



Mediation effect of cognitive flexibility between fear of negative evaluation and interaction anxiety

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Accepted: 2 March 2023 / Published online: 10 March 2023

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Abstract

Social anxiety has an increasing pattern during adolescence and is common among university students. It is associated with many adverse outcomes. Although there is considerable progress in social anxiety literature, there are significant gaps, and more research is needed to clarify causal pathways and moderator and mediator effects. This study evaluated the mediating role of cognitive flexibility in the link between fear of negative evaluation and interaction anxiety, which are two main symptom clusters of social anxiety. The sample comprised 552 undergraduate university students, 453 (82.1%) female and 99 (17.9%) male and 4 (0.7%) unspecified, from various departments. The study used self-report measures. Results showed that the fear of negative evaluation is significantly related to interaction anxiety, and cognitive flexibility demonstrates a partial mediation effect in this relationship. These findings contribute to the current literature by revealing cognitive flexibility as a mediator between fear of negative evaluation and interaction anxiety. The results suggest that working on cognitive flexibility may help prevent the development of interaction anxiety in university students.

Keywords Social anxiety · Fear of negative evaluation · Interaction anxiety · Cognitive flexibility · University students · Mediation model

Social anxiety increases during adolescence and is common among university students (Grant et al., 2007; Villarosa-Hurlocker et al., 2018). It is associated with adverse outcomes such as depression (Stein et al., 1990; Long et al., 2021), retardation in interpersonal communication development (Schneier et al., 1992; Spence & Rapee, 2016), decline in self-confidence and assertiveness (LeSure-Lester, 2001; Iancu et al., 2015), low academic

functioning (Turner et al., 1986; Brook & Willoughby, 2015), increased risk of substance use (Anderson et al., 2011; Page & Andrews, 1996), risk of exposure to sexual bullying (Norris et al., 1996; Schry & White, 2013), an increase in suicidal tendencies (Arditte et al., 2016; Stein et al., 2001). Considering these adverse outcomes, we should take social anxiety seriously before it becomes severe or pathological. On the other hand, the relationship between cognitive flexibility and social anxiety has not been fully explained yet. It is essential to clarify the relationship in-depth for preventive and therapeutic interventions. Studies on cognitive flexibility and constituents of social anxiety are few and generally conducted with adult samples, which was also reported by other researchers working on the issue (Morea & Calvete, 2021).

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Social anxiety

DSM-V defines social anxiety disorder as being seen closely by others, experiencing extreme anxiety, avoiding or enduring these situations with high anxiety levels, and fear of being disgraced or rejected (APA, 2013). One of the two

main symptom clusters of social anxiety is interaction anxiety, and the other is fear of social observation, which is more related to performances (APA, 2013; Kashdan, 2004; Rapee, 1995). Social interaction anxiety is the state of extreme discomfort when communicating with familiar or unfamiliar people (Mattick et al., 1989). On the other hand, fear of negative evaluation is the core cognitive mechanism of social anxiety (Clark & Wells, 1995; Moscovitch, 2009; Rapee & Heimberg, 1997; Weeks et al., 2008). Fear of negative evaluation, which is partly inherited and is related to personality traits (Stein et al., 2002), plays a role in the development of social anxiety and various psychopathologies (Clark & Wells, 1995; Reiss & McNally, 1985).

People who fear negative evaluation may also experience the fear that the situation will be noticed by others, which increases the level of social anxiety (Asendorpf, 1990). People with social anxiety may turn to avoidance behaviors as a coping mechanism (Rapee & Heimberg, 1997; Stravynski, 2007). However, although avoiding interactions, situations or settings seem like a solution for many people, they can lead to problems such as loss of people's ability to see unrealistic fears, increased anxiety, and negative feedback from others (Wells et al., 1995). As can be seen, the fear of negative evaluation triggers interaction anxiety and prevents social behaviors by creating discomfort in the person (Kashdan, 2004; Adams et al., 2011; Wells et al., 1995). In this case, while trying to cope by avoidance, the person may enter a vicious circle. Although fear of negative evaluation is a factor in depression and other disorders, it appears to explain higher levels of social interaction anxiety (Ali et al., 2021; Cruz-Torres et al., 2015; Wang et al., 2012). A study conducted with a ten-year follow-up reported that severe avoidance and behavior suppression predicted higher social anxiety persistence and diagnostic stability (Beesdo-Baum et al., 2012). At this point, to prevent the fear of negative evaluation from turning into a behavioral outcome, we believe that the explanation of the relevant relationships and the interventions to be made in this direction will be valuable.

