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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

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ABSTRACT

The aim of the present study was to evaluate relationship of social anxiety disorder symptoms with probable attention deficit hyperactivity disorder (ADHD) while controlling the personality traits of neuroticism and extraversion, anxiety and depression symptoms in a sample of Turkish university students (n=455). Participants were evaluated with the Beck Depresssion Inventory (BDI), the Beck Anxiety Inventory (BAI), the Eysenck Personality Questionnaire Revised-Abbreviated Form (EPQR-A), *the* Adult *ADHD* Self-Report Scale (*ASRS*-v1.1) and the *Liebowitz Social Anxiety Scale (LSAS).* Severity of social anxiety, depression, anxiety and neuroticism were higher among those with probable ADHD, whereas extraversion score did not differ between the groups. The severity of ADHD score,

particularly hyperactivity/impulsivity score, was related with the "fear or anxiety" together with low extraversion (introversion) and high neuroticism dimensions of personality, whereas the severity of ADHD score, both inatentiveness and hyperactivity/impulsivity scores, was related with "avoidence" together with low extraversion (introversion) dimension of personality. These findings suggest that probable ADHD and severity of ADHD symptoms are related with both "fear or anxiety" and "avoidance" of social anxiety, while personality dimensions of low extraversion (introversion) and high neuroticism may have an effect on this relationships among young adults.

Keywords: ADHD; anxiety; depression; extraversion; neuroticism; personality; social anxiety; university students

1. Introduction

Social anxiety disorder (SAD) is characterized by a persistent fear of one or more social or performance situations with exposure to unfamiliar people or to possible scrutiny by others (American Psychiatric Association, 2013). A person with SAD fears that he or she will act in a way that will be humiliating or embarrassing, and exposure to the feared situations almost invariably provokes anxiety (Stein and Stein, 2008). SAD is a common condition among university students and is associated with functional impairment in educational career (Dell'Osso et al., 2014).

Research on personality traits and the development of social anxiety stresses the dimensional nature of social anxiety. Traits related to emotional processing, such as neuroticism (a temperamental sensitivity to painful or negative stimuli, and experiencing negative affect more frequently and/or intensely) and extraversion (a temperamental sensitivity to pleasurable

stimuli [rewards] and experiencing positive effect, pride, and self-confidence more frequently and/or intensely) (Winter and Kuiper, 1997) are critical. Neuroticism is regarded as a 'vulnerability' marker, and extraversion a 'protective' factor in the development of SAD (Bienvenu et al., 2007; Naragon-Gainey and Watson, 2011). Moreover, it has been found that the heritability of social anxiety can, to a large extend, be explained by the heritability of these personality traits (Bienvenu et al., 2007). Thus, someone who scores low on extraversion and high on neuroticism is more likely to develop social anxiety later in life.

Attention-deficit/hyperactivity disorder (ADHD) is a childhood-onset disorder that persist into adolescence and adulthood in more than half of the cases (Klein et al., 2012) and characterized by hyperactivity/impulsivity and inattention that negatively impacts one's ability to function and fulfill social and personal obligations (Ivanov and Yehuda, 2014). Several studies provided evidence that adults diagnosed with ADHD tend to demonstrate increased levels of neuroticism compared with nonclinical controls (Nigg et al., 2002; Parker et al., 2004; Jacob et al., 2007; Koerting et al., 2016), whereas measures of extraversion have reported mixed results (Nigg et al., 2002; Parker et al.,2004; Jacob et al., 2007; Koerting et al., 2016). The latest study on this subject found that adult ADHD patients scored comparable with nonclinical individuals on extraversion (Koerting et al., 2016).

