

# The Mediating Effects of Self-Esteem and Harm Avoidance on the Association between Social Anxiety Symptoms and Adult Attention Deficit Hyperactivity Disorder Symptom Severity in Turkish Inpatients with Alcohol Use Disorder

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## Abstract

**Objective:** The first objective of this research was to examine the association of the symptom severity of social anxiety with the adult attention deficit hyperactivity disorder (ADHD) symptom severity in Turkish patients with alcohol use disorder (AUD). The second objective was to examine if harm avoidance and self-esteem mediated this relationship.

**Method:** This cross-sectional analysis was performed among 151 inpatients with AUD at the Bakirkoy/AMATEM, a treatment center for substance use disorder, in Istanbul. Patients were examined with the Liebowitz Social Anxiety Scale (LSAS), the Adult ADHD Self-Report Scale (ASRS), the Rosenberg Self-Esteem Scale (SES), and the temperament dimension of Harm Avoidance (HA). Using SPSS-20 software, the data was analyzed using Pearson correlations, multivariate analysis of covariance (MANCOVA), and multiple linear regressions.

**Results:** The scales scores were mildly correlated with each other. The low self-esteem and high HA were related with the inattentive (IN) dimension of ADHD, whereas low self-esteem solely predicted hyperactivity/impulsivity (HI) dimension of ADHD in MANCOVA. In the linear regression analysis, the severity of social anxiety, particularly avoidance dimension, was associated with the symptom severity of ADHD. In the second step of the analysis, together with the avoidance dimension of social anxiety, self-esteem was associated with the symptom severity of ADHD. However, in the third step, after including HA as an independent variable in the analysis, the avoidance dimension of social anxiety was no longer associated with the severity of adult ADHD symptoms, whereas self-esteem together with HA (particularly "anticipatory worry and pessimism" [HA-1], and "asthenia and fatigability" [HA-4]) predicted.

**Conclusion:** Findings of the present study shows that although the symptom severity of social anxiety is associated with the severity of ADHD symptoms among inpatients with AUD, among dimensions of social anxiety, the avoidance dimension plays a main role in this relationship. Also, while the self-esteem partially mediates this relationship, HA seems to have a full mediator effect on this relationship.

**Key words:** Alcohol Use Disorder; Attention Deficit Hyperactivity Disorder; Social Anxiety Disorder; Self Concept

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**H**yperactivity-impulsivity (HI) and inattention (IN) are symptoms of attention deficit hyperactivity disorder (ADHD), a childhood onset disorder that can impair one's ability to cope and perform social and personal roles in adolescence and adulthood (1, 2). According to screening tests, adults with alcohol use disorder (AUD) had an incidence of 21% to 23.1 percent for potential ADHD (3, 4), while this figure was 18.4 percent in Turkish patients with AUD (5). Early initiation of alcohol consumption, risky alcohol usage, the presence of AUD (6), early relapse (7, 8) and the seriousness of alcohol-related symptoms were all associated to ADHD (9).

Social anxiety disorder (SAD) can be described as a chronic fear of social or performance conditions in which one is exposed to new people or may be scrutinized by others (10). An individual with SAD is afraid of acting in a shameful or awkward manner and being exposed to the anticipated conditions almost often causes anxiety (11). Clinical trials (12, 13) and general population studies (14, 15) have also shown that SAD and AUD are often co-occurring disorders. In previous reports of Turkish inpatients with AUD, rates of SAD were 9.8% (16) and 11.4 percent (17), suggesting that it may be a risk factor for subsequent AUD relapses (18).

The association between ADHD and SAD has been studied in a few studies. The risk of ADHD during childhood was 24.0 percent for anxiety disorder patients (19), while adult ADHD was 27.9 percent (20). In adult patients with ADHD, comorbidity of SAD was found as 38.5 percent (20). Finally, epidemiological studies of adult ADHD conducted in North America (21) and South Korea (22) found a relationship between the two disorders. In previous studies, rates of comorbid childhood ADHD ranged between 62% (23) and 72% (24) among adult Turkish outpatients with SAD. The symptom severity of SAD and additional psychopathology were higher among SAD patients with ADHD comorbidity than those without (24, 25). In a subgroup of SAD patients, Koyuncu et al. (26) indicated that SAD may occur as a result of childhood ADHD. In line with this, Evren et al. (27) reported that among non-patient young adults, possible ADHD and symptom severity of ADHD are linked to both dimensions of social anxiety ("fear or anxiety" and "avoidance").

Harm avoidance (HA) can be described as an inherited subjectivity or habit that prevents or delays certain activities, such as passive avoidance, pessimistic thoughts about likely potential problems, fear of uncertainty, feeling ashamed of strangers, and quickly being exhausted (28, 29). Previous research has found an association between severity of HA and both ADHD and the symptom severity of ADHD (30–33), particularly with IN type (32), and the severity of IN symptoms (30, 32, 34–36). Furthermore, higher HA scores could differentiate the mostly IN form from the combined HI group (30, 35). Findings of the previous studies also

found significantly elevated levels of HA among those with SAD (37–41). Evren et al. (42) found an association between HA and Liebowitz Social Anxiety Scale (LSAS) (43) subscales, and reported that HA is a significant predictor of both LSAS subscales in a sample of Turkish patients with AUD.

