

The Link Between Anxiety Sensitivity and Social Anxiety Symptoms: Cognitive Flexibility as a Mediating Factor

Anksiyete Duyarlılığı ve Sosyal Anksiyete Semptomları Arasındaki Bağlantı: Aracı Faktör Olarak Bilişsel Esneklik

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ABSTRACT

Aim: The purpose of this study was to explore the relationship between symptoms of social anxiety and anxiety sensitivity, as well as the role of cognitive flexibility as a mediator.

Methods: A total of 552 people between the ages of 18-35, with no history of psychiatric follow-up and treatment, were included in the study. A sociodemographic data form, the Liebowitz Social Anxiety Scale, Anxiety Sensitivity Index-3 and Cognitive Flexibility Inventory were applied to the participants.

Results: It was determined that social anxiety scores were significantly higher in female participants (86.11 ± 23.50) compared to male participants (79.43 ± 26.10) ($p < 0.001$). There was a positive relationship between social anxiety symptoms and anxiety sensitivity and its subscales ($p < 0.001$) and a negative relationship with cognitive flexibility ($p < 0.001$). According to the mediation analysis results, cognitive flexibility mediates 13% of the total effect of anxiety sensitivity on social anxiety symptoms.

Conclusion: The findings of the study draw attention to the strong relationship between social anxiety symptoms and anxiety sensitivity and show that cognitive flexibility may be an important mediating mechanism in this process. Accordingly, it is thought that interventions aimed at increasing cognitive flexibility in the treatment of social anxiety may be useful.

Key Words: Social anxiety, Anxiety sensitivity, Cognitive flexibility

ÖZ

Amaç: Bu çalışmanın amacı, sosyal anksiyete belirtileri ile anksiyete duyarlılığı arasındaki ilişkiyi ve bilişsel esnekliğin aracı rolünü araştırmaktır.

Yöntem: Çalışmaya psikiyatrik takip ve tedavi öyküsü olmayan, 18-35 yaş aralığında toplam 552 kişi dahil edildi. Katılımcılara sosyodemografik veri formu, Liebowitz Sosyal Anksiyete Ölçeği, Anksiyete Duyarlılığı İndeksi-3 ve Bilişsel Esneklik Envanteri uygulandı.

Bulgular: Kadın katılımcılarda sosyal anksiyete puanlarının (86.11 ± 23.50) erkeklerle kıyasla (79.43 ± 26.10) anlamlı derecede yüksek olduğu belirlenmiştir ($p < 0.001$). Sosyal anksiyete belirtileri ile anksiyete duyarlılığı ve alt ölçekleri arasında pozitif ($p < 0.001$), bilişsel esneklik ($p < 0.001$) ile negatif ilişki bulunmuştur. Aracılık analizi sonuçlarına göre, bilişsel esneklik, anksiyete duyarlılığının sosyal anksiyete belirtileri üzerindeki toplam etkisinin %13'üne aracılık etmektedir.

Sonuç: Çalışmanın bulguları, sosyal anksiyete belirtileri ile anksiyete duyarlılığı arasındaki güçlü ilişkiye dikkat çekmekte ve bilişsel esnekliğin bu süreçte önemli bir aracı mekanizma olabileceğini göstermektedir. Bu doğrultuda, sosyal anksiyete tedavisinde bilişsel esnekliği artırmaya yönelik müdahalelerin faydalı olabileceği düşünülmektedir.