There are a few studies that investigated the relationship between ADHD and SAD. Among patients with anxiety disorder, rate of childhood ADHD risk was 24.0% (n=36) (Mancini et al., 1999), whereas adult ADHD was 27.9% (n=36) (Van Ameringen et al., 2011). Mancini et al. (1999) was the first group to evaluate this relationship, whom reported that 12 of 34 patients with SAD (35.2%) were found to have childhood ADHD. Also, childhood ADHD was associated with earlier onset of anxiety disorder, higher number of comorbidity (anxiety, mood, or substance use disorders), and more severe anxiety and depression symptoms. Van Ameringen et al. (2011) reported a 38.5% SAD comorbidity in adult patients with ADHD. In

other two studies conducted with smaller sample of patients with SAD, Safren et al. (2001) found the rate of childhood ADHD as 3% in 33 SAD patients, whereas Mörtberg et al. (2012) found the childhood symptoms of ADHD as 7.8% in 39 SAD patients and 5.1% scored within the range of adult ADHD. In addition, a childhood study found that the generalized type of SAD had higher ADHD comorbidity rates than nongeneralized subtype of SAD (Chavira et al., 2004). Finally, adult ADHD epidemiological studies conducted in USA (Kessler et al. 2006) and Korea (Park et al. 2011) also revealed an association between these two disorders.

Rest of the studies that evaluated the relationship between ADHD and SAD comes from Turkish literature almost all conducted by the same group of researchers. A childhood study has found higher SAD comorbidity rates in inattention type (60%) of ADHD than in combined type (11.8%) (Yüce et al., 2013). Similarly, a previous study has found a rate of approximately 72% comorbid childhood ADHD in 130 adult outpatients with SAD (Koyuncu et al., 2015a). Fear/anxiety, avoidance, and total scores of Liebowitz Social Anxiety Scale (LSAS) and lifetime major depressive disorder were found to be higher and functionality was found to be lower in the group of patients with comorbid ADHD, when compared with those without ADHD. In their second study, Koyuncu et al. (2015b) found the rate of childhood ADHD comorbidity as 62% (n=88) in patients with SAD (n=142), and 63 of these patients had the diagnosis of inattentive type. This group had higher scores of social anxiety and avoidance and had earlier onset of SAD than the combined type of childhood ADHD. In their third study, Koyuncu et al. (2016a) found higher rates of emotional traumatic experiences and impulsivity along with more severe symptoms of depression, anxiety and social anxiety in the group of SAD patients (n=123) with childhood ADHD than in SAD patients without ADHD in childhood. In their latest study, Koyuncu et al. (2016b) suggested that SAD may develop secondary to childhood ADHD in a subgroup of the patients with SAD.

These previous studies conducted among patients with SAD demonstrated that ADHD symptoms in childhood is related with SAD in adulthood. We, believe that it is important to evaluate the relationship of probable ADHD and symptoms of SAD in population based studies, such as university students, and to control the effects of personality traits of neuroticism and extraversion, anxiety and depressive symptoms.

2. Methods

2.1. Participants and procedure

Cross-sectional online self-report survey was conducted in a university located in Ankara. A website was prepared for online participation. Approval from the Ethical Committee of the university was taken. The study was carried out between November 2015 and January 2016. The students were asked to fill out the form on the website anonymously. Informed consent was approved by students online before continuing with further questions. A total of 520 university students were randomly selected from the list of 3120 students from the whole 5 different faculties of the university. Excluding criteria were rejection to participation (n=27), demanding any fee (n=11), mother language being other than Turkish (n=4) and incomplete participation to study (n=23). According to these criteria 65 university students were excluded from the study. Thus, the study was conducted with a total of 455 university students (184 males and 271 females).

2.2. Measures

2.2.1. Liebowitz Social Anxiety Scale (LSAS)

The LSAS contains 24 situations, selected on the basis of clinical experience, which are rated by the assessor on separate 4-point scales for fear/anxiety and avoidance (Liebowitz, 1987). The scales range from no fear/anxiety (0) to severe fear/anxiety (3) and never avoids (0) to usually avoids (3). Patients are asked to provide ratings based on Turkish version of this scale