Self-esteem may be considered as a person's positive or negative attitude toward oneself (44). When compared to the control group, adults with ADHD have poorer self-esteem (45). Beyond the core symptoms of ADHD in teenagers, self-esteem can be a significant individual patient outcome (46). It has been suggested that self-esteem is internalized at the same time as ADHD is generally diagnosed and treated (47). A person's self-esteem is shaped by a variety of negative perceptions (48, 49). Individuals fail to cope with traumatic experiences as negative beliefs about themselves and their abilities arise. Adults with ADHD sustain and enhance their pessimistic perception of themselves by developing maladaptive coping mechanisms (dysfunctional behavior), such as avoidance and procrastination (50), but they are unable to cope with the crisis. The person caught in this vicious loop is subjected to a never-ending cycle of disappointments (51). As a result, it's no wonder that people with ADHD often have low self-esteem (48, 49).

People with poor self-esteem are more likely to reflect on their flaws rather than their achievements (52). This assessment may have a significant effect on a person's psychological well-being, resulting in conditions such as SAD (53, 54). Consistent with this, patients with SAD had lower scores of self-esteem in a previous study, and self-esteem negatively associated with the severity of social anxiety symptoms (55).

While both ADHD and SAD have been linked to AUD, their relationship has never been investigated in AUD patients. Furthermore, since HA and self-esteem are both linked to ADHD and SAD, they must be considered when assessing the association between ADHD and SAD symptoms. Therefore, the first objective of this study was to examine the association between the severity of adult ADHD symptoms and the symptom severity of social anxiety in a sample of inpatients with AUD. The second objective was to examine the mediating effects of HA and self-esteem on this relationship.

## Materials and Methods

### Participants

The study was conducted among 151 inpatients with AUD at the Bakirkoy/AMATEM, a specialized substance abuse treatment facility, in Istanbul. The protocols used in the research were compliant with the ethical principles of the local committee on human experimentation's as well as the Helsinki Declaration (1975, revised 1983). Following a detailed explanation of the research procedures, patients' written informed consent was received.

By considering 95% confidence level as a proportion of ADHD as 11%, and acceptable difference as 5%, we estimated the sample size to be 150. Although there were 170 suitable patients with a diagnosis of AUD according to the DSM-5 (10), 7 did not want to be included in the study, 8 were not included because of the excluding criteria (because of illiteracy [n=3], cognitive impairment [n=3], and comorbid psychotic disorder [n=2]), and 4 of them did not fill in the forms. Interviews with the 151 participants were conducted by the second author of the present study (E.C.) after the withdrawal symptoms have subsided, that is, approximately 3-4 weeks after the last day of alcohol use .

### Measures

#### Liebowitz Social Anxiety Scale (LSAS)

The social anxiety symptom severity was evaluated with the LSAS, which includes 24 conditions that are scored on two different subscales (43). Answers to the fear/anxiety subscale vary from “no fear/anxiety” (a score of 0) to “extreme fear/anxiety” (a score of 3), whereas answers to the avoidance subscale vary from never avoiding (a score of 0) to normally avoiding (a score of 3). The LSAS is validated for Turkish language (56). The LSAS had a high interrater reliability of 0.98 (the fear-anxiety subscale: 0.96, the avoidance subscale: 0.95). The Cronbach alphas were high (the LSAS: 0.98, the fear-anxiety subscale: 0.96, and the avoidance subscale: 0.95). The subscales and the total scale had a 1-week test-retest reliability of 0.97. The validity analyses (convergent, discriminant, and criterion) showed that the scale is valid (56). We found Cronbach's alphas as 0.84 for fear-anxiety and 0.87 for avoidance.

#### Adult ADHD Self-Report Scales (ASRS-v1.1)

The ASRS (57, 58) is an 18-item 5-point Likert-type scale (ranging from ‘never’ [a score of 0] to ‘very often’ [a score of 4] scale based on DSM-IV-TR criteria (59). ASRS has been shown to have strong psychometric characteristics as a self-report scale for assessing ADHD in adults (60). Thus, the score of the screening version of ASRS may range from 0 to 24, with higher scores showing severe ADHD symptoms. The ASRS was validated for Turkish language, both among university students (61) and inpatients with AUD (62). We found Cronbach's alpha as 0.89 for the ASRS (0.89 for IN and 0.76 for HI).

#### Harm Avoidance (HA)

The HA is a higher order temperament trait of the Temperament and Character Inventory (TCI) (29), which is a forced-choice and self-report measure. The HA also includes four lower order traits: 11 item “anticipatory worry and pessimism” (HA-1), 7 item “fear of uncertainty” (HA-2), 8 item “shyness with strangers” (HA-3), and 9 item “fatigability, and asthenia” (HA-4). We found the Cronbach's alpha of HA as 0.86, which was similar with the Cronbach's alpha (0.85) found in validation study of the Turkish version (63).