Anahtar Sözcükler: Sosyal anksiyete, Anksiyete duyarlılığı, Bilişsel esneklik

Received: 23/01/2025 Accepted: 15/02/2025 Published (Online): 01/04/2025

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To cited: Ozdemir C, Akkus M. The Link Between Anxiety Sensitivity and Social Anxiety Symptoms: Cognitive Flexibility as a Mediating Factor. Acta Med. Alanya 2025;9(1): 64-71 doi: 10.30565/medalanya.1625842

Introduction

Social anxiety, alternatively referred to as social phobia, is a prevailing and incapacitating ailment that significantly impacts the overall well-being of an individual. The apprehension of adverse assessment or peer criticism may induce withdrawal from communal gatherings, thereby causing substantial hindrances to day-to-day operations and interpersonal connections [1]. In addition, social anxiety has the potential to augment the likelihood of acquiring other mental health afflictions, such as depression and substance abuse disorders, exacerbating the negative effects on an individual's general state of being [2]. The cognitive framework of social anxiety suggests that unfavourable convictions concerning oneself, others and the social realm, are instrumental in the emergence and perpetuation of the disorder. These negative beliefs may encompass thoughts of being inferior, unattractive or incompetent, as well as perceptions of the social world as dangerous or threatening. Individuals with social anxiety may engage in safety behaviours and avoidance strategies as coping mechanisms to manage their anxiety, inadvertently reinforcing their negative beliefs and perpetuating the disorder [1].

Anxiety sensitivity is a phenomenon characterized by increased fear or distress in response to an individual's bodily sensations associated with anxiety. Anxiety sensitivity, originally conceptualized as a one-dimensional trait reflecting the tendency to fear the consequences of anxiety, has evolved into a multidimensional construct with three sub-dimensions: physical, cognitive and social [3]. The physical subtype of anxiety sensitivity encompasses concerns about the physical symptoms of anxiety, while cognitive anxiety sensitivity involves worries about the loss of cognitive control due to anxiety. Social anxiety sensitivity, on the other hand, relates to concerns about the unfavourable social consequences of others observing anxiety symptoms [4]. Research has shown that anxiety sensitivity is not limited to specific anxiety disorders but rather serves as a transdiagnostic factor associated with various mental illnesses. This suggests that it plays a significant role in the development and maintenance of psychological distress. Furthermore, anxiety sensitivity has been found to

influence an individual's perception of stress, as it is closely linked to the assessment of events and the importance attributed to those events. High levels of anxiety sensitivity have been associated with increased stress perception, indicating its role as a significant determinant of stress-related experiences [5].

Cognitive flexibility is the capacity to modify one's thought processes by modifying environmental circumstances. It involves the capacity to generate alternative thoughts that are better suited to the situation at hand, rather than being stuck in rigid or maladaptive thought patterns that may lead to distress. Cognitive flexibility encompasses the ability to approach problems from multiple angles, think creatively and employ different strategies to effectively navigate challenging situations. Cognitive flexibility can promote resilience and facilitate psychological well-being, especially in the face of uncontrollable stressors. By cultivating cognitive flexibility through interventions and practices that promote adaptable thinking, individuals can enhance their ability to cope with stressful situations and maintain their mental health in the midst of adversity [6].

Social anxiety is a complex and debilitating disorder sustained by several cognitive processes. To better conceptualise this disorder, it is vital to identify its underlying factors. The relationship between social anxiety and anxiety sensitivity has been investigated in a limited number of studies [7]. In addition, research has shown that individuals with social anxiety tend to exhibit higher levels of anxiety sensitivity, than those without social anxiety. Cognitive flexibility has been posited as a potential mechanism underlying the emergence of anxiety, as it denotes the capacity to shift between diverse modes of emotional stimulus processing, contingent on situational demands and personal objectives [8]. The presence of cognitive inflexibility weaknesses among those with social anxiety, may play a role in the origin and perpetuation of the condition. When the literature is examined, no study investigating the relationship between social anxiety sensitivity and cognitive flexibility has been observed. The present research endeavoured to examine the correlation that exists between anxiety sensitivity of social anxiety and cognitive flexibility, as its

main objective.

Methods

Study design

This research undertaking was planned as a descriptive cross-sectional study and was executed during the period of March to April 2023, at the Family Medicine outpatient facility of Kütahya Health Sciences University. The study was approved by the ethics committee of Kütahya Health Sciences University and Kütahya Provincial Health Directorate.

