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## Evaluation of Medical School Students in Terms of Attention Deficit Hyperactivity Disorder and Emotional Regulation Difficulties

Tıp Fakültesi Öğrencilerinin Dikkat Eksikliği Hiperaktivite Bozukluğu ve Duygu Düzenleme Güçlükleri Açısından Değerlendirilmesi

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### ABSTRACT

**Objective:** The symptoms of attention deficit hyperactivity disorder (ADHD) affect individuals' education, quality of life, work, and social life. Studies have indicated that adults with ADHD often experience emotion dysregulation as much as they exhibit the core symptoms of the disorder, leading to significant problems in social life. This study aimed to evaluate ADHD symptoms and emotional regulation difficulties in medical students studying at a university hospital.

**Methods:** The research was conducted between 20.10.2021 and 20.11.2021 in the family medicine department of a university hospital. The sociodemographic data form, adult ADHD Self-Report Scale (ASRS), and difficulties in emotion regulation scale (DERS) were administered to the participants online via Google surveys. The study sample was grouped according to the total ASRS score of the participants.

**Results:** A total of 552 participants were included in the study. Participants were divided into 3 groups: high probable ADHD (HP-ADHD), probable ADHD (P-ADHD), and without ADHD (WO-ADHD) according to the ASRS cutoff score. The HP-ADHD group had higher DERS total score and all subscale scores than the WO-ADHD group ( $p<0.001$  for all analyses). The ASRS total scores were positively correlated with the DERS total scores ( $r=0.643$ ,  $p<0.001$ ). In addition, suicide attempts, forensic event history, and class failure were

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**Amaç:** Dikkat Eksikliği Hiperaktivite Bozukluğu (DEHB) belirtileri bireylerin eğitim, yaşam kalitesi, iş ve sosyal yaşamlarını etkilemektedir. Araştırmalar, DEHB'li yetişkinlerin bozukluğun temel belirtilerini gösterdikleri kadar sıklıkla duygu düzenleme güçlüğü yaşadıklarını ve bunun da sosyal yaşamda önemli sorunlara yol açtığını göstermektedir. Bu çalışmada, bir üniversite hastanesinde öğrenim gören tıp öğrencilerinde DEHB belirtileri ve duygu düzenleme güçlüklerinin değerlendirilmesi amaçlanmıştır.

**Yöntemler:** Araştırma 20.10.2021-20.11.2021 tarihleri arasında üniversite hastanesinin aile hekimliği bölümünde yürütülmüştür. Katılımcılara sosyodemografik veri formu, Erişkin DEHB Öz Bildirim Ölçeği (ASRS) ve Duygu Düzenleme Güçlüğü Ölçeği (DDGÖ) Google anket sistemi üzerinden çevrimiçi olarak uygulanmıştır. Çalışma örneklemini katılımcıların toplam ASRS puanına göre gruplandırılmıştır.

**Bulgular:** Çalışmaya toplam 552 katılımcı dahil edilmiştir. Katılımcılar ASRS kesme puanına göre yüksek olasılıklı DEHB (AGYOD), olası DEHB (AGOD) ve DEHB olmayan (AGDO) şeklinde 3 gruba ayrılmıştır. AGYOD grubunun DDGÖ toplam puanı ve tüm alt ölçek puanları AGDO grubuna kıyasla daha yüksek bulunmuştur ( $p<0.001$  tüm analizler için). ASRS toplam puanları ile DERS toplam puanları arasında pozitif korelasyon saptanmıştır ( $r=0.643$ ,  $p<0.001$ ). Ayrıca, intihar girişimi, adli

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## ABSTRACT

significantly more frequent in the HP-ADHD group than in the WO-ADHD group ( $p<0.001$ ,  $p=0.043$ ,  $p=0.024$  respectively).

**Conclusion:** There is a significant correlation between ADHD and emotional regulation difficulties, which may cause clinical diversity that may cause problems in different areas of life in adults.

**Keywords:** Adult ADHD, emotion regulation difficulties, medical student, family medicine, psychiatry

## INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is a neuropsychiatric disorder characterized by decreased sustained attention, increased impulsivity, or hyperactivity (1,2). Epidemiological studies have indicated that ADHD is present in approximately 5-10% of children and adolescents and approximately 4% of adults (3,4). Research suggests that all or a subset of the disorder's symptoms can persist into adulthood in about 50% of the cases. The symptoms of ADHD that begin in childhood and continue into adulthood adversely affect individuals' education, quality of life, work, and social life (3,5). The symptoms and problem areas observed in adults may differ from those in children. Attention deficits may manifest as easily diverted attention, difficulty in focusing, forgetfulness, careless errors, and difficulty in organizing. In contrast, hyperactivity may present as restlessness and difficulty in sitting still for extended periods. Impulsivity may be observed as impatience, hastiness, challenges in planning and execution, and problems in executive functions (3). Moreover, impulsive traits in adults with ADHD are known to increase the likelihood of substance abuse and risky behaviors, such as reckless driving (6). ADHD can coexist with numerous psychiatric disorders. It has been observed that 34% of adult women with ADHD and 50% of men with ADHD have at least one psychiatric disorder. Mood disorders, anxiety disorders, antisocial personality disorder, and substance use disorders are common comorbidities associated with ADHD (7). Studies have indicated that adults with ADHD often experience difficulties in emotion regulation as much as they exhibit the core symptoms of the disorder, leading to significant problems in social life (8). Emotion regulation refers to the external and internal processes utilized by an individual to monitor and modify their emotional responses to achieve their goals (9). In other words, emotion regulation can be defined as processes that influence which emotions one has, how one experiences them, and how they express them (10). Rapid and poorly controlled shifts in emotions, impatience, frequent and easy discomfort, and quick temper for minor reasons are examples of emotion regulation difficulties (8,11). Effective emotion regulation can reduce emotional responses to anxiety-provoking situations, whereas difficulties in this area can lead to the development of mood and anxiety disorders (12).