#### Rosenberg Self-Esteem Scale (SES)

The SES (44), which is also validated in teenagers with ADHD (46), is a ten-item self-esteem scale and evaluates a person's general beliefs about himself or herself. The SES has gained popularity as a result of its long history of widely usage, simple grammar, and brevity. The Turkish version of the SES was used to evaluate self-esteem (64). The SES is a 4-point Likert-type scale ranging from “do not agree at all” (a score of 0) to “completely agree” (a score of 3), with higher scores indicating greater self-esteem .

#### Data Analysis

Statistical analyses were conducted via the statistical package SPSS (Chicago, IL) 20.0 for Windows. Sociodemographic variables and scale scores were given as frequencies and percentages. MANCOVA analysis was conducted, where the symptom severities of IN and HI were dependent variables and self-esteem, HA and social anxiety symptoms (“anxiety or fear” and “avoidance”) were independent variables. Stepwise linear regression analysis was conducted, where the symptom severity of ADHD was a dependent variable and self-esteem, HA and the severity of social anxiety symptoms (“anxiety or fear” and “avoidance”) were independent variables. For both regression analyses and MANCOVA we left all settings on the default. P values were 2-tailed for all statistical analyses, and differences were accepted significant at  $p < 0.05$ .

#### ETHICAL APPROVAL

The study was conducted according to the WMA Declaration of Helsinki - Ethical Principles for Medical Research Involving Human Subjects. The study was approved by the Ethical Committee of the institution.

#### INFORMED CONSENT

All participants gave their verbal and written consent.

#### Results

Sociodemographic variables and mean scores of the scales are presented in Table 1. The mean score of the “fear or anxiety” subscale was 25.1 (SD = 11.5), whereas it was 22.6 (SD = 12.0) for the “avoidance” subscale, which were consistent with our previous study conducted in a similar patient group (24.1±11.7 and 21.7±11.4, respectively) (42).

Correlation coefficients found between the scale scores were mild (Table 2). The low self-esteem and high HA were associated with the inattentive (IN) dimension of ADHD, whereas low self-esteem solely predicted hyperactivity/impulsivity (HI) dimension of ADHD in MANCOVA (Table 3).

In the linear regression analysis, the symptom severity of social anxiety (avoidance dimension in particular), was related with the symptom severity of ADHD. When self-esteem was included in the analysis as an independent variable, both HA and avoidance dimension of social anxiety were related with the symptom severity of ADHD. However, when HA was included in the

analyses in the last step, the avoidance dimension of social anxiety was no longer related with the symptom severity of ADHD, whereas self-esteem and HA

(particularly HA-1 and HA-4) were related with the symptom severity of adult ADHD (Table 4).

**Table 1. Sociodemographic Characteristics of the Sample**

	Mean	SD
Age	45.73	10.64
Duration of education	8.56	3.63
Onset of alcohol use	18.70	5.89
Harm Avoidance	19.55	6.81
Rosenberg Self-Esteem Scale	1.66	0.88
Adult ADHD Self-Report Scale	31.33	12.23
Inattention	14.82	7.57
Hyperactivity/impulsivity	16.51	6.12
Liebowitz Social Anxiety Scale	47.68	21.38
Fear or Anxiety	25.09	11.45
Avoidance	22.59	12.02
	n	%
Marital status		
Married	83	55.0
Single	29	19.2
Divorced/widow	39	25.8
Employment		
No	61	40.4
Yes	36	23.8
Part-time	19	12.6
Retired	35	23.2

**Table 2. Correlation between the Scale Scores**

	IN	HI	ASRS	Fear or Anxiety	Avoidance	LSAS
Liebowitz Social Anxiety Scale	0.225**	0.209***	0.244**			
Fear or Anxiety	0.146 <sup>NS</sup>	0.154 <sup>NS</sup>	0.168***			
Avoidance	0.244**	0.211**	0.256**			
Harm Avoidance (HA)	0.523*	0.298*	0.473*	0.272**	0.318*	0.337*
Anticipatory worry and pessimism HA1	0.439*	0.282*	0.413*	0.187***	0.194***	0.218**
Fear of uncertainty HA2	0.402*	0.238**	0.368*	0.265**	0.236**	0.285*
Shyness with strangers HA3	0.340*	0.134 <sup>NS</sup>	0.278**	0.203***	0.280**	0.277**
Fatigability and asthenia HA4	0.423*	0.253**	0.388*	0.203***	0.278**	0.276**
Rosenberg Self-Esteem Scale	0.441*	0.296*	0.421*	0.060 <sup>NS</sup>	0.219**	0.163***

\*p<0.001, \*\*p<0.01, \*\*\*p<0.05, NS: p>0.05; ASRS: Adult ADHD Self-Report Scale, IN: Inattention, HI: Hyperactivity-impulsivity

**Table 3. Predictors of Inattention and Hyperactivity/Impulsivity in Multivariate Analysis of Covariance**

Dependent Variables	Type III Sum of Squares	df	Mean Square	F	p Value	
LSAS- Fear or Anxiety	IN <sup>a</sup>	1.108	1	1.108	0.028	0.867
	HI <sup>b</sup>	9.502	1	9.502	0.285	0.594
LSAS- Avoidance	IN	29.280	1	29.280	0.743	0.390
	HI	28.429	1	28.429	0.854	0.357
Rosenberg Self-Esteem Scale	IN	415.347	1	415.347	10.540	0.001
	HI	170.899	1	170.899	5.134	0.025
Harm Avoidance	IN	953.758	1	953.758	24.202	<0.001
	HI	113.914	1	113.914	3.422	0.066

a. R<sup>2</sup> = 0.330 (Adjusted R<sup>2</sup> = 0.312), b. R<sup>2</sup> = 0.135 (Adjusted R<sup>2</sup> = 0.111)

LSAS: Liebowitz Social Anxiety Scale, HI: Hyperactivity/impulsivity, IN: Inattention.

