores on three fields including fear, avoidance, and physical symptoms are obtained. The Cronbach's alpha coefficient was 0.87.[19] The Cronbach Alpha coefficient of the scale was calculated at 0.94 for the current study.

The Emotion Identification Test from Facial Expressions of Healthy Individuals in Turkish Society: This test was developed by Turan.[20] To create the data set for the test, the researcher took facial photographs expressing six basic emotions (happiness, sadness, surprise, fear, disgust, and anger) and neutral emotions. The photographs deemed appropriate according to expert opinion were collated and a test setup was created in the computer environment. Participants were asked to evaluate which emotion the facial expression they saw on the computer screen expressed for them. Sex, sex range, and geographical region criteria were kept equal, and each emotion expression that had a recognition rate of 80% and above was included in the test. Finally, facial photographs of facial 10 expressions of each emotion were gathered and a test setup consisting of a total of 70 photographs was prepared. In scoring, 1 point is given for correct and 0 points are given for incorrect answers. The maximum score on the test is 70. The correlation values of (EITTS) test-retest scores were examined and the r-value of the test total score was 0.58 ($p<0.001$). The Cronbach's alpha coefficient of the scale was 0.90 for the present study.

Statistical analysis

All statistical analyses were performed using SPSS (version 22). The normality distribution was tested with a histogram and the Shapiro–Wilk test. Descriptive statistics including frequencies and percentages, as well as measures of mean and standard deviation, were used to describe the data. For the social anxiety group, we used the following clinical cut-off score:≥20 on the BSPS. Due to the non-normal distribution of the data, relationships were analyzed between all variables using bivariate Spearman rank correlation. To evaluate the outcomes, the students were divided into two groups: socially anxious and non-anxious. The Mann-Whitney U test was used to evaluate whether there was a difference between the fear of being negatively evaluated and the recognition of emotions from facial expressions between the groups. A p-value <0.05 was considered statistically significant.

Results

A total of 641 university students with a mean age of 21.36±2.98 years participated in the study. The participants' subjective economic perception level was 5.41±1.57 (the level is scored from 1 to 10, with 1 being those who perceive they have the least amount of money, and 10 being those with the perception of having the most money). Most were female (85.2%), while 14.8% were male. Of the participants, 64.4% had no romantic relationship, 51.8% lived in a student dormitory, 33.4% were at the first-year level, 91.9% had no chronic disease, and 90.6% had no mental illness. The BSPS score of 66.0% of the participants was above 20 points.

Demographic characteristics of the participants are shown in Table 1. Descriptive statistics and correlations between all variables are presented in Table 2. Briefly, the mean self-reported BFNE scores were 30.8 (SD = 8.9), mean BSPS scores were 26.9 (SD = 14.3; scored out of 20, with greater scores indicating greater SAD), and mean identification of facial expressions of emotions scores were 59.2 (SD = 8.1)

Table 1. Descriptive Characteristics (n=641)

Variable	n	%
Gender		
Female	546	85.2
Male	95	14.8
Marital status		
Single	413	64.4
Committed dating relationship	228	35.6
Residential area		
Student dormitory	332	51.8
At home with family	219	34.2
At home with friends	36	5.6
Alone at home	28	4.4
At home with relatives	26	4.0
Grade		
1	214	33.4
2	142	22.2
3	106	16.5
4	175	27.3
5	2	0.3
6	2	0.3
Having a chronic illness		
Yes	52	8.1
No	589	91.9
Having a mental illness		
Yes	60	9.4
No	581	90.6
BSPS* score		
<20	218	34.0
≥20	423	66.0

*BSPS: Brief Social Phobia Scale; This accorded with a total score of 20 has been judged to reflect social phobia symptoms severe enough to warrant treatment.

Descriptive statistics and correlations between all variables are presented in Table 2. Briefly, the mean self-reported BFNE scores were 30.8 (SD = 8.9), mean BSPS scores were 26.9 (SD = 14.3; scored out of 20, with greater scores indicating greater SAD), and mean identification of facial expressions of emotions scores were 59.2 (SD = 8.1).