Although studies in the literature have evaluated university students with ADHD and various clinical characteristics, the studies conducted in this field are limited. This study aimed to evaluate ADHD symptoms and emotional regulation difficulties in students studying at the medical faculty of a university hospital. The study hypothesizes that students with a high probability of ADHD will have higher emotional regulation difficulties than those without. We believe that this

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olay öyküsü ve sınıfta kalma; AGYOD grubunda AGDO grubuna kıyasla anlamlı derecede daha yüksek oranda bulunmuştur ( $p<0.001$ ,  $p=0.043$ ,  $p=0.024$  sırasıyla).

**Sonuç:** DEHB ile duygu düzenleme güçlükleri arasında anlamlı bir ilişki vardır ve bu durum yetişkinlerde yaşamın farklı alanlarında güçlüklerle neden olabilecek klinik çeşitliliğe sebep olabilir.

**Anahtar Sözcükler:** Erişkin DEHB, duygu düzenleme güçlükleri, tıp öğrencisi, aile hekimliği, psikiyatri

research will shed light on future studies on ADHD and its clinical implications in adulthood and contribute to the literature.

## MATERIALS AND METHODS

### Sample of the Study

The research was conducted between 20.10.2021 and 20.11.2021 at a university hospital's department of family medicine and was conducted according to the Helsinki protocol. Necessary permissions for the research were obtained from the Health Sciences Non-Interventional Clinical Research Ethics Committee of İnönü University (approval number: 2021/2540, date: 19.10.2021). The inclusion criteria were students at the university's medical faculty and research volunteer. The exclusion criteria were not having the cognitive capacity to complete the scales used in the study and having a psychiatric disease that could affect emotional regulation (such as schizophrenia, schizoaffective disorder, bipolar disorder, etc.). A sociodemographic data form and scales necessary for the research were distributed online to medical faculty students via the Google survey system. The snowball sampling system included 552 participants in the study. The sociodemographic data form, adult ADHD Self-Report Scale (ASRS), and difficulties in emotion regulation scale (DERS) were applied to the participants. The study sample was grouped according to the total ASRS score of the participants. Those with a total ASRS score of 24 and above were named the high probable ADHD group (HP-ADHD), those between 17-23 were named the probable ADHD group (P-ADHD), and those 16 and below were named the without ADHD group (WO-ADHD). Online consent was obtained from all participants.

### Applied Psychiatric Evaluation Scales

**Adult Attention Deficit Hyperactivity Disorder Self-Report Scale Adult ADHD Self-Report Scale (ASRS):** This scale was developed by the World Health Organization to screen for ADHD (13). Turkish validity and reliability studies on the scale were conducted by Dogan et al. (14). It comprises two subscales, each comprising nine attention deficit and hyperactivity/impulsivity items.

**Difficulties in Emotional Regulation Scale (DERS):** This scale was developed by Gratz and Roemer (15) to assess emotional regulation difficulties. The validity and reliability of the scale was examined by Ruganci and Gençöz (16). The ASRS assessing difficulties in emotion regulation consists of six subscales: lack of awareness of emotions (awareness), lack of understanding of emotions (clarity), lack of acceptance of emotions (non-acceptance), limited access to emotion regulation strategies perceived as effective (strategies), difficulties in impulse control when experiencing negative emotions (impulses),

and difficulties in goal-oriented behaviors when experiencing negative emotions (goals). The scale comprises 36 items and does not have a cut-off point. An increase in each subscale and the total score indicates an increase in difficulty experienced in regulating emotions.

**Sociodemographic Data Form:** Prepared based on information obtained from previous studies, this form collects participants' data on age, gender, history of psychiatric-physical diseases, failure in class, and substance experience.

### **Statistical Analysis**

This study summarized quantitative (numeric) variables as median (min.-max.), while qualitative variables were presented as numbers and percentages. The Shapiro-Wilk test was used to assess the normal distribution of quantitative variables. The Kruskal-Wallis H-variance analysis was employed to determine if there was a significant difference in quantitative variables between groups. Post hoc multiple comparison tests after this analysis were conducted using the Conover test. The Pearson chi-squared test was used to investigate whether there was a significant difference between groups regarding qualitative variables. Post hoc multiple comparison tests after this analysis were conducted using the Bonferroni correction for significance between two proportions. Correlations between ASRS scores and DERS scores were investigated using Spearman's rank-order correlation. A p-value of  $\leq 0.05$  was set as the level of statistical significance. The analyses were conducted using the Kruskal-Wallis software developed by the department of biostatistics and medical informatics of the medical faculty (<http://biostatapps.inonu.edu.tr/kruskalwallis/>) and the IBM SPSS Statistics 26 package program.