**Table 4. Predictors of the Symptom Severity of Attention Deficit Hyperactivity Disorder Measured with the Total Adult Attention Deficit Hyperactivity Disorder Self-Report Scale Score**

	Step	Unstandardized Coefficients		Standardized Coefficients	t	p
		B	Std. Error	Beta		
1a	LSAS	0.138	0.045	0.244	3.067	0.003
1b	LSAS - Avoidance	0.245	0.076	0.256	3.235	0.002
2	LSAS - Avoidance	0.164	0.072	0.172	2.292	0.023
	Rosenberg Self-Esteem Scale	5.308	1.040	0.383	5.102	<0.001
3a	LSAS - Avoidance	0.092	0.070	0.096	1.307	0.193
	Rosenberg Self-Esteem Scale	3.484	1.086	0.251	3.208	0.002
	Harm Avoidance (HA)	0.591	0.145	0.329	4.074	<0.001
3b	LSAS - Avoidance	0.100	0.070	0.105	1.436	0.153
HA-1 (Anticipatory worry and pessimism)	Rosenberg Self-Esteem Scale	3.482	1.075	0.251	3.238	0.001
	HA-4 (Fatigability and asthenia)	1.003	0.378	0.212	2.654	0.009
		0.990	0.394	0.197	2.515	0.013

LSAS: Liebowitz Social Anxiety Scale, LSAS score was independent variable in Step 1a, fear or anxiety and avoidance dimensions of LSAS were independent variables Step 1b. In Step 2 self-esteem score was added as an independent variable. In Step 3a harm avoidance (HA) was added, whereas in Step 3b dimensions of HA were included in the analysis as independent variables instead of HA.

Step 1a:  $F=9.403$ ;  $df=1, 149$ ,  $p=0.003$ ; Adjusted  $R^2=0.053$ . Step 1b:  $F=10.463$ ;  $df=1, 149$ ,  $p=0.002$ ; Adjusted  $R^2=0.059$ . Step 2:  $F=19.126$ ,  $df=2; 148$ ,  $p<0.001$ ; Adjusted  $R^2=0.195$ ; Step 3a:  $F=19.626$ ;  $df=3; 147$ ,  $p<0.001$ ; Adjusted  $R^2=0.271$ . Step 3b:  $F=15.418$ ;  $df=4; 146$ ,  $p<0.001$ , Adjusted  $R^2=0.278$ .

## Discussion

The main finding of this study is that although the symptom severity of SAD (as evaluated by the total LSAS score) predicted the symptom severity of ADHD, avoidance dimension was the main predictor. The results revealed that self-esteem could be considered as a partial mediator on the association between the avoidance dimension of SAD and the symptom severity of ADHD. However, HA (especially HA-1 and HA-4) could be considered as full mediator in this relationship. In the assessment of predictors of ADHD dimensions of IN and HI, self-esteem and HA predicted the severity of IN symptoms, while self-esteem predicted only the severity of HI symptoms.

Adults with ADHD generally exhibit lower levels of self-esteem (45). There are many negative experiences that affect the development of negative self-esteem of adults with ADHD (48, 49). Due to emerging negative beliefs about the self and their own skills, adult patients with ADHD may attempt to cope with stressful events by developing inappropriate coping strategies (dysfunctional behavior), such as avoidance (50), which can turn into a symptom of social anxiety or HA. Both cross-sectional (65) and longitudinal (53) studies suggested that low self-esteem leads to anxiety (vulnerability effect), but anxiety does not lead to low self-esteem (the scarring effect). Consistent with these, low self-esteem was a partial mediator on the relationship between the symptom severity of avoidance (dimension of SAD) and the symptom severity of ADHD in this study.

Higher HA was related with the symptom severity of ADHD, which was reported in the previous studies (30–33). Therefore, our results suggest that those with high ADHD symptoms are easily worried, socially reserved, shy, apprehensive, and easily fatigued (32). In the

literature, HA was particularly associated with IN type of ADHD (32) and severity of IN symptoms (30, 32, 34–36). Furthermore, higher HA scores may distinguish the mainly IN type from the pooled combined HI patients (30, 35). Similarly, a previous study has found a strong relationship between HA and IN symptoms, primarily as a result of overlapping genetic influences (36). Previous studies have shown that this relationship continues even after controlling psychiatric co-morbidities, such as depression, anxiety and substance use disorders (66, 67). In parallel with these studies, HA has been linked to IN type of ADHD in this study.