The G*Power 3.1.9.7 program was used for sample size calculation. The “Chi-square test” was taken into consideration in sample size calculation. For effect size (Cohen w)=0.3, $d(f)=1$, α error=0.05, $1-\beta$ error=0.9 and two-way p -value; a total of 117 patients were evaluated. The research was executed using a sample size of 552 individuals who fulfilled the eligibility criteria and gave their informed consent to partake in the investigation. Participants were between the ages of 18 to 35, who applied to the family medicine outpatient clinic for non-psychiatric reasons (screening, driving licence, starting work, health report, administrative reasons, etc.), who had no history of psychiatric admission, follow-up and treatment in their medical records, who did not describe any mental complaints in the clinical evaluation made by the family physician specialist, who did not have any neurological and internal problems that would affect any cognitive performance during the interview and who agreed to participate in the study.

Data collection

A sociodemographic form collecting the age, gender, years of education, marital status, smoking and alcohol consumption status of the patients, was completed by the family physician specialist. The Anxiety Sensitivity Index-3, Liebowitz Social Anxiety Scale and Cognitive Flexibility Inventory were applied to all individuals who met the inclusion criteria.

The Anxiety Sensitivity Index-3

The Anxiety Sensitivity Index-3 (ASI-3) consists of a total of 18 items and is divided into three

sub-dimensions: physical, social and cognitive. Each sub-dimension contains six items. The scale is a five-point Likert-type scale ranging from 0 (strongly disagree) to 4 (strongly agree). The total score that can be obtained from the scale ranges from 0 to 72; higher scores indicate higher anxiety sensitivity. This scale was developed by Stewart, Taylor and Watt to assess the level of individuals' perception of anxiety symptoms as threatening, and its Turkish adaptation and validity-reliability study was conducted by Mantar et al. [9].

The Liebowitz Social Anxiety Scale

Liebowitz Social Anxiety Scale (LSAS) is a scale that shows the social relationship and performance situations in which individuals show fear and avoidance behaviours. It consists of a total of 24 items, 11 of which are related to social relationships and 13 of which are related to performance. Each item is scored between 0 and 3. The total score of the scale ranges from 0 to 144, with higher scores indicating more severe social anxiety. This scale was developed by Michael R. Liebowitz in 1987 to assess for social anxiety disorder and its validity and reliability study in Turkey was conducted by Soykan et al. [10].

The Cognitive Flexibility Inventory

The Cognitive Flexibility Inventory (CFI) was formulated to measure cognitive flexibility, which is related to the ability to replace incompatible thoughts with appropriate and compatible ones. The scale, which consists of a total of 20 items, has two subscales: ‘control’ and ‘alternatives’. Each item is scored from 1 (strongly disagree) to 7 (strongly agree). The total score of the scale ranges from 20 to 140; higher scores indicate a higher level of cognitive flexibility. This scale was developed by Dennis C. Dennis and John M. Vander Wal and its validity and reliability study in Turkey was conducted by Dilbaz and Güz [11].

Statistical analysis

The statistical analysis was conducted using the SPSS version 21 (IBM®, Chicago, USA). The examination of the variables' distribution, whether normal or abnormal, was conducted through the utilization of the Shapiro-Wilk test. The distribution of data was summarized using descriptive statistics.

In the case of normally distributed numerical data, the mean and standard deviation were employed, while the median (minimum-maximum) was used for abnormally distributed data. For nominal data, the number and percentage were reported. For the analysis of normally distributed numerical variables, the “Student’s T-test” and “One-way ANOVA” were utilized. For the analysis of non-normally distributed variables, the “Mann-Whitney U” and “Kruskal-Wallis test” were applied. The “chi-square analysis” was employed to compare nominal data. The mediating effect of cognitive flexibility on the relationship between social anxiety and anxiety sensitivity, was analysed using Process Macro based on bootstrapping. A statistical significance was attributed to p values that were below 0.05 during the execution of statistical analyses.