## **RESULTS**

### **Clinical and Sociodemographic Features of the Groups**

A total of 552 participants were included in the study. The mean age of the participants was found to be  $20.6 \pm 2$ . Of them, 335 (60.7%) were female and 217 (39.3%) were male. According to the ASRS cut-off scores, 76 participants were included in the HP-ADHD group, 239 in the P-ADHD group, and 237 in the WO-ADHD group. When the groups were evaluated in terms of psychiatric disease history, suicide attempt, forensic event history, and failure in class, there was a statistically significant difference between the groups ( $p=0.028$ ,  $p<0.001$ ,  $p=0.042$ ,  $p=0.023$ ). The HP-ADHD group had a higher proportion of psychiatric disease, suicide attempts, forensic events, and class failures than the WO-ADHD group. When groups were compared in terms of substance experiences, they were similar to each other. Contrary to expectations, the WO-ADHD group had a higher percentage (3.4%) of participants with substance experience. In terms of psychiatric disease history, the most common history in all three groups was anxiety disorder. The history of ADHD was 5.3% in the HP-ADHD group, 0.8% in the P-ADHD group, and 0.8% in the WO-ADHD group. When the groups were compared in terms of psychiatric disorders other than ADHD, psychiatric disorders were higher in the HP-ADHD group. However, this difference did not show statistical significance between the groups ( $p=0.080$ ). The clinical and sociodemographic characteristics of the groups are presented in Tables 1 and 2.

### **Comparison of Groups by Scale Scores**

When the groups were evaluated in terms of the ASRS total and subscale scores, a statistically significant difference was detected between them ( $p<0.001$  for all analyses). The HP-ADHD group had higher ASRS total and subscale scores than the P-ADHD group, and the P-ADHD group had higher scores than the WO-ADHD group. When the groups were evaluated for DERS total and subscale scores, a statistically significant difference was detected between them ( $p<0.001$  for all analyses). Excluding the awareness subscale, the HP-ADHD group had higher scores on all other subscales and the DERS total score than the WO-ADHD group, and the P-ADHD group had higher scores than the WO-ADHD group ( $p<0.001$  for all analyses). A comparison of the scale scores between the groups is presented in Table 3.

### **Evaluation of Correlation Between ASRS and DERS Scores**

The ASRS total scores were positively correlated with the DERS total scores ( $r=0.643$ ,  $p<0.001$ ). In addition, all subscale scores were positively correlated with themselves ( $p<0.001$  for all analyses). The correlation between participants' ASRS scores and DERS scores is given in Table 4.

## **DISCUSSION**

Emotional regulation difficulties in ADHD have become a focal point for researchers, and various studies conducted on the subject recently. Researchers have noted that emotional dysregulation in adult ADHD is as significant as core symptoms, and due to these difficulties, individuals with ADHD face challenges in social and academic domains (8). Furthermore, ADHD has been reported to increase the risk of other psychiatric disorders throughout life, as well as failures in educational and vocational areas, criminal incidents, accidents, social disabilities, and addiction (1,17). As indicated in the diagnostic criteria for adult ADHD, rather than being a mental disorder, it's proposed that patients may present to clinicians with different clinical characteristics that can impair functionality in various areas (8). In this study, we aimed to evaluate medical faculty students' perceptions of ADHD and emotional regulation difficulties.

Research has frequently indicated that psychiatric comorbidities accompany ADHD, emphasizing the significant role of emotional regulation skills development in co-diagnosis (12). The most common psychopathologies coexisting with ADHD are mood and anxiety disorders, substance use disorders, and personality disorders. These studies highlight the challenges in diagnosing ADHD in adults and underscore the fact that ADHD is often not adequately recognized and treated. Early identification and treatment of ADHD and its psychiatric comorbidities in adults can potentially alter the trajectory of psychiatric morbidity in later life (18). Faraone et al. (17) discussed the clinical heterogeneity of ADHD, stating that a small number of patients have no psychiatric comorbidities, but some present with complex issues such as communication disorders, intellectual disabilities, specific learning difficulties, sleep disorders, anxiety and mood disorders, autism spectrum disorders, tic disorders, disruptive behavior disorders, and substance use disorders. Our findings related to psychiatric comorbidity were consistent with the literature (17,18). In our study, a significantly higher rate of psychiatric illness history was found in the HP-ADHD

**Table 1.** Comparison of the groups in terms of clinical and sociodemographic features

			Groups			Total	Pearson chi-square		Pairwise comparisons	
			HP-ADHD <sup>1</sup>	P-ADHD <sup>2</sup>	WO-ADHD <sup>3</sup>		Test statistic	p		
Gender	Female	n	52	147	136	335	3.057	0.217	-	
		%	68.4%	61.5%	57.4%	60.7%				
	Male	n	24	92	101	217				
		%	31.6%	38.5%	42.6%	39.3%				
Psychiatric illness history	Yes	n	12	28	15	55	7.183	0.028	Yes	1;2 p=0.990
		%	15.8%	11.7%	6.3%	10.0%				1;3 <b>p=0.030</b>
	No	n	64	211	222	497			No	1;2 p=0.990
		%	84.2%	88.3%	93.7%	90.0%				1;3 <b>p=0.030</b>
Family history of psychiatric illness	Yes	n	19	37	26	82	9.086	0.011	Yes	1;2 p=0.176
		%	25.0%	15.5%	11.0%	14.9%				1;3 <b>p=0.007</b>
	No	n	57	202	211	470			No	1;2 p=0.176
		%	75.0%	84.5%	89.0%	85.1%				1;3 <b>p=0.007</b>
Physical illness	Yes	n	6	15	17	38	0.290	0.865	-	
		%	7.9%	6.3%	7.2%	6.9%				
	No	n	70	224	220	514				
		%	92.1%	93.7%	92.8%	93.1%				
Suicide Attempt	Yes	n	13	13	9	35	17.738	<0.001	Yes	1;2 <b>p=0.004</b>
		%	17.1%	5.4%	3.8%	6.3%				1;3 <b>p&lt;0.001</b>
	No	n	63	226	228	517			No	1;2 <b>p=0.004</b>
		%	82.9%	94.6%	96.2%	93.7%				1;3 <b>p&lt;0.001</b>
Forensic event history	Yes	n	4	4	2	10	6.363	0.042	Yes	1;2 p=0.250
		%	5.3%	1.7%	0.8	1.8%				1;3 <b>p=0.043</b>
	No	n	72	235	235	542			No	1;2 p=0.250
		%	94.7%	98.3%	99.2%	98.2%				1;3 <b>p=0.043</b>
Failure in class	Yes	n	21	50	34	105	7.581	0.023	Yes	1;2 p=0.668
		%	27.6%	20.9%	14.3%	19.0%				1;3 <b>p=0.024</b>
	No	n	55	189	203	447			No	1;2 p=0.668
		%	72.4%	79.1%	85.7%	81.0%				1;3 <b>p=0.024</b>
									2;3 p=0.180	