HA is highly associated with symptoms of anxiety and depression (68, 69), and may be a marker of vulnerability to depression and anxiety disorders (68, 70). Individuals with high HA are described as extremely cautious, passive and insecure, and prone to respond with high rates of anxiety and depression to stressful events (71). Consistent with these studies, a decrease in HA was found with the treatment of depression (72, 73). Thus, as Merwood et al. (36) reported, these relationships found between HA and ADHD may suggest that ADHD patients with severe IN symptoms may have high risk of internalizing symptoms, such as anxiety. Consistent with this HA (particularly HA-1 and HA-4) was a mediator on the relationship between the symptom severity of “avoidance” dimension of SAD and the symptom severity of ADHD, particularly IN symptoms in this study.

In a recent study that evaluated the association of SAD and ADHD (26), in a subgroup, it was found that SAD can develop secondary to childhood ADHD (26). Due to the symptoms of ADHD, patients with ADHD can develop low self-esteem and maladaptive coping behaviors in social situations. Others may misjudge

these behaviors and may insult, criticize bully and humiliate these individuals with ADHD. As a consequence, these individuals can experience social anxiety and cognitive inhibition in social contexts. As a result, as social anxiety remains and the person withdraws, inhibition gradually increases. As in this study conducted among patients with AUD, our earlier study also supported this assumption in university students (27). This previous study (27) suggests that although neuroticism and introversion are associated with symptom severity of social anxiety, both probable ADHD and symptom severity of ADHD may be associated with symptoms of social anxiety independently from these associations.

### Limitation

The novelty of the current study was that it has examined the association of SAD and ADHD among a large sample of inpatients with AUD, and examined the mediator effect of HA and self-esteem on this relationship. Nevertheless, the findings of the current study should be considered with some of its limitations. First limitation of the present research was that the symptom severities of anxiety and depression were not evaluated, which may be related with variables of interest; ie, ADHD, HA, self-esteem, and SAD. Second, since this is a cross-sectional study, the results cannot be used to establish causal associations between the primary constructs of interest. As a result, longitudinal studies are expected to determine the causal association between the symptom severities of ADHD and SAD. Third, since we used self-rating measures in this study, extreme ADHD and SAD symptoms could be linked with poorer cognitive capacity, making the findings less credible. In addition, self-rating scales may only suggest an increased risk, not a diagnosis. Finally, not controlling the diagnosis of avoidant personality disorder may be considered as a limitation. However, at minimum these results show that, although the severity of SAD (particularly avoidance dimension) was related to the severity of ADHD symptoms, self-esteem is a partial mediator on this relationship, whereas HA (HA-1 and HA-4 in particular) is a full mediator. When particularly considering the dimensions of ADHD, self-esteem and HA predicted the symptom severity of IN, whereas self-esteem solely predicted the symptom severity of HI.

### Conclusion

Various cognitive behavioral programs for adult ADHD emphasize the importance of implementing techniques to improve self-esteem (45, 74–76). Among inpatients with AUD, including specific therapy programs for enhancing self-esteem of individuals with high ADHD symptoms may protect those individuals from using a coping mechanism such as avoidance, thus become socially anxious.

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### Conflict of Interest

None.

### References

1. Klein RG, Mannuzza S, Olazagasti MA, Roizen E, Hutchison JA, Lashua EC, et al. Clinical and functional outcome of childhood attention-deficit/hyperactivity disorder 33 years later. *Arch Gen Psychiatry*. 2012;69(12):1295-303.
2. Ivanov I, Yehuda R. Optimizing fitness for duty and post-combat clinical services for military personnel and combat veterans with ADHD—a systematic review of the current literature. *Eur J Psychotraumatol*. 2014;5.
3. Johann M, Bobbe G, Putzhammer A, Wodarz N. Comorbidity of alcohol dependence with attention-deficit hyperactivity disorder: differences in phenotype with increased severity of the substance disorder, but not in genotype (serotonin transporter and 5-hydroxytryptamine-2c receptor). *Alcohol Clin Exp Res*. 2003;27(10):1527-34.
4. Ohlmeier MD, Peters K, Te Wildt BT, Zedler M, Ziegenbein M, Wiese B, et al. Comorbidity of alcohol and substance dependence with attention-deficit/hyperactivity disorder (ADHD). *Alcohol Alcohol*. 2008;43(3):300-4.
5. Evren C, Umut G, Bozkurt M, Can Y, Evren B, Agachanli R. Partial mediator role of physical abuse on the relationship between attention-deficit/hyperactivity disorder symptoms and severity of dissociative experiences in a sample of inpatients with alcohol use disorder. *Indian J Psychiatry*. 2017;59(3):306–12.
6. Estévez N, Dey M, Eich-Höchli D, Foster S, Gmel G, Mohler-Kuo M. Adult attention-deficit/hyperactivity disorder and its association with substance use and substance use disorders in young men. *Epidemiol Psychiatr Sci*. 2016;25(3):255-66.
7. Ercan ES, Coşkunol H, Varan A, Toksöz K. Childhood attention deficit/hyperactivity disorder and alcohol dependence: a 1-year follow-up. *Alcohol Alcohol*. 2003;38(4):352–6 .
8. Grella CE, Hser YI, Joshi V, Rounds-Bryant J. Drug treatment outcomes for adolescents with comorbid mental and substance use disorders. *J Nerv Ment Dis*. 2001;189(6):384–92 .
9. Bozkurt M, Evren C, Umut G, Evren B. Relationship of attention-deficit/hyperactivity disorder symptom severity with severity of alcohol-related problems in a sample of inpatients with alcohol use disorder. *Neuropsychiatr Dis Treat*. 2016;12:1661–7.
10. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*, 5th