When we look at the factors associated with social anxiety, we come across many variables such as family atmosphere, peer relationships (Bracik et al., 2012; Brook & Schmidt, 2008), perceived weak social skills, and emotional control (Hofmann, 2007), perceived social acceptance, conditioning experiences, information processing styles, cognitive misconceptions, and gaps (Beidel & Turner, 2007; Hofmann & DiBartolo, 2001; Hudson & Rapee, 2000; Lundh et al., 2002; Riskind et al., 2010; Teachman & Allen, 2007; Vasey & Dadds, 2001) and cognitive flexibility (Arlt et al., 2016). In this study, cognitive flexibility, which could be a critical element in both preventive and therapeutic interventions, will be examined.

Cognitive flexibility

Cognitive flexibility is the individual's awareness of alternative options in situations they encounter, approaching new conditions with flexibility and feeling competent, and adapting quickly and effectively (Ionescu, 2012; Martin & Anderson, 1998). Cognitive flexibility is a part of executive functions (Diamond, 2016) and is essential for adequate functioning in daily tasks (Diamond & Ling, 2019). The relationship between executive functions and psychopathology is bidirectional (Masten & Cicchetti, 2010). Experiencing a problem in executive functions may lead to psychopathological symptoms (e.g., social anxiety), and these symptoms may cause more problems in executive functions, thus leading to a vicious circle. For this reason, in this study, the cognitive flexibility variable, which could be effective in breaking this vicious circle, is examined.

People with high cognitive flexibility have good problem-solving skills, a high level of social competence, and self-regulation; they also have a low level of reluctance in communication and rigid attitude (Martin & Rubin, 1995; Bilgin, 2009). For this reason, therapies, especially the cognitive therapy model, aim to provide cognitive flexibility to the clients by replacing the individual's non-functional rigid beliefs and thoughts about himself, the world, and the future with more realistic and functional thoughts (Beck et al., 1979; Young et al., 2001).

Cognitive flexibility and social anxiety

In anxiety-producing situations, people with social anxiety turn their attention to themselves, lose interest in the environment, focus on observing themselves and their thoughts, criticize themselves, lose the management of these feelings and thoughts, and focus on negative elements (Garcia et al., 2019; Hirsch et al., 2004). In addition, they are more inclined to interpret uncertain events negatively (Stopa & Clark, 2000) and pay attention to negative signs in the social environment (Clark & McManus, 2002). People with social anxiety also consider themselves less socially skilled than others (Leary & Kowalski, 1995; Rapee, 1995). All these findings, which depict directing attention to a limited area, misinterpretation of events, and not feeling competent, seem to be compatible with a picture encountered when the cognitive flexibility level is low.

Studies show that cognitive flexibility and social anxiety are negatively related (Arlt et al., 2016; Fujii et al., 2013; Hong et al., 2020; Judah et al., 2013; Sepahvand, 2020). There are also some studies that reported no relationship (Demetriou et al., 2018; Liang, 2018). A study conducted considering the gender factor showed that the control

dimension of cognitive flexibility did not play a mediating role in the relationship between avoidant attachment and social anxiety in men but partially mediated the relationship between social anxiety and avoidant attachment in women (Dağ & Gülüm, 2013). Another critical study revealed that cognitive flexibility has a mediating role in social anxiety and exposure to peer bullying (Liu et al., 2021).

While there has been considerable progress in social anxiety literature, there are significant gaps, and more research is needed, especially to clarify causal pathways and moderator and mediator effects. For this purpose, the present study, we aimed to examine the mediating role of cognitive flexibility in the relationship between fear of negative evaluation and social interaction anxiety, which has not been studied before, to understand better and explain the experience of social anxiety. For this purpose, the present study aimed to examine the mediating role of cognitive flexibility in the relationship between fear of negative evaluation and social interaction anxiety, which has not been studied before, to understand better and explain the experience of social anxiety. That is to say; we are interested in the associations among these variables, specifically as;

- 1- To what extent is fear of negative evaluation associated with interaction anxiety and cognitive flexibility?
- 2- To what extent cognitive flexibility mediate the effects between fear of negative evaluation and interaction anxiety?