The Pearson chi-square test was utilized to investigate whether there was a significant difference between groups in terms of qualitative variables. Post-hoc multiple comparison tests after this analysis were conducted using the Bonferroni-corrected significance test. ADHD: Attention Deficit Hyperactivity Disorder, HP-ADHD: High Probable ADHD, P-ADHD: Probable ADHD, WO-ADHD: Without ADHD, p<0.050.

**Table 2.** Comparison of the groups in terms of smoking, alcohol and substance experience

			Groups			Total	Pearson chi-square	
			HP-ADHD	P-ADHD	WO-ADHD		Test statistic	p
Smoking	Yes	n	11	29	26	66	0.683	0.711
		%	14.5%	12.1%	11.0%	12.0%		
	No	n	65	210	211	486		
		%	85.5%	87.9%	89.0%	88.0%		
Alcohol	2-3 times/week	n	3	0	3	6	9.193	0.056
		%	3.9%	0.0%	1.3%	1.1%		
	Rare	n	15	42	38	95		
		%	19.7%	17.6%	16.0%	17.2%		
	None	n	58	197	196	451		
		%	76.3%	82.4%	82.7%	81.7%		
Substance experience	Yes	n	2	1	8	11	5.512	0.064
		%	2.6%	0.4%	3.4%	2.0%		
	No	n	74	238	229	541		
		%	97.4%	99.6%	96.6%	98.0%		

Pearson's chi-square test was utilized to investigate whether there was a significant difference between groups regarding qualitative variables. ADHD: Attention Deficit Hyperactivity Disorder, HP-ADHD: High probable ADHD, P-ADHD: Probable ADHD, WO-ADHD: Without ADHD,  $p < 0.050$ .

group than in the WO-ADHD group. The most frequently reported psychiatric illness in the HP-ADHD group was anxiety disorder (6.6%). The history of ADHD was higher in the HP-ADHD group than in the other groups, but was present in only 4 (5.3%) patients. This finding suggests, as also noted in the literature, that ADHD in adults may not be adequately diagnosed (18). The high rate of psychiatric illness in the HP-ADHD group might lead to diagnostic confusion. Substance misuse or addiction is approximately twice as prevalent in individuals with ADHD compared with the general population (18). The relationship between substance use disorders and ADHD is believed to stem from similar neurobiological mechanisms and factors, such as coexisting psychiatric disorders, impulsivity, novelty-seeking, and self-medication for ADHD symptoms (19). It has been noted that individuals with ADHD often resort to substance use for sleep disturbances or emotional regulation (18). ADHD in childhood and adolescence has been indicated as a strong predictor of tobacco, alcohol, and substance use in adulthood (20). Individuals with comorbidity of ADHD and substance use disorder have been shown to experience more significant problems in social and academic domains, along with decreased quality of life (21). In contrast to previous studies (18-20), no significant difference was found between the groups in terms of substance experience. Because substance use is illegal in our country, participants might not have answered this question objectively, which could have influenced our findings. Park et al. (22) indicated a strong relationship between adult ADHD symptoms and suicidal tendencies. Research focusing on increased suicide risk in ADHD has centred on typical comorbidities, specific personality traits, and cognitive impairments that may predispose individuals to suicidal behaviors. In their study, Park et al. (22) demonstrated a significant relationship between ADHD symptoms and nicotine addiction, alcohol misuse/addiction, mood disorders, bipolar disorder, major depressive disorder, anxiety

disorders, obsessive-compulsive disorder, somatoform disorder, and post-traumatic stress disorder. Although many studies have reported that ADHD diagnosis is an independent risk factor for suicide, it is believed that coexisting comorbidities such as affective disorders, anxiety disorders, and substance use mediate this risk (23). Impulsivity, a core symptom of ADHD, plays a crucial role in impairing decision-making processes in patients (24). Impulsivity is a personality trait characterized by behaviors without consideration of consequences. Individuals with ADHD can be prone to making hasty and risky decisions when confronted with life's dilemmas and crises because of the disease's associated impairments in decision-making, inattentiveness, and impulsivity. Instead of securing long-term gains or devising successful strategies, these cognitive tendencies may drive individuals to prefer immediate escape from stressful events, which can include suicidal actions (25). Consistent with previous studies (25), our study found a significantly higher incidence of history of suicide attempt in the HP-ADHD group than in the other groups. However, we believe that other possible psychiatric comorbidities and clinical features may also play a role in reaching this outcome. Individuals with ADHD can face legal problems due to persistent symptoms of ADHD. Longitudinal studies have shown that untreated ADHD cases in adulthood demonstrate risk behaviors like alcohol and substance addiction, criminal tendencies, self-harm, and traffic accidents (26). Numerous studies in the literature have shown that individuals with ADHD are more frequently penalized in various settings (27). Consistent with previous studies, our study found a significantly higher incidence of forensic event history in the HP-ADHD group than in the WO-ADHD group. It has been shown that cognitive skills can be impaired due to ADHD's core symptoms, namely inattention, hyperactivity/impulsivity, or their combination. Numerous studies have shown that attention disorders at an early age are linked to future difficulties in reading, mathematics,