Results

The study included 552 participants. Table 1 presents the means, standard deviations and percentages of the participants’ socio-demographic characteristics and questionnaire scores. The mean age of all participants was 26.54 ± 4.67 years. Of all participants, 67.4% were female and 63.8% were single. The mean number of years of education was 14.89 ± 2.42 . The mean LSAS score was 83.93 ± 24.58 , ASI 24.88 ± 13.73 and CFI 65.42 ± 5.79 . The comprehensive and detailed summary of the participants’ socio-demographic characteristics and the scores obtained from the questionnaire can be found in Table 1.

The comparison of scale scores according to gender is given in detail in Table 2. The mean LSAS score of women (86.11 ± 23.50) was significantly higher than that of men (79.43 ± 26.10) ($p < 0.001$). Women’s LSAS-Avoidance score was 43.24 ± 11.72 , while men’s score was 41.25 ± 13.92 . Women scored significantly higher than men ($p = 0.016$). For the LSAS-Concern subscale, women’s worry scores were also significantly higher (42.87 ± 12.68) compared to men’s (37.91 ± 13.63) ($p < 0.001$). The overall ASI score of women (26.00 ± 14.39) was higher than that of men (22.57 ± 11.91) ($p = 0.018$). ASI-Physical subscale score was significantly higher in women (8.50 ± 6.03) compared to men (6.93 ± 4.99) ($p = 0.009$). In the ASI-Cognitive subscale, women (9.04 ± 5.58)

scored significantly higher than men (7.75 ± 4.64) ($p = 0.033$). There was no significant difference between women (8.45 ± 4.95) and men (7.88 ± 4.94) on the ASI-Social subscale ($p = 0.176$). There was no significant difference between women (65.32 ± 5.90) and men (65.63 ± 5.55) in overall CFI scores ($p = 0.113$).

Table 1. Sociodemographic characteristics and questionnaire scores of all participants (N=552)

	All participants (N=552)
Age (years)*	26.54 ± 4.67
Gender, female**	372 (67.4)
Education level (years)*	14.89 ± 2.42
Marital status, single**	352 (63.8)
Smoking (+)**	188 (34.1)
Alcohol consumption (+)**	92 (16.7)
LSAS*	83.93 ± 24.58
LSAS-Avoidance	42.68 ± 12.51
LSAS-Worry	41.25 ± 13.20
ASI*	24.88 ± 13.73
ASI-Physical	7.99 ± 5.76
ASI-Cognitive	8.62 ± 5.33
ASI-Social	8.26 ± 4.96
CFI*	65.42 ± 5.79
CFI-Alternative	48.82 ± 8.21
CFI-Control	16.59 ± 3.80

*Mean \pm sd, Mann Whitney U Test; **N(%), Chi-square. ASI: Anxiety Sensitivity Index, LSAS: Liebowitz Social Anxiety Scale, CFI: Cognitive Flexibility Inventory

The Spearman correlation analysis was performed to evaluate the linear relationship between the questionnaire scores. In the correlation analysis, a significant positive correlation was observed between ASI and sub-scores of ASI ($p < 0.001$) and LSAS total score ($p < 0.001$) and LSAS sub-scores ($p < 0.001$). A significant negative correlation was found with CFI ($p < 0.001$). In addition, a significant negative correlation was observed between CFI-A and ASI ($p < 0.001$), ASI-S ($p < 0.001$) and ASI-C ($p < 0.001$). A significant positive correlation was observed between CFI-C and ASI ($p = 0.009$), ASI-S ($p = 0.004$) and ASI-C ($p = 0.002$).

The mediating role of cognitive flexibility in the effect of anxiety sensitivity on social anxiety symptoms is shown in Figure 1. The direct effect of anxiety sensitivity on social anxiety symptoms (standardised effect) was $\beta = 0.351$ ($p < 0.001$).