Method

Participants and procedure

The sample consists of university students studying in various departments (Elementary Mathematics Education, English Education, Pre-school Education, Primary Education, Turkish Education, Psychological Counseling and Guidance, and Special Education, Chemistry Education, Computer and Instructional Technologies Education, Painting Education, Arabic Education) of a state university located in the western part of Turkey in the 2020–2021 academic year. We collected the data by administering a demographic form and the scales to university students via Google Forms. The form link was distributed through WhatsApp groups across different classes. Informed consent was obtained from the participants, who were included in the study voluntarily. The total sample included 552 university students. We used the convenience sampling method due to pandemics. In the convenience sampling method, the researcher selects participants based on their willingness and availability (Creswell, 2012). The gender distribution of participants was 453 (82.1%) female students and 99 (17.9%) male students and 4 (%0.7)

unspecified. The students' ages ranged from 18 to 26 (mean age = 20.17; SD = 1,63). All participants were informed about the present study's significance and the aim before participation and asked for informed consent. Anonymity of the responses was considered for all of the participants and no personal information was collected. The approval of the Ethics Committee required for the study was obtained by the resolution of the University Ethics Committee.

Measures

The Brief Fear of Negative Evaluation Scale (BFNE) The twelve-item scale was developed by Leary (1983). It was adapted to Turkish culture by Çetin et al. (2010). 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. The CFA reportedly confirmed the single factor structure of the scale, and the fit indexes ($X^2 = 89.91$, $N = 325$, $p = .00$, $RMSEA = .062$, $GFI = .95$, $AGFI = .92$, $NFI = .96$, $CFI = .98$, $IFI = .98$, $RFI = .95$) were acceptable. The scale showed a significant relationship with social appearance anxiety at the level of .60. 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 .84, and the split-half reliability coefficient was .83. The test-retest procedure was performed at an interval of two weeks, and the test-retest reliability coefficient was reported as .82. Factor loads ranged from .34 to .74 (Çetin et al., 2010). The Cronbach Alpha coefficient of the scale was calculated at .89 for the current study.

The interaction anxiety scale The fifteen-item scale was developed by Leary and Kowalski (1993); high scores represent high social interaction anxiety. Coşkun (2009) adapted the scale to Turkish and examined its validity and reliability. The responses to statements are rated on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). In the adaptation process, as a result of the CFA performed, the single-factor structure of the scale was confirmed, and the fit indexes ($X^2 = 292.90$, $df = 90$, $p = .00001$, $RMSEA = .06$, $RMR = .06$, $GFI = .82$, $NFI = .87$, $NNFI = .89$, $CFI = .90$) were acceptable. There are reverse items on the scale. Cronbach's alpha internal consistency coefficient was .91. Test-retest reliability coefficient, performed with an interval of three weeks, was found to be .80. The item test correlations ranged from .39 to .70 (Coşkun, 2009).

The Cronbach Alpha coefficient of the scale is .85 for the current study.

The cognitive flexibility scale Dennis and Vander Wal (2010) developed the twenty-item scale. Sapmaz and Doğan (2013) made the Turkish adaptation of the scale and examined its validity and reliability. The responses to statements are rated on a 5-point Likert scale, ranging from 1 (Not at all appropriate) to 5 (completely appropriate). Construct validity, criterion validity, Cronbach alpha internal coefficient, and test-retest reliability coefficient were examined. As a result of the CFA, the two-factor structure of the scale was confirmed, and the fit indexes ($X^2/sd=2.44$, RMSEA = .054, RMR = .052, GFI = .92, AGFI = .90, NFI = .96, CFI = .98, IFI = .98, RFI = .95) were acceptable. The Cronbach alpha coefficient was specified for full scale as .90; for the ‘alternatives’ sub-dimension as .90; and for the ‘control’ sub-dimension as .84. The test-retest reliability coefficient was specified for full scale as .75; for the ‘alternatives’ sub-dimension as .78; and ‘control’ sub-dimension as .73. The high scores on the scale implies high cognitive flexibility of respondents (Sapmaz & Doğan, 2013). The Cronbach Alpha coefficient of the scale was calculated at .89 for the current study.