- edition (DSM-5). Washington DC: American Psychiatric Association; 2013 .
11. Stein MB, Stein DJ. Social anxiety disorder. *Lancet*. 2008;371(9618):1115-25.
  12. Thomas SE, Thevos AK, Randall CL. Alcoholics with and without social phobia: A comparison of substance use and psychiatric variables. *J Stud Alcohol*. 1999;60(4):472-9.
  13. Perugi G, Frare F, Madaro D, Maremmani I, Akiskal HS. Alcohol abuse in social phobic patients: is there a bipolar connection? *J Affect Disord*. 2002;68(1):33-9 .
  14. Schneier FR, Johnson J, Hornig CD, Liebowitz MR, Weissman MM. Social phobia: Comorbidity and morbidity in an epidemiological sample. *Arch Gen Psychiatry*. 1992;49:282-8.
  15. Magee WJ, Eaton WW, Wittchen HU, McGonagle KA, Kessler RC. Agoraphobia, simple phobia, and social phobia in the National Comorbidity Survey. *Arch Gen Psychiatry*. 1996;53(2):159-68 .
  16. Evren C, Can S, Evren B, Cakmak D. The relationship between alexithymia and depression, anxiety and erectile dysfunction in a sample of male alcoholic inpatients: a controlled study. *Klin Psikofarmakol Bul - Bull Clin Psychopharmacol*. 2002;12(4):165-73 .
  17. Eken B, Evren C, Saatcioglu O, Cakmak D. Relationship of personality disorders with sociodemographic characteristics, depression and anxiety among alcohol dependents. *Dusunen Adam J Psychiatry Neurol Sci*. 2003;16:71-9 .
  18. Crum RM, Pratt LA. Risk of heavy drinking and alcohol use disorders in social phobia: a prospective analysis. *Am J Psychiatry*. 2001;158(10):1693-700.
  19. Mancini C, van Ameringen M, Oakman JM, Figueiredo D. Childhood attention deficit/hyperactivity disorder in adults with anxiety disorders. *Psychol Med*. 1999;29(3):515-25.
  20. Van Ameringen M, Mancini C, Simpson W, Patterson B. Adult attention deficit hyperactivity disorder in an anxiety disorders population. *CNS Neurosci Ther*. 2011;17(4):221-6.
  21. Kessler RC, Adler L, Barkley R, Biederman J, Conners CK, Demler O, et al. The prevalence and correlates of adult ADHD in the United States: results from the National Comorbidity Survey Replication. *Am J Psychiatry*. 2006;163(4):716-23.
  22. Park S, Cho MJ, Chang SM, Jeon HJ, Cho SJ, Kim BS, et al. Prevalence, correlates, and comorbidities of adult ADHD symptoms in Korea: Results of the Korean epidemiologic catchment area study. *Psychiatry Res*. 2011;186(2-3):378-83.
  23. Koyuncu A, Ertekin E, Yüksel Ç, Aslantaş Ertekin B, Çelebi F, Binbay Z, et al. Predominantly inattentive type of ADHD is associated with social anxiety disorder. *J Atten Disord*. 2015;19(10):856-64.
  24. Koyuncu A, Çelebi F, Ertekin E, Kök BE, Tükel R. Clinical Effects of ADHD Subtypes in Patients With Social Anxiety Disorder. *J Atten Disord*. 2019;23(12):1464-9.
  25. Koyuncu A, Çelebi F, Ertekin E, Kök BE, Tükel R. Attention deficit and hyperactivity in social anxiety disorder: relationship with trauma history and impulsivity. *Atten Defic Hyperact Disord*. 2016;8(2):95-100.
  26. Koyuncu A, Alkin T, Tükel R. Development of social anxiety disorder secondary to attention deficit/hyperactivity disorder (the developmental hypothesis). *Early Interv Psychiatry*. 2016.
  27. Evren C, Dalbudak E, Ozen S, Evren B. The relationship of social anxiety disorder symptoms with probable attention deficit hyperactivity disorder in Turkish university students; impact of negative affect and personality traits of neuroticism and extraversion. *Psychiatry Res*. 2017;254:158-63.
  28. Kose S. A psychobiological model of temperament and character: TCI. *Yeni Symp*. 2003;41(2):86-97 .
  29. Cloninger CR, Svrakic DM, Przybeck TR. A psychobiological model of temperament and character. *Arch Gen Psychiatry*. 1993;50(12):975-90.
  30. Salgado CAI, Bau CHD, Grevet EH, Fischer AG, Victor MM, Kalil KLS, et al. Inattention hyperactivity dimensions of ADHD are associated with different personality profiles inattention and hyperactivity dimensions of ADHD are associated with different personality profiles. *Psychopathology*. 2009;42(2):108-12.
  31. Jacob C, Gross-Lesch S, Jans T, Geissler J, Reif A, Dempfle A, et al. Internalizing and externalizing behavior in adult ADHD. *Atten Defic Hyperact Disord*. 2014;6(2):101-10.
  32. Perroud N, Hasler R, Golay N, Zimmermann J, Prada P, Nicastro R, et al. Personality profiles in adults with attention deficit hyperactivity disorder (ADHD). *BMC Psychiatry*. 2016;16(1):199.
  33. Kim KM, Nam S, Kim SY, Lee SM, Choi J-W, Kang T, et al. Psychopathological, temperamental, and characteristic factors in adults with remaining childhood attention-deficit hyperactivity symptoms. *Int J Psychiatry Clin Pract*. 2017;21(3):236-41.
  34. Faraone S V, Kunwar A, Adamson J, Biederman J. Personality traits among ADHD adults: implications of late-onset and subthreshold diagnoses. *Psychol Med*. 2009;39(4):685-93.
  35. Gomez R, Woodworth R, Waugh M, Corr PJ. Attention-deficit/hyperactivity disorder symptoms in an adult sample: Associations with Cloninger's temperament and character dimensions. *Pers Individ Dif*. 2012;52(3):290-4.
  36. Merwood A, Asherson P, Larsson H. Genetic associations between the ADHD symptom dimensions and Cloninger's temperament dimensions in adult twins. *Eur Neuropsychopharmacol*. 2013;23(6):416-25.
  37. Péliissolo A, André C, Pujol H, Yao SN, Servant D, Braconnier A, et al. Personality dimensions in