Taking into account the mediating role of cognitive flexibility (M-mediator variable), the effect of anxiety sensitivity (antecedent variable) on social anxiety symptoms (Y) (standardised effect) was $\beta = 0.306$ ($p < 0.001$).

Table 2. Comparison of scale scores according to gender (N=552)

	Female (n=372)	Male (n=180)	p value
LSAS	86.11± 23.50	79.43± 26.10	<0.001
LSAS-Avoidance	43.24± 11.72	41.52± 13.92	0.016
LSAS-Worry	42.87± 12.68	37.91± 13.63	<0.001
ASI	26.00± 14.39	22.57± 11.91	0.018
ASI-Physical	8.50± 6.03	6.93± 4.99	0.009
ASI-Cognitive	9.04± 5.58	7.75± 4.64	0.033
ASI-Social	8.45± 4.95	7.88± 4.94	0.176
CFI	65.32± 5.90	65.63± 5.55	0.113
CFI-Alternative	48.51± 8.39	49.47± 7.79	0.118
CFI-Control	16.80± 3.81	16.15± 3.76	0.053

Mean±sd, Mann Whitney U Test. ASI: Anxiety Sensitivity Index, LSAS: Liebowitz Social Anxiety Scale, CFI: Cognitive Flexibility Inventory

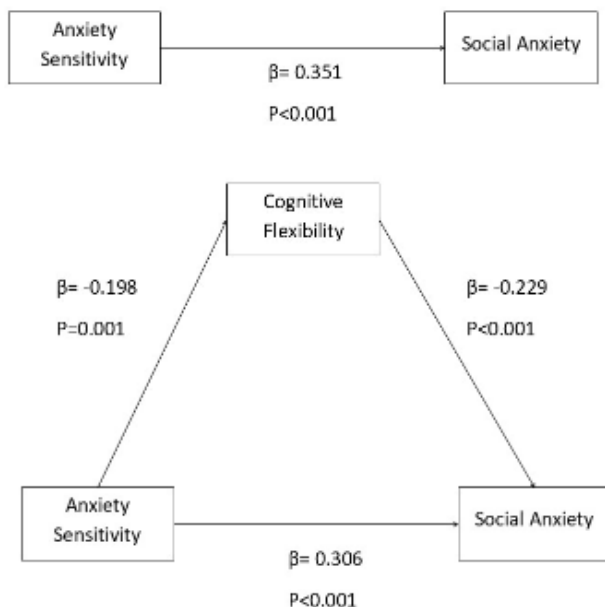


Figure 1. Mediation model results in predicting social anxiety, $p < 0.05$

The mediating effect of cognitive flexibility on the relationship between social anxiety symptoms and anxiety sensitivity, was analysed on a bootstrapping basis and summarised in detail in

Table 3. The difference between the direct and indirect effects of anxiety sensitivity and cognitive flexibility on social anxiety symptoms, emphasises the importance of the mediating role of cognitive flexibility. The indirect effect, that is, the effect of cognitive flexibility on social anxiety symptoms, constitutes approximately 12.88% (0.081/0.629) of the total effect. This can be interpreted as approximately 13% of the total effect of anxiety sensitivity on social anxiety is mediated by cognitive flexibility.

Table 3. Bootstrapping coefficients

	Effect	Estimate	SE	95%CI (LL/UL)	β	z	p
Indirect	ASI \Rightarrow CFI \Rightarrow LSAS	0.0813	0.0234	(0.0357/0.1276)	0.0454	3.47	<0.001
	ASI \Rightarrow CFI	-0.0838	0.0178	(-0.1192/-0.0494)	-0.1985	-4.70	<0.001
Component	CFI \Rightarrow LSAS	-0.9706	0.1830	(-1.3274/-0.6102)	-0.2288	-5.30	<0.001
	ASI \Rightarrow LSAS	0.5475	0.0709	(0.4081/0.6859)	0.3058	7.73	<0.001
Total	ASI \Rightarrow LSAS	0.6288	0.0742	(0.4829/0.7737)	0.3512	8.48	<0.001