There was a positive correlation between the BFNE and BSPS and its subdimensions ($p < 0.01$). In addition, the BFNE had a negative relationship with the neutral emotion ($r = -0.09$, $p<0.01$). There was a positive correlation between the BSPS and the feeling of disgust ($r=0.10$, $p<0.01$). Anxiety and avoidance, subdimensions of the BSPS, had a positive correlation with disgust ($r=0.11$, $p<0.01$; $r=0.10$, $p<0.05$, respectively); however, physiological reactions, another subdimension of the BSPS, had a negative correlation with the neutral emotion ($r=-0.09$, $p<0.05$) (Table 2).

Table 3 shows the results of the evaluation of whether there was a difference between fear of being negatively evaluated and recognition of emotions from facial expressions between groups with high and low SAD. The BFNE score was significantly higher in the individuals with SAD ($z=-13.489$, $p=0.000$). There was a significant difference between individuals with high SAD and individuals with low SAD in recognizing anger and disgust emotions ($z=-2.266$, $p=0.023$; $z=-2.224$, $p=0.026$) (Figure 1). As shown in Figure. 2 there was no difference between the socially anxious groups and non-socially anxious groups in the overall misclassification of identifying facial expressions.

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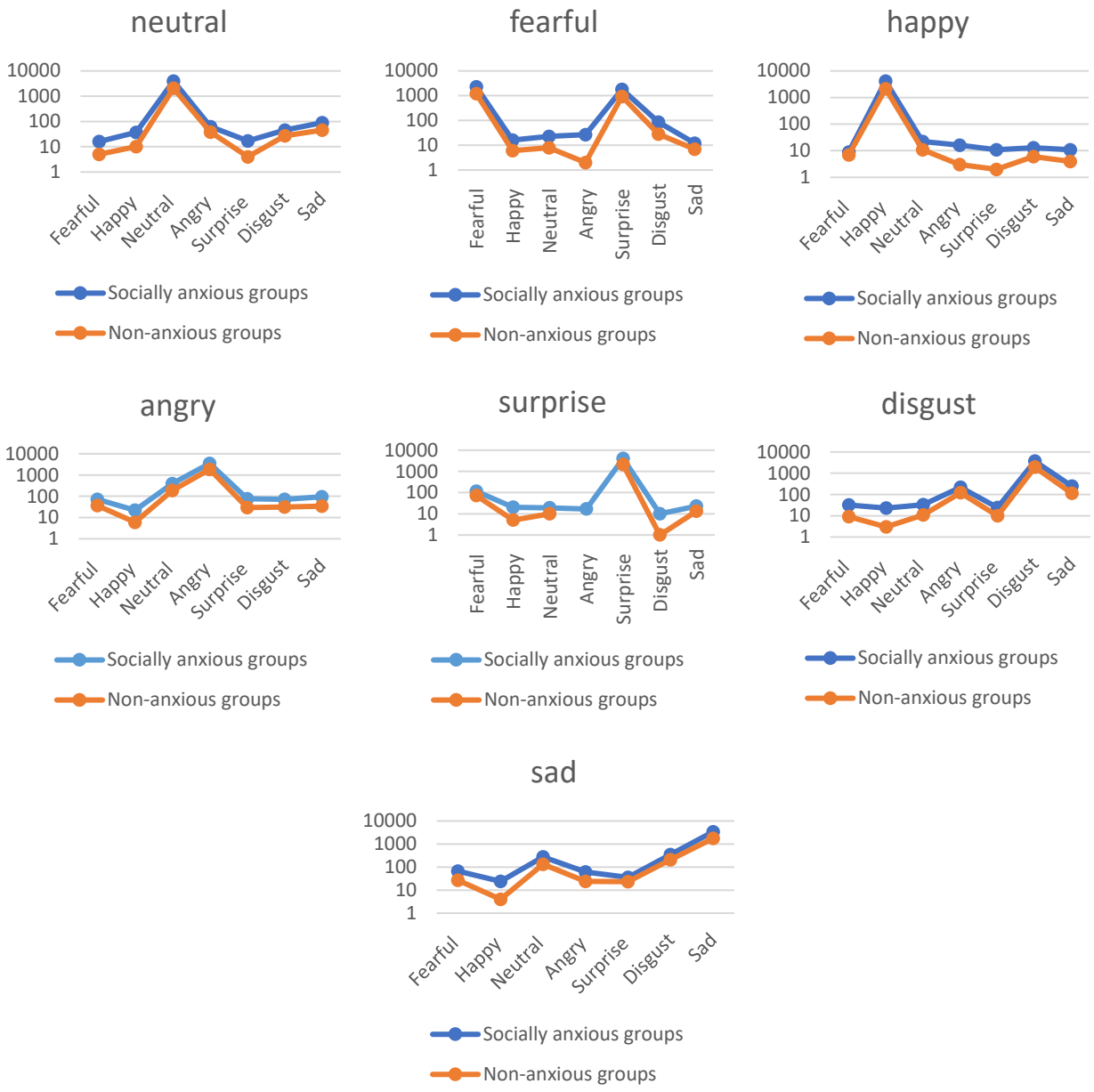