(Soykan et al., 2003). Altough the LSAS has also self-rated version, which has reported strong psychometric properties with an internal consistency of *alpha*=0.95 and a 12-week test-retest reliability of *r*=0.83 (Baker et al., 2002), the reliability and validity study for the Turkish version of the LSAS was carried out only for the "clinician-administered" form (Soykan et al., 2003). Nevertheless, Soykan et al. (2003) noted that individuals with social anxiety suffer from difficulties in social interactions and especially face-to-face contact which can effect their answers in clinician-administered scales and suggested further studies to obtain information about using the Turkish version of the scale in self-report assessment. The self-rated version of LSAS has also been evaluated for internet administration with a reported internal consistency of *alpha*=0.94 (Hedman et al., 2010) and has recently been used in university students for similar purpose as the present study (Lemos et al., 2016). Finally, Cronbach's alpha coefficients were found to be 0.91 for fear/anxiety, 0.92 for avoidance and 0.95 for LSAS in the present study.

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

ADHD symptoms were measured with the ASRS (Kessler et al., 2005a; 2005b), an 18-item scale based on Diagnostic and Statistical Manual of Mental Disorders: Fourth Edition (DSM-IV-TR) criteria (American Psychiatric Association, 2000). As a self-report scale ASRS was found to be reliable and valid scale for evaluating ADHD for adults and shows a high internal consistency and high concurrent validity with the rater-administered measure (Adler et al., 2006). It should be noted that for the purposes of their study, Kessler et al. (2005a) administered the measure to a general population and not specifically to individuals who reported having symptoms of ADHD.

Developed under the auspices of the World Health Organization, ASRS is also a short six-item screening instrument, the questions in which were extracted, using stepwise logistic

regression, from a larger survey of 18 questions comprising the Adult Self-Report Survey that taps the 18 specific "Criterion A" symptoms defining the disorder in DSM-IV. The ASRS 6-item screen was developed for community based studies and exhibits strong concordance with clinician diagnoses as well as sound psychometric properties (Chamberlain et al., 2016).

The 5-point Likert-type scale ranges from "0" (never) to "4" (very often). Thus, the possible range of scores on the ASRS screening version is 0 to 24, with higher scores indicating more ADHD symptomology. Each response of sometimes or greater (2 or more) on screening items 1–3 equated to 1 point; each response of ten or greater (3 or more) on screening items 4–6 resulted in a point. A total score of 4 or more indicated probable ADHD. We therefore used this recommended definition to identify highly likely ADHD cases in our sample and named as "probable ADHD". Previous data suggest that this approach is widely used and the 6-item screening version has been shown to outperform the full 18-item version in sensitivity (68.7% v. 56.3%) and specificity (99.5% v. 98.3%) in American general population (Kessler et al., 2005b, 2007). Containing six diagnostic symptoms, it takes only a few minutes to complete ASRS and therefore is ideal for screening procedures. Nevertheless, the result of the test does not replace a clinical diagnosis and the clinician must take false positives into consideration by evaluating the ASRS positives with gold standard scales.

The ASRS was validated in Turkish in a sample of university students previously (Dogan et al., 2009). Principle component analysis revealed two factors (inattention and hyperactivity/impulsivity) explaining 41.6% of the total variance. Reliability analysis showed that the Turkish version of ASRS has a high level of internal consistency (Cronbach's *alpha*=0.88, 0.82 for 'inattention' and 0.78 for 'hyperactivity/impulsivity'). Additionally, the correlation coefficients for two-week test-retest reliability among the 50 subjects were high (for total scores, r=0.85; for two subscales, r=0.73-0.89). Pearson product-moment correlation coefficients were revealed that the subscales and total score of the ASRS were significantly

correlated with the Turkish Wender Utah Rating Scale (Wierzbicki, 2005; Oncu et al., 2005) (Pearson's correlations=0.46-0.52, $p<0.01$) and the Symptom Checklist-90-Revised (Derogatis, 1983; Dag, 1991) (Pearson's correlations=0.54-0.61, $p<0.01$). Cronbach's alpha coefficients were found to be 0.85 for 'inattention', 0.81 for 'hyperactivity/impulsivity' and 0.89 for ASRS in the present study.