ASI: Anxiety Sensitivity Index, LSAS: Liebowitz Social Anxiety Scale, CFI: Cognitive Flexibility Inventory

DISCUSSION

The complex and multifaceted nature of the relationship between social anxiety symptoms, anxiety sensitivity and cognitive flexibility is remarkable. The results of our investigation indicate a substantial correlation between symptoms of social anxiety and anxiety sensitivity. Furthermore, the observed link was mediated by cognitive flexibility.

Although anxiety sensitivity was initially associated with panic disorder, transdiagnostic approaches have reported that it may be an important transdiagnostic factor in the aetiology, assessment and treatment of multiple affective disorders, including social anxiety disorder [12]. However, there are a limited number of studies investigating the relationship between anxiety

sensitivity and social anxiety disorder in the literature [13].

In some studies in the literature, it has been reported that there is a relationship between high anxiety sensitivity and social anxiety disorder and that anxiety sensitivity may be a sustaining factor in social anxiety symptoms [13]. In our study, a strong relationship was found between social anxiety symptoms and anxiety sensitivity. This relationship indicates that individuals with high levels of anxiety sensitivity may be more prone to experience symptoms related to social anxiety.

In our study, social anxiety scores were significantly higher in women than in men. The results of the ASI were similarly higher in women than in men, suggesting that women may experience higher levels of social anxiety and may also have higher levels of anxiety sensitivity. The significant differences observed in the ASI-Physical and ASI-Cognitive subscales suggest that women are more sensitive to the physical symptoms of anxiety and are more likely to interpret these symptoms as dangerous. This increased sensitivity to physical sensations may contribute to the higher prevalence of anxiety disorders among women [14]. These results are consistent with other studies that found women are more likely than males to report having greater social anxiety symptoms. It is similar to the literature suggesting that women would be more likely to exhibit anxiety and avoidant behaviours in social settings. These gender differences in social anxiety can be attributed to a variety of socio-cultural and biological factors.

Anxiety sensitivity has a multidimensional structure consisting of physical, cognitive and social sub-dimensions. This hierarchical structure is important in understanding the links between certain subscales of anxiety sensitivity and different anxiety-related psychopathologies [15]. The physical subscale related to dread of physical sensations is linked to panic disorder, whereas the cognitive subscale concerning fear of diminished cognitive control is connected with depression and generalized anxiety disorder (GAD) [16]. However, the findings on the relationship between the sub-dimensions of anxiety sensitivity and social anxiety are inconsistent. While some studies found a significant relationship between

the social subscale of anxiety sensitivity and social anxiety, others reported different results [17, 18]. In a further study, it was reported that none of the subscales predicted social anxiety symptoms, one year later [12]. Ölmez et al. emphasised the importance of anxiety sensitivity in individuals with social anxiety disorder and drew attention to the role of the social, cognitive and physical subscales of the Anxiety Sensitivity Index (ASI) in assessing the severity of the condition [19]. Similarly, a significant correlation was found between social anxiety symptoms and all subscales of anxiety sensitivity in our study. Observable physical symptoms such as facial flushing, trembling and sweating are common in individuals with social anxiety and it is known that individuals show increased sensitivity to these symptoms [19]. The establishment of continuous rumination, a negative interpretation tendency in cognitive processes and a fear of being negatively evaluated in social situations, are all factors that lead to the development and maintenance of social anxiety. These detrimental cognitive processes are thought to be more common in those with high levels of cognitive anxiety sensitivity [19, 20]. Social anxiety is a complex and debilitating disorder sustained by various cognitive processes. Identifying the factors underlying this disorder is critical for a more comprehensive conceptualisation. Anxiety sensitivity can lead to a cascading cycle of social anxiety, with cognitive, somatic and behavioural symptoms of social anxiety disorder. Given the links between anxiety sensitivity and specific features of social anxiety in the current theoretical framework, further research is needed to integrate anxiety sensitivity with cognitive-behavioural models of social anxiety disorder.