Analysis plan

The standard z values $[-3, +3]$, kurtosis, and skewness coefficient values (+1,-1) were used to determine univariate extreme values in the research data. After checking the univariate and multivariate normality, 248 responses from the dataset were removed and the remaining analyses were completed with the responses of 552 students. In addition, we made a missing data analysis, and the EM algorithm was used to solve the missing data problem. The IBM SPSS 22.0 software program was used for statistical analyses. Descriptive analyses of variables were examined, and bivariate correlations were computed to examine associations between variables. In the main analysis, Model 4 in PROCESS v3.5, developed by Hayes (2018) as the SPSS macro, was used to examine the mediating role of cognitive flexibility in the relationship between fear of negative evaluation and interaction anxiety. Mediating analysis tests and give inference on how X’s effect on Y operates (Hayes & Rockwood, 2017). Mediation hypotheses clarify how an antecedent variable (X) affects an outcome variable (Y) through one or more intervening variables or mediators (M) (Preacher & Hayes, 2008). In this study, the bootstrap coefficient was obtained using 5000 bootstrap sampling. The effect’s significance was tested by considering that the 95% confidence interval values do not include zero with the bootstrap technique (MacKinnon et al., 2004). The proposed mediation model aimed to test the mediating effect of cognitive flexibility

in the relationship between fear of negative evaluation and interaction anxiety.

Results

In this mediation model, we examined the effect of cognitive flexibility (M-the mediator variable) on the direct and indirect effects of the fear of negative evaluation (the antecedent variable) on the interaction anxiety (Y), which is the outcome variable. Before conducting the mediation analysis, descriptive statistics (mean scores, standard deviations, kurtosis, and skewness values) of the variables and Pearson correlations were obtained and presented (see Table 1).

As seen in Table 1, the kurtosis and skewness values of variables implies the normality the scale scores (Tabachnick & Fidell, 2013). Interaction anxiety was found to be in a positive relationship with fear of negative evaluation ($r=.70$, $p<.01$) and a negative relationship with cognitive flexibility ($r=-.54$, $p<.01$). In addition, the fear of negative evaluation had a negative relationship with cognitive flexibility ($r=-.50$, $p<.01$).

The mediating effect of cognitive flexibility on the relationship between the fear of negative evaluation and interaction anxiety was analyzed using Process Macro based on bootstrapping. The results were presented in detail (see Table 2 and Fig. 1.).

Figure 1 shows that fear of negative evaluation positively predicted interaction anxiety in university students ($c=.86$, $p<.001$). When cognitive flexibility, the mediator variable, was included in the model, this value significantly decreased ($c=.71$, $p<.001$). In cases where the effect coefficient decreases when the mediator variables are included in the model’s relationship between the X and Y variables, the mediation relationship is considered significant (Preacher & Hayes, 2008). Therefore, cognitive flexibility is a partial mediator variable in the relationship between fear of negative evaluation and interaction anxiety. In addition, fear of negative evaluation negatively

Table 1 Descriptive statistics of variables

Variable(s)	BFNA	IA	CF
Fear of Negative Evaluation	–	.70**	–.50**
Interaction Anxiety		–	–.54**
Cognitive Flexibility			–
Mean	28.25	40.06	74.56
Standard deviation	8.03	9.82	9.18
Skewness	.156	.060	–.059
Kurtosis	–.374	–.377	–.246

BFNA The Brief Fear of Negative Evaluation, IA Interaction Anxiety, CF Cognitive Flexibility, $p<.001$ **

predicted cognitive flexibility ($a1 = -.58, p < .001$) and cognitive flexibility negatively predicted interaction anxiety ($a^2 = -.27, p < .001$). Therefore, the hypothesis mediating model was significant [$F(2, 549) = 320.84, p < .001$], and both variables together explained %54 of the variance in interaction anxiety. As fear of negative evaluation increases in the model, cognitive flexibility decreases, and a decrease in cognitive flexibility increases interaction anxiety.

In order to determine whether the indirect paths in the model are significant or not, we calculated the bootstrapping coefficients at the %95 confidence interval. These findings are demonstrated (see Table 3.)

As seen in Table 3, the mediation model analysis showed that fear of negative evaluation significantly affected

interaction anxiety through cognitive flexibility $b = .153, \%95 \text{ GA } [.1074, .2026]$.