Although, it has been suggested that multimodal assessment, including informant and self-report, should be used to gather more information about symptoms of ADHD (Alexander and Liljequist, 2013), self-report measures are frequently used to confirm ADHD symptomatology in university students (Gray et al., 2014). While research on assessment with this specific population is limited, in a study conducted by Katz et al. (2009), participants self-reported higher childhood and current symptoms scores than informants. Studies that conducted among university students generally used 6 item ASRS for screening probable ADHD, and the rate of students who were classified as "probable", "highly likely" or "suspected ADHD" were 8.3% (Mortier et al., 2015), 13.4% in online version (Burlison et al., 2013) and 27.2% (Takahashi et al., 2016) respectively. Finally, both the 6-item and 18-item ASRS are feasible, reliable and cost efficient approaches to use in the assessment and monitoring of ADHD symptoms in the university population (Gray et al., 2014).

2.2.3. Eysenck Personality Questionnaire Revised Abbreviated Form (EPQR-A)

The EPQR-A includes 24 items in four personality traits: "neuroticism/stability" trait was used to assess the stability of emotion; "extraversion/introversion" trait was used to assess the tendency of extraversion and introversion; "psychoticism/socialization" trait was used to assess the subjects' psychiatric characteristics and "lie" trait was used as the validity scale (Francis et al., 1992). Similar with the original scale, factor analysis of the Turkish version yielded 4 factors; the neuroticism, extraversion, psychoticism, and lie traits (Karancı et al., 2007). The reliability and validity of the questionnaire were supported in a Turkish university

student sample (Karancı et al., 2007). In the present study only extraversion and neuroticism traits were used, according to the purpose of the study. Kuder–Richardson *alpha* coefficients for the extraversion and neuroticism traits were 0.78 and 0.65 respectively, and the test–retest reliability of the traits were 0.84 and 0.82 respectively, for Turkish version (Karancı et al., 2007). Cronbach's *alpha* coefficients were found to be 0.79 and 0.68 respectively in the present study.

2.2.4. Beck Depression Inventory–Beck Anxiety Inventory

Symptoms and severity of depression were evaluated by using the Beck Depression Inventory (BDI) (Beck et al., 1961), Turkish version (Hisli, 1989), and symptoms and severity of anxiety were evaluated by the Beck Anxiety Inventory (BAI) (Beck et al., 1988), Turkish version (Ulusoy et al., 1998). Both scales have been validated on Turkish populations. Cronbach's *alphas* were 0.92 for BDI and 0.92 for BAI in the present study.

2.3. Data analysis

The statistical package SPSS 17.0 for Windows (SPSS, 278 Chicago, IL) was used for all the analyses. Student t test was used to compare groups according to current age and scale scores. Gender was compared by means of the χ^2 statistics. Taken the severity of 'fear or anxiety' and 'avoidance' as dependent variables, two hierarchical (depression, anxiety and extraversion and neuroticism in Step 1 [Stepwise], ASRS score in Step 2a [Enter], and inatentiveness and hyperactivity/impulsivity scores instead of ASRS score in Step 2b [Enter]) linear regression model was performed. Taken the 'fear or anxiety' and 'avoidance' as dependent variables, probable ADHD status as a main factor and depression, anxiety, 'neuroticism/stability' and 'extraversion/introversion' as covariates, multivariate covariance analysis (MANCOVA) was performed. For all statistical analysis, p values were 2 tailed, and differences were considered

significant at $p<0.05$. For MANCOVA Bonferroni's correction was applied to reduce type I error and the significance level was accepted as $p<0.01$.

3. Results

Age and gender did not differ between those with probable ADHD (n=96, 21.1%) and those without (n=359, 78.9%). Severity of LSAS total score and 'fear or anxiety' and 'avoidance' subscales, depression, anxiety and neuroticism scores were higher among those with probable ADHD, whereas extraversion score did not differ between the groups (Table 1). In linear regression analyses, the severity of ADHD score, particularly hyperactivity/impulsivity score, was related with the 'fear or anxiety' together with low extraversion (introversion) and high neuroticism dimensions of personality, whereas the severity of ADHD score, both inatentiveness and hyperactivity/impulsivity scores, was related with 'avoidence' together with low extraversion (introversion) dimension of personality and anxiety (Table 2). Multivariate covariance analysis (MANCOVA) with 'fear or anxiety' and 'avoidance' as dependent variables and probable ADHD status as a main factor showed similar results with regression analyses (Table 3).