and overall school performance (28). It should be noted that individuals with ADHD are more likely to repeat grades and have a lower academic success level than the general population (29). Our findings related to academic performance were consistent with those of previous research. Our study found a significantly higher rate of failure in class in the HP-ADHD group than in the WO-ADHD group. ADHD is a psychiatric disorder with a high genetic predisposition. A study conducted in our country reported that 6.8% of the parents of children with ADHD met the diagnostic criteria for adult ADHD (30). It is important to note that the genetic transition risk in ADHD is higher in females, suggesting that environmental

factors are more predominant in males. In contrast, genetic factors are more significant in females. It has been highlighted that there is a higher incidence of psychiatric illness in parents of children with ADHD compared with the control group (30). Consistent with previous studies, our study found a significantly higher incidence of psychiatric illness history in families in the HP-ADHD group than in the WO-ADHD group.

In adults with ADHD, researchers like Wender, Brown, Conner, and Barkley, who developed alternative models, have all emphasized the significance of emotional symptoms in ADHD (8). Retz et al. (8) indicated that the psychopathological presentation and functional

**Table 3.** Comparison of the groups regarding age and scale scores

	Group			p	Pairwise comparisons
	HP-ADHD <sup>1</sup>	P-ADHD <sup>2</sup>	WO-ADHD <sup>3</sup>		
Age	21 (18-27)	20 (17-26)	20 (17-28)	0.263	-
Attention deficit	25 (10-35)	18 (4-23)	12 (0-16)	<0.001	1;2 p<0.001 1;3 p<0.001 2;3 p<0.001
Hyperactivity impulsivity	21.5 (9-36)	17 (6-23)	11 (0-16)	<0.001	1;2 p<0.001 1;3 p<0.001 2;3 p<0.001
ASRS total	45 (34-67)	34 (23-44)	24 (0-32)	<0.001	1;2 p<0.001 1;3 p<0.001 2;3 p<0.001
Awareness	15 (6-25)	14 (5-25)	12 (5-21)	<0.001	1;2 p=0.160 1;3 p<0.001 2;3 p<0.001
Clarity	17 (5-25)	13 (5-25)	10 (5-23)	<0.001	1;2 p<0.001 1;3 p<0.001 2;3 p<0.001
Non-acceptance	17 (6-30)	13 (6-30)	10 (6-30)	<0.001	1;2 p=0.001 1;3 p<0.001 2;3 p<0.001
Impulse	19.5 (6-30)	15 (6-29)	11 (6-23)	<0.001	1;2 p<0.001 1;3 p<0.001 2;3 p<0.001
Goals	20 (8-25)	18 (6-25)	14 (5-24)	<0.001	1;2 p<0.001 1;3 p<0.001 2;3 p<0.001
Strategies	26.5 (11-40)	21 (8-39)	15 (8-33)	<0.001	1;2 p<0.001 1;3 p<0.001 2;3 p<0.001
DERS total	118 (53-169)	96 (48-152)	74 (40-130)	<0.001	1;2 p<0.001 1;3 p<0.001 2;3 p<0.001

Kruskal-Wallis H variance analysis was employed to determine if there was a significant difference between groups regarding quantitative variables. Post-hoc multiple comparison tests after this analysis were conducted using the Conover test. ADHD: Attention Deficit Hyperactivity Disorder, ASRS: Adult ADHD Self-Report Scale, DERS: Difficulties in emotion regulation scale, HP-ADHD: High probable ADHD, P-ADHD: Probable ADHD, WO-ADHD: Without ADHD, p<0.050

impairments in adult ADHD cannot be entirely accounted for by classic ADHD symptoms, such as inattention, hyperactivity, and impulsivity. They highlighted that individuals with ADHD have difficulty coping with stress because of mood variability, get angry frequently and quickly, and have high emotional reactivity. Moreover, these individuals often experience interpersonal relationship problems, and a significant portion of their reasons for medical consultations are related to these interpersonal issues (8). In a study conducted by Surman et al. (31) it was noted that ADHD individuals with intense emotion regulation difficulties, as compared to those without such intense difficulties, had a higher rate of functional impairment, divorce, risk of traffic accidents, and risk of arrest. In another study, emotional lability, comorbidity, and functional impairment in adults

with ADHD were examined; a higher prevalence of emotional lability was reported in ADHD adults than in controls. It was observed that hyperactivity/impulsivity is a stronger predictor of emotional lability than subsyndromal symptoms, and emotional lability independently contributed to daily functional impairments. Attention was drawn to the fact that some scale scores assessing emotional lability (e.g., affective lability-anger subscale) were higher in ADHD individuals showing antisocial behavior than in those who did not. In conclusion, it was suggested that emotional lability in ADHD is related to the disorder itself rather than comorbid conditions and might elucidate some disturbances not explained by the disorder's classic symptoms. It has also been stated that routine screening for emotional lability, which can lead to long-term problems in adult