Discussion

The primary interest of this study was to address the limited body of research studying the relationship between the constituents of social anxiety and extend the knowledge about the mediating factors. Thus, we examined the mediating role of cognitive flexibility in the relationship between fear of negative evaluation and interaction anxiety using a correlational design. We tested our model, and the results showed that cognitive flexibility partially mediates the relationship between interaction anxiety and fear of negative evaluation.

Table 2 The results on mediation analysis

	Outcome Variables					
	M (Cognitive Flexibility)			Y (Interaction Anxiety)		
Antecedent Variables		<i>b</i>	<i>S.E.</i>		<i>b</i>	<i>S.E.</i>
X (Brief Fear of Negative Evaluation)	a	-.576**	.042	c'	.705**	.041
M (Cognitive Flexibility)	-	-	-	b	-.266**	.035
Constant	\hat{I}_M	90.826	1.236	\hat{I}_Y	39.994	3.422
		$R^2 = .253$			$R^2 = .538$	
		$F(1; 550) = 187.186; p < .001$			$F(2; 549) = 320.835; p < .001$	

** $p < .001$

Fig. 1 Mediation Model Results in Predicting Interaction Anxiety, ** $p < .001$

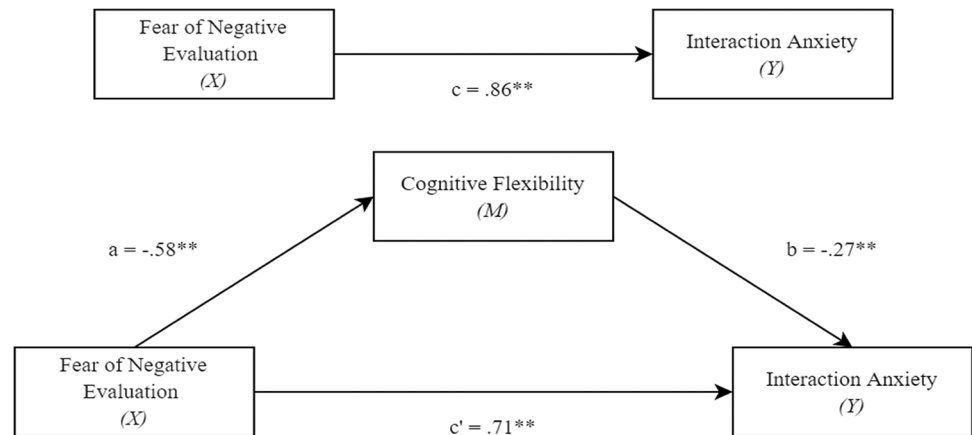


Table 3 Bootstrapping coefficients

Effects	Coeff.	Standard Dev.	t	p	Bootstrapping Lower Limit	Bootstrapping Upper Limit
Total Effect	.8584	.0371	23.11	.000	.7855	.9314
Direct Effect	.7051	.0410	17.18	.000	.6245	.7856
Indirect Effect ($X \rightarrow M \rightarrow Y$)	.1534	.0241			.1074	.2026

(X = Fear of Negative Evaluation, Y = Interaction Anxiety, M = Cognitive Flexibility)

Analysis of the current research demonstrated that the increase in fear of negative evaluation also enhanced the level of interaction anxiety for the study group. Fear of negative evaluation is an underlying element of social anxiety. Individuals who are afraid of being criticized by others avoid making eye contact, attracting the attention of others, and tend to pull themselves off communication in social environments where they do not feel comfortable (Rapee & Heimberg, 1997). Experiencing this fear, which is also triggered by the desire to be socially accepted, prevents interacting with others (Roberts et al., 2014). In this context, the fear of others' thoughts about oneself also triggers interaction anxiety (Johnson et al., 2020). In parallel with these findings, the study conducted by Aktan (2018) with university students showed a positive and significant relationship between thoughts of others about oneself and their interaction concerns.