4. Discussion

Consistent with our hypothesis, the present study documented that the severity of ADHD symptoms is related with the severity of both 'fear or anxiety' and 'avoidence' symptoms of SAD among university students. Similar results were gained from the multivariate analysis, which showed that high probability of ADHD was strongly related with both 'fear or anxiety' and 'avoidence'. In this analysis low extraversion (introversion) was a significant covariant for both 'fear or anxiety' and 'avoidence', whereas high neuroticism was a significant covariant for only 'fear or anxiety'. Thus, these results show that symptoms of SAD and ADHD are interrelated among university students.

It is well established that social anxiety has a positive relationship with neuroticism and a negative relationship with extraversion (Bienvenu, et al., 2001; 2004; Kotov et al., 2007). Similar results were obtained from the study conducted among university students (Kaplan et al., 2015). In this regard, neuroticism is regarded as a 'vulnerability' marker, and extraversion a 'protective' factor in the development of SAD (Bienvenu et al., 2007; Naragon-Gainey and Watson, 2011). Also, genetic factors that influence individual variation in extraversion and neuroticism appear to account entirely for the genetic liability to social anxiety (Bienvenu et al., 2007). Behavioral inhibition is one of the early indicators of social anxiety, which later in life may advance into a certain personality structure (low extraversion and high neuroticism-unstable introverts) and the development of maladaptive cognitive biases (Cremers and Roelofs 2016). Neuroticism or emotionality is characterized by high levels of negative affect such as depression and anxiety. According to Eysenck's theory, neurotic people — who have low activation thresholds, and unable to inhibit or control their emotional reactions, experience negative affect (fight-or-flight) in the face of very minor stressors - are easily nervous or upset. Introverts are chronically over-aroused and jittery and are therefore in need of peace and quiet to bring them down to an optimal level of performance. In the study that evaluated cultural differences it was shown that high neuroticism, and low extraversion were unique contributors to social anxiety with European Americans, whereas in the Chinese ethnic context only low extraversion was a unique contributor (Fang et al., 2016). In the present study conducted among Turkish university students, analyses showed that introversion is related with both 'fear/anxiety' and 'avoidance', whereas high neuroticism is only related with 'fear/anxiety'. Thus, it seems that neuroticism and extraversion may have different associations with 'fear/anxiety' and 'avoidance' of social anxiety among university students. Studies that considered the association between ADHD and these personality dimensions found increased levels of neuroticism among adults diagnosed with ADHD than nonclinical

controls (Nigg et al., 2002; Parker et al.,2004; Jacob et al., 2007; Koerting et al., 2016), whereas measures of extraversion have reported mixed results (Nigg et al., 2002; Parker et al.,2004; Jacob et al., 2007; Koerting et al., 2016). Nevertheless, consistent with a recent study, which compaired ADHD patients with healthy controls (Koerting et al., 2016), we found that the university students with probable ADHD had higher scores from neuroticism than those without, whereas extraversion did not differ between these groups.

In their latest study Koyuncu et al. (2016b) suggested that SAD may develop secondary to childhood ADHD in a subgroup of the patients with SAD. Patients with ADHD may develop maladaptive coping behaviours in social settings due to the symptoms of ADHD. These behaviours may be misunderstood and may have negative consequences, such as criticism, insults, humiliation and bullying from others. As a result these patients with ADHD may develop social fears and a cognitive inhibition that occurs in social situations. The inhibition increases gradually as the social fears persist and the individual becomes withdrawn. Koyuncu et al. (2016b) concluded that, according to this hypothesis, ADHD as the primary disease should be the focus of treatment for these subgroup of patients with SAD. Our result is consistent with this hypothesis that, both probable ADHD and symptom severity of ADHD were related with symptom severity of social anxiety in the present study, even after controlling neuroticism and extraversion, suggesting that although high neuroticism and low extraversion are related with social anxiety symptoms, ADHD may be related with social anxiety symptoms apart from these relationships.