- social phobics with or without depression. *Acta Psychiatr Scand.* 2002;105(2):94–103.
38. Kim SW, Hoover KM. Tridimensional Personality Questionnaire: Assessment in patients with social phobia and control group. *Psychol Rep.* 1996;78(1):43–9.
  39. Chatterjee S, Sunitha TA, Velayudhan A, Khanna S. An investigation into the psychobiology of social phobia: personality domains and serotonergic function. *Acta Psychiatr Scand.* 1997;95(6):544–50.
  40. Marteinsdottir I, Tillfors M, Furmark T, Andenberg UM, Ekselius L. Personality dimensions measured by the Temperament and Character Inventory (TCI) in subjects with social phobia. Vol. 57, *Nordic Journal of Psychiatry.* 2003. p. 29–35.
  41. Hofmann SG, Loh R. The Tridimensional Personality Questionnaire: changes during psychological treatment of social phobia. *J Psychiatr Res.* 2006;40(3):214–20.
  42. Liebowitz MR. Social phobia. *Mod Probl Pharmacopsychiatry.* 1987;22:141–73 .
  43. Evren C, Evren B, Dalbudak E. Alexithymia and personality in relation to social anxiety symptoms in male alcohol-dependent inpatients. *Arch Neuropsychiatry.* 2008;45(3):72–7 .
  44. Rosenberg M. *Society and the adolescent self-image.* Princeton: Princeton University Press; 1965 .
  45. Newark PE, Elsässer M, Stieglitz RD. Self-esteem, self-efficacy, and resources in adults with ADHD. *J Atten Disord.* 2016;20(3):279–90.
  46. Dittmann RW, Wehmeier PM, Schacht A, Minarzyk A, Lehmann M, Sevecke K, et al. Atomoxetine treatment and ADHD-related difficulties as assessed by adolescent patients, their parents and physicians. *Child Adolesc Psychiatry Ment Health.* 2009;3(1):21.
  47. Bussing R, Zima BT, Perwien AR. Self-esteem in special education children with ADHD: relationship to disorder characteristics and medication use. *J Am Acad Child Adolesc Psychiatry.* 2000;39(10):1260–9.
  48. Philipsen A, Richter H, Peters J, Alm B, Sobanski E, Colla M, et al. Structured group psychotherapy in adults with attention deficit hyperactivity disorder: results of an open multicentre study. *J Nerv Ment Dis.* 2007;195(12):1013–9.
  49. Ramsay JR, Rostain AL. *Cognitive behavioral therapy for Adult ADHD: An integrative psychosocial and medical approach.* New York, NY: Routledge; 2008 .
  50. Young S, Bramham J. *ADHD in adults. A psychological guide to practice.* Chichester: UK: Wiley; 2007 .
  51. Newark PE, Stieglitz R-D. Therapy-relevant factors in adult ADHD from a cognitive behavioural perspective. *Atten Defic Hyperact Disord.* 2010;2(2):59–72.
  52. De La Ronde C, Swann WB. Self-esteem: The puzzle of low self-regard. In: Baumeister R, editor. *Self-esteem: The puzzle of low self-regard.* New York: Plenum Press; 1993. p. 147–65 .
  53. van Tuijl LA, de Jong PJ, Sportel BE, de Hullu E, Nauta MH. Implicit and explicit self-esteem and their reciprocal relationship with symptoms of depression and social anxiety: a longitudinal study in adolescents. *J Behav Ther Exp Psychiatry.* 2014;45(1):113–21.
  54. Shaffer R, Kipp K, Wood E, Willoughby T. *Developmental Psychology: Childhood and Adolescence.* Toronto: Nelson Education Ltd; 2010 .
  55. Iancu I, Bodner E, Ben-Zion IZ. Self esteem, dependency, self-efficacy and self-criticism in social anxiety disorder. *Compr Psychiatry.* 2015;58:165–71.
  56. Soykan C, Ozguven HD, Gencoz T. Liebowitz Social Anxiety Scale: The Turkish version. *Psychol Rep.* 2003;93(3\_suppl):1059–69.
  57. Kessler RC, Adler L, Ames M, Demler O, Faraone S, Hiripi E, et al. The World Health Organization Adult ADHD Self-Report Scale (ASRS): a short screening scale for use in the general population. *Psychol Med.* 2005;35(2):245–56 .
  58. Kessler RC, Chiu WT, Demler O, Merikangas KR, Walters EE. Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry.* 2005;62(6):617–27.
  59. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders, 4th edition, Text Revision (DSM-IV-TR).* Washington DC: American Psychiatric Association; 2000 .
  60. Adler LA, Spencer T, Faraone S V, Kessler RC, Howes MJ, Biederman J, et al. Validity of pilot Adult ADHD Self- Report Scale (ASRS) to rate adult ADHD symptoms. *Ann Clin Psychiatry.* 2006;18(3):145–8.
  61. Dogan S, Oncu B, Saracoglu G, Kucukgoncu S. Validity and reliability of the Turkish version of the Adult ADHD Self-Report Scale (ASRS-v1.1). *Anadolu Psikiyat Derg.* 2009;10:77–87. (Turkish).
  62. Evren C, Umut G, Teksin-Unal G, Agachanli R, Evren B. Psychometric properties of the Turkish version of the Adult ADHD Self-Report Scale (ASRS) in a sample of inpatients with alcohol use disorder. *Dusunen Adam J Psychiatry Neurol Sci.* 2016;33(2):109–19.
  63. Kose S, Sayar K, Ak I, Aydin N, Kalelioglu U, Kirpinar I, et al. Turkish version of the Temperament and Character Inventory (TCI): Reliability, validity, and factorial structure. *Klin Psikofarmakol Bul - Bull Clin Psychopharmacol.* 2004;14(3):107–131. (Turkish).
  64. Cuhadaroglu F. *Self-esteem in adolescence.* Hacettepe University, Ankara, Turkey; 1986 .
  65. Yen C-F, Yang P, Wu Y-Y, Cheng C-P. The relation between family adversity and social anxiety among adolescents in Taiwan: effects of family function and self-esteem. *J Nerv Ment Dis.* 2013;201(11):964–70.