Figure 1. Distribution of misclassification by emotion type

Table 2. Correlation, means, and standard deviation table

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
M	30.8	26.9[a]	11.5	10.8	4.6	59.2	5.4	9.5	8.0	9.8	8.3	9.3	8.7
SD	8.9	14.3	6.1	5.9	3.6	8.1	3.0	1.3	2.0	0.9	1.9	1.3	1.4
Cronbach's α	0.90	0.94	0.89	0.87	0.84	0.90	0.82	0.82	0.71	0.91	0.73	0.74	0.60
1. BFNE	-												
2. BSPS	0.693**	-											
3. Fear	0.674**	0.963**	-										
4. Avoidance	0.653**	0.957**	0.919**	-									
5. Physiological reactions	0.530**	0.755**	0.615**	0.599**	-								
6. EITTS	0.032	0.050	0.096*	0.047	-0.043	-							
7. Fearful	0.029	0.032	0.070	0.020	-0.031	0.802**	-						
8. Surprise	-0.030	0.010	0.026	0.011	-0.024	0.251**	0.019	-					
9. Sad	-0.024	-0.010	0.023	-0.003	-0.068	0.570**	0.290**	0.126**	-				
10. Happy	-0.027	0.017	0.053	0.008	-0.034	0.294**	0.176**	0.292**	0.216**	-			
11. Angry	0.014	0.040	0.069	0.047	-0.025	0.559**	0.247**	0.218**	0.253**	0.225**	-		
12. Neutral	-0.096*	-0.064	-0.046	-0.050	-0.092*	0.265**	0.117**	0.243**	0.097*	0.285**	0.027	-	
13. Disgust	0.048	0.109**	0.117**	0.100*	0.064	0.349**	0.122**	0.111**	0.087*	0.204**	0.222**	0.126**	-

BFNE: Brief Fear of Negative Evaluation Scale; BSPS: Brief Social Phobia Scale; EITTS: Emotion Identification Test from Facial Expressions of Healthy Individuals in Turkish Society. M and SD are used to represent mean and standard deviation respectively.

[a] Scores range from 20–72, This accorded with a total score of 20 has been judged to reflect social phobia symptoms severe enough to warrant treatment.