**Table 4.** Evaluating the correlation between participants' scale scores

		AD	H/I	ASRS	AWR	CLR	NAC	IMP	GOA	STR	DERS
AD	r	1	0.506	0.879	0.370	0.532	0.430	0.503	0.580	0.541	0.621
	p		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	n	552	552	552	552	552	552	552	552	552	552
H/I	r	0.506	1	0.856	0.205	0.407	0.352	0.519	0.364	0.436	0.490
	p	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	n	552	552	552	552	552	552	552	552	552	552
ASRS	r	0.879	0.856	1	0.335	0.544	0.453	0.589	0.549	0.565	0.643
	p	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	n	552	552	552	552	552	552	552	552	552	552
AWR	r	0.370	0.205	0.335	1	0.534	0.335	0.312	0.264	0.370	0.552
	p	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	n	552	552	552	552	552	552	552	552	552	552
CLR	r	0.532	0.407	0.544	0.534	1	0.537	0.587	0.520	0.639	0.790
	p	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001
	n	552	552	552	552	552	552	552	552	552	552
NAC	r	0.430	0.352	0.453	0.335	0.537	1	0.639	0.501	0.726	0.817
	p	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001
	n	552	552	552	552	552	552	552	552	552	552
IMP	r	0.503	0.519	0.589	0.312	0.587	0.639	1	0.633	0.769	0.855
	p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001
	n	552	552	552	552	552	552	552	552	552	552
GOA	r	0.580	0.364	0.549	0.264	0.520	0.501	0.633	1	0.648	0.752
	p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001
	n	552	552	552	552	552	552	552	552	552	552
STR	r	0.541	0.436	0.565	0.370	0.639	0.726	0.769	0.648	1	0.913
	p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001
	n	552	552	552	552	552	552	552	552	552	552
DERS	r	0.621	0.490	0.643	0.552	0.790	0.817	0.855	0.752	0.913	1
	p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	
	n	552	552	552	552	552	552	552	552	552	552

Correlations between ASRS and DERS scores were investigated using Spearman's rank-order correlation. ADHD: Attention Deficit Hyperactivity Disorder, AD: Attention Deficit, H/I: Hyperactivity/impulsivity, ASRS: Adult ADHD Self-Report Scale, AWR: Awareness, CLR: Clarity, DERS: Difficulties in emotion regulation scale, GOA: Goals, IMP: Impulse, NAC: Non-acceptance, STR: Strategies, p<0.050

ADHD, is essential (32). Barkley and Murphy (33) in their research, proposed that dysfunctional emotion regulation in ADHD is associated with a lower level of psychosocial functionality, diminished parenting skills, vocational problems, risky driving behaviors, and criminal activities. Our findings on emotional regulation difficulties were consistent with those of previous studies. In the results of our study, except for the awareness subscale, all subscale scores and the DERS total score were significantly higher in the HP-ADHD group than in the P-ADHD group and in the P-ADHD group than in the WO-ADHD group. A significant positive correlation was found between the ASRS scores and the DERS total and subscale scores. The higher prevalence of emotion regulation difficulties in the HP-ADHD group might have contributed to the higher incidence of psychiatric illness history, suicide attempts, and forensic event history, as well as the higher frequency of failure in class, which could indicate psychosocial functionality. Given the high comorbidity rates in adult ADHD (7) and the belief that difficulties in emotion regulation play a key role in the development of many other mental disorders (12), addressing emotion regulation difficulties in adults with ADHD during treatment could make therapeutic interventions more effective. Numerous studies have reported the positive effects of cognitive behavioral therapy (CBT) on ADHD symptoms and comorbid psychiatric diseases. Research on the impact of various models, such as dialectical behavioral therapy and mindfulness meditation training, on ADHD treatment is ongoing (34). Therapeutic approaches that target and improve problematic stages of the emotion regulation process can contribute to symptom reduction. For instance, if an individual with ADHD has a deficit in the emotional awareness dimension, mindfulness meditation training may be beneficial in enhancing the individual's sensitivity. There is a need for further research that examines models other than CBT to evaluate the efficacy of psychotherapy in ADHD. Our study has some limitations. In previous studies in the literature, patients diagnosed with ADHD through clinical examination were included and evaluated. However, in our research, the subjects were not psychologically examined; scales were used for mental state assessment. Participants were assessed based on symptom levels determined by the scales and grouped as HP-ADHD, P-ADHD, and WO-ADHD. Therefore, it was not possible to discuss the diagnoses. This situation may have affected our results and limited our study. Because our research was cross-sectional, the results showed the current states of the participants, preventing further comments on the causality and longitudinal progression of the results. This is another limitation of our research. Another area for improvement was that participants may have provided objective answers to some questions, such as their history of forensic events or substance experiences. This may have affected our results. Since no detailed inquiry was made into the content of the forensic event during the study, further comments on whether these incidents constitute a crime could not be made. This is one of the limitations of our research. Our study had some strengths. We included the vast majority of medical faculty students in the study. This was one of the strengths of our research. It was important for the groups to be similar in terms of variables such as age, gender, and physical illness to minimize other factors that might affect the results, and this was a characteristic that strengthened our study. Although many studies have examined ADHD and various clinical features in university students, our study is one of the few studies evaluating ADHD and