The present study has some limitations. First, because this study is cross-sectional, its findings cannot indicate the causal relationships among the primary constructs of interest. Second, because of excluding criteria, a total of 65 students were excluded from the study, whom may represent ADHD symptoms, thus indicating a possible type II error. Nevertheless the response rate (87.5%) found in the present study was higher than the response rate (65.4%) found in the

previous study with similar methodology (Mortier et al. 2015). Third, because of the shortcoming of the sociodemographic form, which included only information of gender and age, detailed information about significant variables, such as previous diagnoses, consumption of any medicine and substance abuse could not be provided. Fourth, severe ADHD symptoms and SAD may be associated with weaker cognitive performance, which makes results less reliable since we used self-rating scales in the present study. Also self-rating scales may only show high risk rather than the diagnosis. Fifth, like for most studies of SAD, diagnosis of avoidant personality disorder was not controlled in the present study. Finally, because our study is not prospective in structure, it is not possible to demonsrate the casual relationships between low extraversion/high neuroticism, probable ADHD and symptoms of SAD exactly. But at least these findings demonstrate that, although low extraversion and high neuroticism is a vulnerability for social anxiety, regardless of this association, both high probability of ADHD and severity of ADHD symptoms are important factors related with SAD symptoms in university students.

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Table 1 Comparing scale scores according to the presence of probable attention deficit hyperactivity disorder (ADHD).

	Probable ADHD					
	Absent ***n*=359, 78.9%**		**Present** ***n*=96, 21.1%**			
	Mean	**S.D.**	**Mean**	**S.D.**	***t***	***p***
Age	21.80	2.59	21.66	3.64	0.282	0.779
Gender (*n*, %)					**χ2**=0.182	0.670
Males	147	40.9	37	38.5		
Females	212	59.1	59	61.5		
EPQR-A						
Neuroticism	2.86	1.81	3.75	1.78	-4.317	<0.001
Extraversion	3.08	1.97	3.15	2.23	-0.271	0.787
BDI	9.38	9.20	13.85	10.57	-3.778	<0.001
BAI	9.16	9.74	11.96	9.09	-2.531	0.012
LSAS	40.55	22.12	52.60	25.86	-6.65	<0.001
Fear or Anxiety	21.42	11.81	27.62	13.55	-5.67	<0.001
Avoidance	19.13	12.11	24.99	13.59	-7.25	<0.001

EPQR-A: Eysenck Personality Questionnaire Revised-Abbreviated Form, BDI: Beck Depression Inventory, BAI: Beck Anxiety Inventory, LSAS: Liebowitz Social Anxiety Scale

Table 2 Stepwise linear regression analyses with fear or anxiety and avoidance of social anxiety as dependent variables and severity of depression, anxiety, personality dimensions and attention deficit hyperactivity disorder (ADHD) as independent variables

		Unstandardized Coefficients		Standardized Coefficients		
		B	**Std. Error**	***Beta***	***t***	***p***
Fear or Anxiety						
Step 1	**Introversion**	-1.898	0.264	-0.309	-7.198	<0.001
	Neuroticism	1.158	0.324	0.171	3.572	<0.001
	BAI	0.183	0.061	0.142	2.993	0.003
Step 2a	**Introversion**	-1.985	0.259	-0.324	-7.680	0.000
	Neuroticism	0.849	0.324	0.125	2.623	0.009
	Socialization	0.119	0.061	0.093	1.948	0.052
	BAI	0.244	0.053	0.210	4.654	<0.001
	ASRS	-1.985	0.259	-0.324	-7.680	<0.001
Step 2b	**Introversion**	-2.003	0.272	-0.326	-7.356	<0.001
	Neuroticism	0.849	0.324	0.125	2.618	0.009
	BAI	0.118	0.062	0.091	1.903	0.058
	IN	0.223	0.118	0.107	1.888	0.060
	HI	0.269	0.128	0.124	2.092	0.037
Avoidance						
Step 1	**Introversion**	-2.226	0.265	-0.357	-8.397	<0.001
	BAI	0.212	0.061	0.162	3.446	0.001
	Neuroticism	0.847	0.326	0.123	2.598	0.010
Step 2a	**Introversion**	-2.322	0.259	-0.372	-8.974	<0.001
	BAI	0.142	0.061	0.109	2.317	0.021

