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Psychiatric Comorbidities in Adult Attention Deficit Hyperactivity Disorder: Sex-Based Patterns of Internalizing and Externalizing Disorders in a Clinical Sample

Erişkin Dikkat Eksikliği Hiperaktivite Bozukluğunda Psikiyatrik Eştanılar: Bir Klinik Örneklemde Cinsiyete Dayalı İçselleştirme ve Dışsallaştırma Bozuklukları Örüntüleri

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ABSTRACT

Objective: Attention-deficit/hyperactivity disorder (ADHD) affects 2.5% of adults, with high comorbidity rates (70–80%) and sex-based patterns. This study aimed to examine the prevalence of psychiatric comorbidities in adult patients with ADHD, with a focus on internalizing and externalizing disorders across sexes.

Method: This cross-sectional observational study examined data from 70 adult patients (aged 18–60 years) diagnosed with ADHD who sought treatment at Koru Ankara Hospital between April 2022 and September 2023. Psychiatric comorbidities were retrospectively identified from electronic patient records. Comorbidities were categorized as externalizing (alcohol/substance use disorders, impulse control disorders, and personality disorders) or internalizing (anxiety disorders, depressive disorders, eating disorders, and obsessive–compulsive and related disorders), and comorbidity patterns between sexes were compared.

Results: At least one psychiatric comorbidity was found in 71.4% of the patients (69% female, 75% male). The most common comorbidities were anxiety (34.3%) and mood disorders (20%), including major depressive disorder (15.4%), bipolar disorder (2.9%), and dysthymia (1.4%). Men had significantly higher rates of alcohol/substance use disorders and externalizing disorders, whereas internalizing disorders were not significantly different between the sexes. Patients with both internalizing and externalizing disorders were predominantly male.

Conclusion: Psychiatric comorbidities are prevalent in adults with ADHD. While internalizing disorders showed no sex differences, externalizing disorders were significantly more common in men, highlighting the need for sex-specific comorbidity screening in clinical practice. Future studies should use larger, longitudinal, and multicenter designs to better understand developmental pathways and support personalized treatment strategies.

Keywords: Attention deficit disorder with hyperactivity, comorbidity, internalizing disorders, externalizing disorders, sex differences

ÖZ

Amaç: Dikkat eksikliği hiperaktivite bozukluğu (DEHB) erişkinlerin %2,5'ini etkilemekte olup, yüksek eştanı oranları (%70–80) ve cinsiyete özgü örüntüler göstermektedir. Bu çalışmanın amacı, DEHB tanılı erişkin hastalarda psikiyatrik eştanıların yaygınlığını cinsiyetler arasındaki içselleştirme ve dışsallaştırma bozuklukları örüntülerine odaklanarak incelemektir.

Yöntem: Bu kesitsel gözlemsel çalışmada, Nisan 2022-Eylül 2023 tarihleri arasında Koru Ankara Hastanesi'ne başvuran hastalardan DEHB tanısı almış 70 erişkin hastanın verileri (18–60 yaş arası) incelenmiştir. Psikiyatrik eştanılar geriye dönük olarak elektronik hasta dosyalarından taranmıştır. Eştanılar dışsallaştırma (alkol/madde kullanım bozuklukları, dürtü kontrol bozuklukları ve kişilik bozuklukları) veya içselleştirme (anksiyete bozuklukları, depresif bozukluklar, yeme bozuklukları ve obsesif-kompulsif ve ilişkili bozukluklar) olarak sınıflandırılarak cinsiyetler arasındaki eştanı örüntüleri karşılaştırılmıştır.

Bulgular: Hastaların %71,4'ünde en az bir psikiyatrik eştanı vardı (kadınlarda %69, erkeklerde %75). En yaygın eştanılar anksiyete bozuklukları (%34,3) ve major depresif bozukluk (%15,4), bipolar bozukluk (%2,9) ve distimi (%1,4) dahil olmak üzere duygudurum bozuklukları (%20) idi. Erkeklerde alkol/madde kullanım bozuklukları ve dışsallaştırma bozuklukları daha yüksek oranda görülürken, içselleştirme bozuklukları oranları cinsiyetler arasında anlamlı bir farklılık göstermedi. İçselleştirme ve dışsallaştırma bozukluklarının birlikte görüldüğü hastalar ise ağırlıklı olarak erkeklerden oluşmaktaydı.