*indicates $p < 0.05$. ** indicates $p < 0.01$

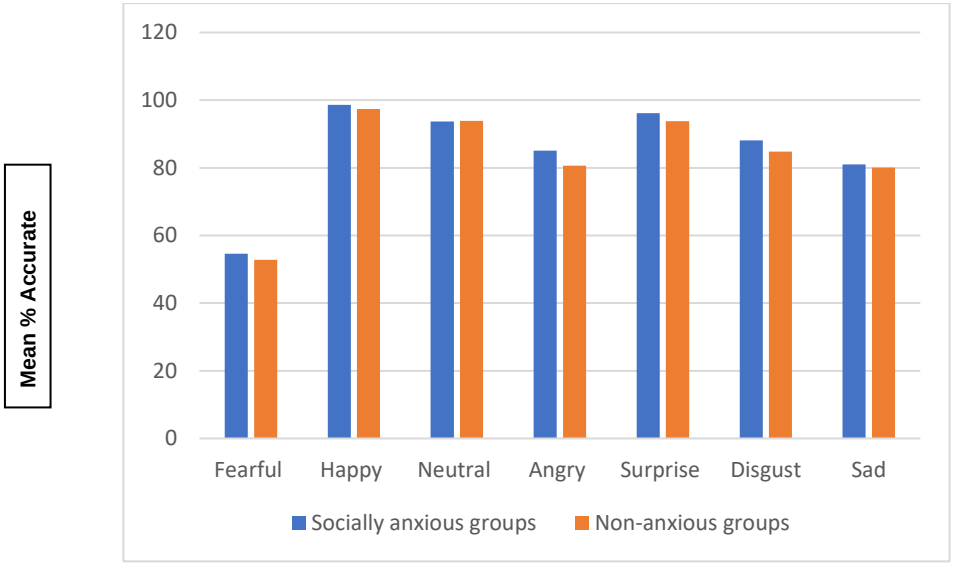

Figure 2. Mean % (SE) accuracy of facial expression recognition by emotion type

Table 3. Distribution of emotion recognition scores from face expressions between socially anxious and non-socially anxious groups

Variable	Socially anxious groups	Non-socially anxious groups	Statistical analysis *	
	Mean± SD	Mean± SD	z	p
BFNE	34.03±8.47	24.53±5.97	**-13.489***	0.000
EITTS	59.72±7.24	58.34±9.60	-1.652	0.098
Fearful	5.46±3.09	5.28±3.03	-0.779	0.436
Surprise	9.61±1.05	9.38±1.70	-0.957	0.339
Sad	8.10±1.98	8.01±2.16	-0.011	0.991
Happy	9.86±0.76	9.74±1.31	-0.096	0.924
Angry	8.51±1.76	8.06±2.19	**-2.266***	0.023
Neutral	9.37±1.24	9.39±1.41	-0.849	0.396
Disgust	8.81±1.32	8.48±1.71	**-2.224***	0.026

*Mann-Whitney U Test; SD: Standard Deviation; p: Significance ($p \leq 0.05$).

Discussion

This study was conducted to investigate the emotion recognition performance from facial expressions of individuals with high SAD levels. Consistent with the study's hypotheses, individuals with high SAD had a significantly higher fear of being negatively evaluated than those with low SAD. A positive relationship was

found between fear of being evaluated negatively and SAD. A significant difference was found between the groups with high SAD and low SAD in recognizing feelings of anger and disgust. There was a positive correlation between anxiety and avoidance, the subdimensions of the BSPS, with the feeling of disgust; however, there was a negative correlation between the physiological reactions subdimension and the feeling of neutrality. Fear of being evaluated negatively had a negative correlation with neutral emotions.

Fear of being evaluated negatively is an underlying element of SAD.[6] Individuals afraid of being evaluated negatively may also experience the fear that this will be noticed by others, which may increase their SAD level.[9] Sigurvinsdottir and colleagues found that individuals with SAD have high levels of fear of being evaluated negatively.[14] Previous studies have shown a positive correlation between being afraid of being negatively evaluated and SAD.[21,22] SAD is characterized by a negative interpretation bias toward ambiguous social stimuli.[11] Individuals with SAD exaggerate the likelihood of others' negative evaluations of their performance and catastrophize the consequences of being negatively evaluated. Biased information processing contributes to the continuation of SAD.