emotion regulation difficulties. This was another strength of our study. In conclusion, in our study, except for the awareness subscale, all other subscale scores and the DERS total score were significantly higher in the HP-ADHD group than in the P-ADHD group and in the P-ADHD group than in the WO-ADHD group. Moreover, compared with the WO-ADHD group, the HP-ADHD group had a significantly higher history of psychiatric illness, suicide attempts, forensic event history, failure in class, and family history of psychiatric illness. In adulthood, ADHD can present not only due to core symptoms and additional emotional regulation difficulties and academic, social, and other problems. Individuals with ADHD may face legal issues due to ongoing symptoms of ADHD. Follow-up studies have shown that untreated individuals with ADHD in adulthood display risk behaviors such as alcohol and substance addiction, criminal tendencies, self-harm, and traffic accidents. The family medicine system constitutes the basic tier of our country's health system. Although overlooked ADHD cases often present to family physicians with complaints of inattentiveness and difficulty concentrating (35), ADHD can manifest in various clinical forms in adulthood compared with childhood (36). Given the risks associated with ADHD in adulthood, family physicians must be aware of the clinical presentation of adult ADHD and to refer undiagnosed, overlooked cases that raise suspicion to a psychiatrist. This will be of great importance to both individual and public health. We believe that within the realm of preventive medicine, ADHD in childhood could be included in family medicine screening programs, and there is a need to develop primary health policies in this area. Our study will shed light on further research in this field and contribute to the literature. Additional studies examining ADHD and emotion regulation difficulties in adults with larger sample sizes are needed.

### **Ethics**

**Ethics Committee Approval:** Necessary permissions for the research were obtained the Health Sciences Non-Interventional Clinical Research Ethics Committee of İnönü University (approval number: 2021/2540, date: 19.10.2021).

**Informed Consent:** Online consent was obtained from all participants.

### **Footnotes**

#### **Authorship Contributions**

Concept: A.A., M.A., Design: A.A., M.A., E.B.S., Supervision: E.B.S., Data Collection or Processing: A.A., A.K.A., Analysis or Interpretation: A.A., A.K.A., Literature Search: A.A., M.A., E.B.S., B.K.T., Writing: A.A., Critical Review: E.B.S., B.K.T.

**Conflict of Interest:** No conflict of interest was declared by the authors.

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### **REFERENCES**

1. Akan M, Ayaz N, Uğur K. Comparison of substance users under judicial supervision with controls in terms of attention deficit hyperactivity disorder and emotion regulation difficulties. *Turkish J Clin Psy.* 2024; 27: 55-64.