### The Mediators on the Relationship between Social Anxiety and ADHD

66. Tillman R, Geller B, Craney JL, Bolhofner K, Williams M, Zimmerman B, et al. Temperament and character factors in a prepubertal and early adolescent bipolar disorder phenotype compared to attention deficit hyperactive and normal controls. *J Child Adolesc Psychopharmacol.* 2003;13(4):531–43.
67. Sizoo B, van den Brink W, van Eenige MG, van der Gaag RJ. Personality characteristics of adults with autism spectrum disorders or attention deficit hyperactivity disorder with and without substance use disorders. *J Nerv Ment Dis.* 2009;197(6):450–4.
68. Minelli A, Pedrini L, Magni LR, Rotondo A. Personality traits in an Italian sample: relationship with anxiety and depression. *Clin Pract Epidemiol Ment Health.* 2009;5(1):26–30.
69. Nyman E, Miettunen J, Freimer N, Joukamaa M, Mäki P, Ekelund J, et al. Impact of temperament on depression and anxiety symptoms and depressive disorder in a population-based birth cohort. *J Affect Disord.* 2011;131(1–3):393–7.
70. Farmer RF, Seeley JR. Temperament and character predictors of depressed mood over a 4-year interval. *Depress Anxiety.* 2009;26(4):371–81.
71. Pierò A. Personality correlates of impulsivity in subjects with generalized anxiety disorders. *Compr Psychiatry.* 2010;51(5):538–45.
72. Corruble E, Duret C, Pelissolo A, Falissard B, Guelfi JD. Early and delayed personality changes associated with depression recovery? A one-year follow-up study. *Psychiatry Res.* 2002;109(1):17–25.
73. Borman PD, Zilberman ML, Tavares H, Surís AM, el-Guebaly N, Foster B. Personality changes in women recovering from substance-related dependence. *J Addict Dis.* 2006;25(4):59–66.
74. Ramsay RJ, Rostain AL. Adapting psychotherapy to meet the needs of adults with attention-deficit/hyperactivity disorder. *Psychother Theory, Res Pract Train.* 2005;42(1):72–84.
75. Stevenson CS, Whitmont S, Bornholt L, Livesey D, Stevenson RJ. A cognitive remediation programme for adults with attention deficit hyperactivity disorder. *Aust N Z J Psychiatry.* 2002;36(5):610–6.
76. Virta M, Vedenpää A, Grönroos N, Chydenius E, Partinen M, Vataja R, et al. Adults with ADHD benefit from cognitive-behaviorally oriented group rehabilitation: a study of 29 participants. *J Atten Disord.* 2008;12(3):218–26.