Processing facial expressions is an important source of interpersonal information about positive or negative evaluations of others in the process of evaluating and responding to unexpected environmental situations.[8,10] In the present study, individuals with high levels of SAD performed better than those with low levels of SAD in recognizing feelings of anger and disgust. Previous studies found no difference between individuals with and without SAD correctly recognizing emotions from facial expressions, individuals with SAD have more correct responses in recognizing facial expressions, individuals with SAD have more correct responses in recognizing angry facial expressions, and individuals with SAD evaluate angry and disgusted faces as more unreliable than those without SAD and need more information to recognize facial expressions.[23-26] Individuals with SAD pay more attention to angry faces.[13] Liang and colleagues found that the eye movements of individuals with SAD are more fixed on angry facial expressions than other emotions.[24] Gentili and colleagues reported that individuals with SAD have high amygdala activity in response to negative facial expressions (e.g., anger, disgust, and fear).[26] Individuals in a feared social situation feel that they are being negatively evaluated by others to an exaggerated and unrealistic extent, and expect to be negatively evaluated and rejected. Thus, individuals with SAD tend to focus their attention on themselves. This situation interferes with addressing external social clues normally. This can lead to attention and interpretation biases in detecting social threats, resulting in hypervigilance to negative emotions.[23]

Better addressing threat clues may emerge as a result of increased perception or selective attention. Therefore, higher levels of SAD may be associated with an increased ability to detect negative emotions in others beyond a negative response bias.[14] In the present study, anxiety and avoidance, the subdimensions of the BSPS, had a positive correlation with the feeling of disgust. The expression of anger and disgust is one of the main emotional

components of hostility.[1] Therefore, facial expressions of disgust can be quite threatening for individuals with SAD as they may signal disapproval or rejection.[10,12] Individuals with SAD exhibit a pattern called hypervigilance or avoidance. Hypervigilance-avoidance models define hypervigilance as an initial attention bias toward threatening stimuli (e.g., angry facial expressions) followed by avoidance of these stimuli.[27] According to this pattern, individuals with SAD show the first stage (hypervigilance), which is characterized by increased attention to expressions of negative emotions such as disgust and angry faces.[1]

Bodily manifestations of anxiety during interpersonal interactions, and especially their visibility, also become a central object of fear in individuals with SAD. This results in the individual exhibiting high levels of self-focused attention.[2] Stimuli that are neutral or only mildly aversive to most people can lead to hyperarousal, increased vigilance, emotional distress, and attempts to escape or avoid the anxiety-provoking object or situation.[11] Biased attention to social threats, excessive attention to internal clues, and negative interpretation of ambiguous social events contribute to biased information processing in individuals with SAD.[28] The present study found that fear of being evaluated negatively and the physiological reaction subdimension of the BSPS had a negative correlation with neutral emotions. As the fear of individuals with SAD being evaluated negatively increases, the rate of correct perception of neutral facial expressions decreases. Neutral faces presented in combination with a negative sense of smell lead to increased activation in the amygdala and hippocampus of patients with SAD.[29] Israelashvili and colleagues found that individuals with SAD misclassify neutral expressions more often as angry and less often as sad.[23] A meta-analysis study conducted by Günther and colleagues showed that individuals with SAD tend to misinterpret neutral faces as angry.[30] Neutral faces typically are evaluated as emotionally ambiguous stimuli, but individuals with SAD perceive them as threatening.[15] Individuals with SAD may be alert to subtle facial expressions indicating untrustworthiness or overinterpret ambiguous clues as signs of untrustworthiness to avoid feared negative evaluations.[25] In addition, when these individuals make judgments about how others see them, they may attach more importance to their impressions than to others' negative clues.

The strongest aspect of this study is that it applied facial expressions including seven different emotions in a large sample. However, the results need to be interpreted in light of the limitations of the study. First, the study focused only on the correct recognition of facial expressions reflecting emotional expressions. No assessment was made in terms of emotional intensity. All instruments were self-reported questionnaires, resulting in the possibility of response bias. Second, no time constraints were used when the participants evaluated facial expressions. This could have prevented individuals with SAD from experiencing anxiety about being evaluated and provided a sense of safety. Thirdly, the study data were administered online, and individuals evaluated their facial expressions without feeling any pressure under any supervision. Future studies should address the extent to which individuals with SAD accurately evaluate facial expressions when their anxiety levels increase.

In addition, study designs in which there is emotional intensity in facial expressions and evaluations made in a defined period should be used.

Ethical Considerations: The study was approved by the Ethics Committee at the Ankara Yıldırım Beyazıt University (Date: 21.03.2024; No: 03-612).

Conflict of Interest: The authors declare no conflict of interest.

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