As seen in this research's findings, cognitive flexibility has a significant role in interaction anxiety. Likewise, many studies have found a negative relationship between cognitive flexibility and social anxiety (Arlt et al., 2016; Hong et al., 2020). In line with the current study's findings, a lack of ability for flexible thinking gives rise to a repetitive negative interpretation of social relationships, thus contributing to social anxiety (Everaert et al., 2020). Dysfunctional thoughts about interaction in social areas and influential negative beliefs toward establishing relationships are closely related to insufficient cognitive processing (Sluis et al., 2017). Adapting to new social environments and efficiently responding to interactional stimuli is a crucial part of the dynamics of cognitive flexibility (van Niekerk et al., 2017; Morea & Calvete, 2021). Cognitive flexibility, defined as coping with challenging situations and producing alternative solutions, is very low in people with high interaction and social anxiety (Sepahvand, 2020).

In addition to the outcome pointed out above, cognitive flexibility skill as the mediation variable is a significant factor between fear of negative evaluation and interaction anxiety. When individuals negatively perceive themselves from the perspective of others and consequently feel inadequate in establishing and maintaining relationships, it decreases cognitive flexibility, which is also the ability to adapt to innovations (Diamond & Ling, 2019). On the other hand, the inadequacy of these cognitive skills also reduces coping abilities when encountering interaction and relational problems. It raises the risk of experiencing interaction anxiety (Liu et al., 2021). Following the present results, Uğur et al. (2021) stated that the ability to tolerate the uncertainty of social interaction is related to dealing with the fear of negative evaluation by preventing this fear from leading to a pathological consequence.

Adolescents' negative thoughts about their social performance could mediate between shyness and social anxiety

(Blöte et al., 2019). We suggest that boosting the social self-perception of shy (pre-)adolescents may help prevent social anxiety development. At this point, working on cognitive flexibility may also have an essential role in boosting social self-perception and reducing interaction anxiety. Moreover, Liu et al. (2021) demonstrated that adolescents with social anxiety are more likely to be exposed to bullying from peers. Therefore, cognitive flexibility can be a protective factor for peer bullying. Another study presenting the extent of fear of negative evaluation and social anxiety, conducted with college students (Villarosa-Hurlocker et al., 2018), reveals that the psychological stress of social settings can lead to severe drinking problems as an avoidance mechanism for young adults. In addition, authoritarian parental attitudes affect cognitive flexibility negatively (Bilgin, 2009). For this reason, supporting cognitive flexibility in people with negatively affected social competence can reduce their interaction anxiety.

Limitations

The current study has significance for pointing out the role of cognitive flexibility in the relationship between fear of evaluation and interaction anxiety; however, it also has various limitations. First of all, the research study group involves university students aged between 18 and 26. This model can also be tested with people varying in phases of life and also diverse groups in order to generalize results. Since some life phases, such as adolescents and diverse groups like disabled people, are at more risk than others, it is more likely to undergo social anxiety disorder (Hendriks et al., 2014; Tilfors et al., 2012). Another limitation of the study is the majority of female participants. Moreover, this study is limited to self-report measurements. This subject can be examined via observations and carried out by experimental research to test the effect of cognitive flexibility in an intervention study. Another limitation is conducting this research as a cross-sectional study. Thus longitudinal research can demonstrate a more powerful causal relationship regarding the importance of cognitive flexibility in the relationship between fear of evaluation and interaction anxiety.

Furthermore, to obtain detailed knowledge and an in-depth understanding, the focus of the research can also be examined through qualitative methods. Through phenomenology or grounded theory (Creswell, 2012) all aspects of cognitive flexibility and its protective effect on signs of social anxiety can be explored in a detailed way.

Conclusion

This study examined the mediating role of cognitive flexibility on the relationship between fear of negative evaluation and interaction anxiety among university students. We tested

our model and found cognitive flexibility partially mediating between fear of negative evaluation and interaction anxiety. University students suffer severely from social anxiety and other mental health problems (Grant et al., 2007; Villarosa-Hurlocker et al., 2018). Regarding our findings, cognitive flexibility can be used in prevention and intervention practices in counseling centers of universities to decrease chronic stress in social settings before it turns into social anxiety disorder in the long run. These results suggest that cognitive flexibility can be supported in individual and group counseling to strengthen problem-solving, regulation skills, and social competence.

Data availability The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

The authors have no relevant financial or non-financial interests to disclose.

Ethics approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by the Ethics Committee of Istanbul Sabahattin Zaim University (Date:30/04/2021, No:2021/04).

Consent to participate Informed consent was obtained from all individual participants included in the study.

Consent to publish The participants have consented to the submission of the data report to the journal.

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