2. Orgun IT, Soysal Acar AŞ, Torun YT, Gücüyener K. Dikkat eksikliği hiperaktivite bozukluğu olan bir grup hastada görsel dikkat bileşenlerinin değerlendirilmesi. *Gazi Medical Journal*. 2020; 31: 603-8.
3. Tuğlu C, Şahin ÖÖ. Adult attention deficit hyperactivity disorder: Neurobiology, diagnostic problems and clinical features. *Current Approaches in Psychiatry* 2010; 2: 75-116. <https://core.ac.uk/download/pdf/26997511.pdf>
4. Chun JH, Lee DR, Lee JU, Shin SR, Park KH. The association of childhood obesity with attention deficit/hyperactivity disorder. *Korean J Fam Med*. 2010; 31: 852-61.
5. Faraone SV, Biederman J, Mick E. The age-dependent decline of attention deficit hyperactivity disorder: A meta-analysis of follow-up studies. *Psychol Med*. 2006; 36: 159-65.
6. Olazagasti MAR, Klein RG, Mannuzza S, Belsky ER, Hutchison JA, Lashua-Shriftman EC, et al. Does childhood attention-deficit/hyperactivity disorder predict risk-taking and medical illnesses in adulthood? *J Am Acad Child Adolesc Psychiatry*. 2013; 52: 153-62.
7. Biederman J, Faraone SV, Monuteaux MC, Bober M, Cadogen E. Gender effects on attention-deficit/hyperactivity disorder in adults, revisited. *Biol Psychiatry*. 2004; 55: 692-700.
8. Retz W, Stieglitz R-D, Corbisiero S, Retz-Junginger P, Rösler M. Emotional dysregulation in adult ADHD: What is the empirical evidence? *Expert Rev Neurother*. 2012; 12: 1241-51.
9. Thompson RA. Emotion regulation: A theme in search of definition. *Monogr Soc Res Child Dev*. 1994; 59: 25-52.
10. Gross JJ. The emerging field of emotion regulation: An integrative review. *Rev Gen Psychol* 1998; 2: 271-99. <https://doi.org/10.1037/1089-2680.2.3.271>
11. Moukhtarian TR, Mintah RS, Moran P, Asherson P. Emotion dysregulation in attention-deficit/hyperactivity disorder and borderline personality disorder. *Borderline Personal Disord Emot Dysregul*. 2018; 5: 9.
12. Compas BE, Jaser SS, Bettis AH, Watson KH, Gruhn MA, Dunbar JP, et al. Coping, emotion regulation, and psychopathology in childhood and adolescence: A meta-analysis and narrative review. *Psychol Bull*. 2017; 143: 939-91.
13. Kessler RC, Adler LA, Gruber MJ, Sarawate CA, Spencer T, Van Brunt DL. Validity of the World Health Organization Adult ADHD Self-Report Scale (ASRS) Screener in a representative sample of health plan members. *Int J Methods Psychiatr Res*. 2007; 16: 52-65.
14. Dogan S, Öncü B, Varol-Saraçoğlu G, Küçükgöncü S. Validity and reliability of the Turkish version of the Adult ADHD Self-Report Scale (ASRS-v1. 1). *Anadolu Psikiyatri Derg*. 2009; 10: 77-87. [https://www.researchgate.net/publication/235996183\\_VValidity\\_and\\_reliability\\_of\\_the\\_Turkish\\_version\\_of\\_the\\_Adult\\_ADHD\\_Self-Report\\_Scale\\_ASRS-v11](https://www.researchgate.net/publication/235996183_VValidity_and_reliability_of_the_Turkish_version_of_the_Adult_ADHD_Self-Report_Scale_ASRS-v11)
15. Gratz KL, Roemer L. Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *J Psychopathol Behav Assess*. 2004; 26: 41-54.
16. Rugancı RN, Gençöz T. Psychometric properties of a Turkish version of the Difficulties in Emotion Regulation Scale. *J Clin Psychol*. 2010; 66: 442-55.
17. Faraone SV, Asherson P, Banaschewski T, Biederman J, Buitelaar JK, Ramos-Quiroga JA, et al. Attention-deficit/hyperactivity disorder. *Nat Rev Dis Primers*. 2015; 1: 15020.
18. Katzman MA, Bilkey TS, Chokka PR, Fallu A, Klassen LJ. Adult ADHD and comorbid disorders: Clinical implications of a dimensional approach. *BMC Psychiatry*. 2017; 17: 302.
19. Martinez-Raga J, Szerman N, Knecht C, de Alvaro R. Attention deficit hyperactivity disorder and dual disorders. Educational needs for an underdiagnosed condition. *Int J Adolesc Med Health*. 2013; 25: 231-43.
20. Dirks H, Scherbaum N, Kis B, Mette C. ADHD in adults and comorbid substance use disorder: Prevalence, clinical diagnostics and integrated therapy. *Fortschr Neurol Psychiatr*. 2017; 85: 336-44.
21. Kronenberg LM, Goossens PJ, van Etten DM, van Achterberg T, van den Brink W. Need for care and life satisfaction in adult substance use disorder patients with and without attention deficit hyperactivity disorder (ADHD) or autism spectrum disorder (ASD). *Perspect Psychiatr Care*. 2015; 51: 4-15.
22. Park S, Cho MJ, Chang SM, Jeon HJ, Cho S-J, Kim B-S, et al. Prevalence, correlates, and comorbidities of adult ADHD symptoms in Korea: Results of the Korean epidemiologic catchment area study. *Psychiatry Res*. 2011; 186: 378-83.
23. Balazs J, Miklósi M, Keresztény Á, Dallos G, Gáboros J. Attention-deficit hyperactivity disorder and suicidality in a treatment naïve sample of children and adolescents. *J Affect Disord*. 2014; 152-154: 282-7.
24. Matthies S, Philipsen A, Svaldi J. Risky decision making in adults with ADHD. *J Behav Ther Exp Psychiatry*. 2012; 43: 938-46.
25. Furczyk K, Thome J. Adult ADHD and suicide. *Atten Defic Hyperact Disord*. 2014; 6: 153-8.
26. Hodgkins P, Arnold LE, Shaw M, Caci H, Kahle J, Woods AG, et al. A systematic review of global publication trends regarding long-term outcomes of ADHD. *Front Psychiatry*. 2012; 2: 84.
27. Appelbaum KL. Assessment and treatment of correctional inmates with ADHD. *Am J Psychiatry*. 2008; 165: 1520-4.
28. Fergusson DM, Lynskey MT, Horwood LJ. Attentional difficulties in middle childhood and psychosocial outcomes in young adulthood. *J Child Psychol Psychiatry*. 1997; 38: 633-44.
29. Jangmo A, Stålhandske A, Chang Z, Chen Q, Almqvist C, Feldman I, et al. Attention-deficit/hyperactivity disorder, school performance, and effect of medication. *J Am Acad Child Adolesc Psychiatry*. 2019; 58: 423-32.
30. Güçlü O, Erkıran M. Psychiatric loading in parents of children with attention deficit hyperactivity disorder. *Turkish J Clin Psy*. 2004; 7: 32-41.
31. Surman CB, Biederman J, Spencer T, Miller CA, McDermott KM, Faraone SV. Understanding deficient emotional self-regulation in adults with attention deficit hyperactivity disorder: A controlled study. *Atten Defic Hyperact Disord*. 2013; 5: 273-81.
32. Skirrow C, Asherson P. Emotional lability, comorbidity and impairment in adults with attention-deficit hyperactivity disorder. *J Affect Disord*. 2013; 147: 80-6.
33. Barkley RA, Murphy KR. Impairment in occupational functioning and adult ADHD: The predictive utility of executive function (EF) ratings versus EF tests. *Arch Clin Neuropsychol*. 2010; 25: 157-73.
34. Philipsen A. Psychotherapy in adult attention deficit hyperactivity disorder: implications for treatment and research. *Expert Rev Neurother*. 2012; 12: 1217-25.
35. Öyekçin DG, Şahin EM. Erişkin dikkat eksikliği hiperaktivite bozukluğuna birinci basamak yaklaşım. *The Journal of Turkish Family Physician* 2011; 2: 1-8. <https://turkishfamilyphysician.com/makaleler/derleme/eriskin-dikkat-eksikligi-hiperaktivite-bozukluguna-birinci-basamak-yaklasim/>
36. Magnin E, Maurs C. Attention-deficit/hyperactivity disorder during adulthood. *Rev Neurol*. 2017; 173 :506-15.