There is a small number of research investigations that have been conducted to investigate the connection between social anxiety and cognitive flexibility in the existing body of literature. Some studies suggest that there is no relationship between social anxiety and cognitive flexibility [20, 21]. On the other hand, other research demonstrates a negative association between cognitive flexibility and social anxiety, which is consistent with the findings of our study. Findings from research on cognitive flexibility suggest a potential relationship between cognitive flexibility and various psychopathologies, including social

anxiety [22]. When the findings of the study were analysed comprehensively, it was found that social anxiety, cognitive flexibility and anxiety sensitivity exhibited a complex reciprocal relationship. During the mediation analysis aiming to better understand the dynamics underlying this relationship, it was found that cognitive flexibility functions as a mediator in the effect of anxiety sensitivity on social anxiety. It was found that approximately 13% of the total effect of anxiety sensitivity on social anxiety was mediated by cognitive flexibility. Similarly, it has been reported in the literature that cognitive flexibility functions as a mediator for social anxiety and this mediation is associated with high anxiety levels.

According to the cognitive model, it is emphasised that individuals' cognitive distortion tendencies, dysfunctional attitudes and negative automatic thoughts are the basis of social anxiety. According to the investigations, dysfunctional beliefs were a predictor of cognitive flexibility [23]. The ability to adjust to unfamiliar social contexts and react suitably to social cues plays a pivotal role in the dynamics of cognitive flexibility. The absence of adaptable cognitive abilities can potentially contribute to the development of social anxiety through the manifestation of repetitive negative interpretations within social relationships [24]. Attention to and interpretation of information plays a critical role in cognitive processes. Biases in this information processing process cause a vicious cycle of negative thoughts, behavioural avoidance and increased feelings of anxiety. For this reason, anxiety sensitivity has been associated with a cognitive defence against negative reactions to anxiety symptoms, caused by attention and interpretation biases related to anxiety. In contrast, cognitive flexibility is an asset that enables one to concentrate on pertinent information while disregarding non-essentials and flexibly reorienting attention among various information sources. This involves the ability to identify multiple alternative evaluations or explanations when confronted with stressful circumstances [25]. This role may explain the mediating function of cognitive flexibility on anxiety sensitivity and social anxiety symptoms.

The limitations of our study are that self-report scale-based assessments were utilized

and cognitive flexibility was assessed using an inventory, rather than neuropsychological comprehensive tests. The sample size, the fact that the participants were evaluated by a clinician prior to the study and the fact that past psychiatric history was determined and controlled as an exclusion criterion, constitute the strengths of our study.

In conclusion, this study provides a significant addition to the current body of knowledge regarding the interplay among symptoms of social anxiety, anxiety sensitivity and cognitive flexibility. The findings suggest that individuals who exhibit high levels of anxiety sensitivity and low cognitive flexibility, are more likely to experience higher social anxiety symptoms compared to their counterparts. The effect of anxiety sensitivity on social anxiety symptoms as a transdiagnostic approach and the mediating role of cognitive flexibility is significant. Therefore, considering the relationship between anxiety sensitivity and cognitive flexibility, it is critical to recognise patients with high anxiety sensitivity and to offer therapies and interventions that include cognitive flexibility for better treatment of social anxiety symptoms.

Conflict of Interest: The authors declare no conflict of interest related to this article.

Funding sources: The authors declare that this study has received no financial support.

Ethics Committee Approval: The research received approval from the Ethics Committee of Kütahya Health Sciences University (2023/01-24).

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Acknowledgement: The authors thank the participants in this study.

Peer-review: Externally peer reviewed.

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