	Neuroticism	0.509	0.324	0.074	1.570	0.117
	ASRS	0.268	0.053	0.226	5.096	<0.001
Step 2b	**Introversion**	-2.326	0.272	-0.373	-8.536	<0.001
	BAI	0.142	0.062	0.108	2.288	0.023
	Neuroticism	0.508	0.324	0.074	1.567	0.118
	IN	0.263	0.118	0.125	2.225	0.027
	HI	0.274	0.129	0.125	2.130	0.034

Fear or Anxiety; Step 1: F=33.757, df=3, 451, p<0.001, Adjusted R^2=0.178, Step 2a: F=31.892, df=4, 450, p<0.001, Adjusted R^2=0.214, R^2 Change=0.037, Step 2b: F=25.468, df=5, 449, p<0.001, Adjusted R^2=0.212, R^2 Change=0.038. **Avoidance;** Step 1: F=37.903, df=3, 451, p<0.001, Adjusted R^2=0.196, Step 2a: F=36.494, df=4, 450, p<0.001, Adjusted R^2=0.238, R^2 Change=0.044, Step 2b: F=29.131, df=5, 449, p<0.001, Adjusted R^2=0.237, R^2 Change=0.044. BAI: Beck Anxiety Inventory, ASRS: Adult ADHD Self-Report Scale, IN: inatentiveness, HI: hyperactivity/impulsivity

Table 3. Multivariate covariance analysis (MANCOVA) with fear or anxiety and avoidance as dependent variables and probable attention deficit hyperactivity disorder (ADHD) status as main factor in university students (*n*=455).

Source	**Dependent Variable**	**Type III Sum of Squares**	***df***	***F***	***p***
High ADHD risk	Fear or Anxiety	1745.395	1	14.094	<0.001
	Avoidance	1590.048	1	12.712	<0.001
Covariates					
BAI	Fear or Anxiety[a]	665.015	1	5.370	0.021
	Avoidance[b]	684.529	1	5.473	0.020
Neuroticism	Fear or Anxiety	881.134	1	7.115	0.008
	Avoidance	291.765	1	2.333	0.127
Introversion	Fear or Anxiety	6813.438	1	55.019	<0.001
	Avoidance	9229.696	1	73.791	<0.001

[a.] R^2=0.209 (Adjusted R^2=0.201) [b.] R^2=0.227 (Adjusted R^2=0.219)

Covariants were severity of depression, anxiety and personality dimensions of neuroticism/ stability and extraversion/introversion. Only covariants that included significant relation with any of the main defense styles were shown. After Bonferroni correction, level of significance was set at p=0.01. ADHD: attention deficit hyperactivity disorder, BAI: Beck Anxiety Inventory.

Highlights

- Severity of social anxiety symptoms and neuroticism scores were higher among those with the probable ADHD, whereas extraversion score did not differ between the groups.
- The severity of ADHD score, particularly hyperactivity/impulsivity score, predicted the “fear or anxiety” together with low extraversion (introversion) and high neuroticism dimensions of personality.
- The severity of ADHD score, both inatentiveness and hyperactivity/impulsivity scores, predicted “avoidence” together with low extraversion (introversion) dimension of personality.
- Multivariate covariance analysis with “fear or anxiety” and “avoidance” as dependent variables and probable ADHD as a main factor showed similar results with regression analyses.