Sonuç: Erişkinlerde DEHB sıklıkla psikiyatrik eştanılarla birlikte görülmektedir. Çalışmamızda içselleştirme bozukluklarında cinsiyet farkı görülmezken, dışsallaştırma bozuklukları erkeklerde anlamlı düzeyde daha sık saptanmıştır. Bu bulgular, klinik uygulamada cinsiyete özgü eştanı taramalarının önemini ortaya koymaktadır. Gelecekteki çalışmaların, gelişimsel süreçleri daha iyi anlamak ve kişiselleştirilmiş tedavi stratejilerini desteklemek amacıyla daha büyük örneklemlerle, çok merkezli ve uzunlamasına tasarımlarla yürütülmesi önerilmektedir.

Anahtar sözcükler: Dikkat eksikliği hiperaktivite bozukluğu, eştanı, içselleştirme bozuklukları, dışsallaştırma bozuklukları, cinsiyet farklılıkları

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Introduction

Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder that begins in early childhood and can affect cognitive, behavioral, and social functioning (Faraone et al. 2024). This disorder is characterized by symptoms of inattention, impulsivity, and hyperactivity, as defined in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). ADHD is not limited to childhood, and a significant portion of its symptoms persist into adulthood (APA 2013). Epidemiological studies have shown that the prevalence of ADHD in the adult population varies between approximately 2.5% and 4.4% (Kessler et al. 2006, Fayyad et al. 2017).

The clinical presentation of ADHD in adulthood is more heterogeneous than that in childhood (NICE 2018, Faraone et al. 2021). While hyperactivity and extroverted behaviors decrease with age, different symptoms emerge. These include distractibility, inner restlessness, difficulty in impulse control, time management problems, and difficulties in emotion regulation (Chang et al. 2013, Michelini et al. 2016, Hinshaw et al. 2022). This evolution makes it difficult to recognize adult patients with ADHD. This often leads to confusion between the underlying disorders and other psychiatric diagnoses (Katzman et al. 2017).

Only 10% of adult patients with ADHD receive a diagnosis, and even fewer reach treatment (Larsson et al. 2011). One of the main reasons for these diagnostic and treatment difficulties is that ADHD often coexists with other psychiatric disorders. Studies report that 70–80% of individuals with adult ADHD have at least one psychiatric comorbidity during their lifetime (Faraone et al. 2015, Ohnishi et al. 2019, Choi et al. 2022, Faraone et al. 2024). The rate of three or more concurrent psychiatric conditions in adults with ADHD is higher than that in the general population (Kessler et al. 2014). The most common dual diagnoses include mood, anxiety, alcohol and substance use, and personality disorders (Stibbe et al. 2020, Luderer et al. 2021, Babinski 2024). The presence of concurrent psychiatric disorders not only complicates the diagnostic process but also reduces the treatment response and negatively affects the prognosis (Biederman 2004). Additionally, these co-occurring conditions in ADHD have been associated with poor functioning and increased treatment costs (Secnik et al. 2005).

Clinical research has demonstrated that psychiatric co-occurrence in ADHD indicates common neurobiological and genetic underpinnings between ADHD and other psychiatric disorders (Castellanos and Proal 2012, Cortese et al. 2012). Differences in both the physical structure and activity of brain areas linked to executive functioning constitute the projection of these commonalities at the neuropsychiatric level. These include dopaminergic and noradrenergic dysfunction and orbitofrontal cortex and anterior cingulate cortex abnormalities (Martel and Nigg 2006, Sonuga-Barke et al. 2010). The high rate of genetic correlations found between ADHD and other disorders suggests that these disorders may be different expressions of a dimensional spectrum (Martin et al. 2018).

The concept of "comorbidity" in psychiatry remains controversial at both terminological and conceptual levels, as the high degree of covariation among psychiatric diagnoses limits the explanatory power of existing categorical classification systems (Lilienfeld 2003). This limitation poses significant challenges for system-based diagnostic models and has led to the development of alternative theoretical frameworks (Lilienfeld 2003).

The internalizing-externalizing model, developed by Krueger (1999), offers a dimensional approach that transcends traditional categorical classifications by explaining symptom overlap and shared etiological factors across psychiatric disorders. Rather than viewing concurrent conditions as merely the coexistence of separate disorders, this framework conceptualizes them as reflections of shared psychopathological processes (Krueger 1999, Cosgrove et al. 2011). Internalizing disorders encompass conditions associated with internal distress, including depression, anxiety, and somatization. In contrast, externalizing disorders are characterized by outward-directed behaviors such as conduct disorder, antisocial personality disorder, substance use, and impulse control disorders (Lahey et al. 2008, Beauchaine et al. 2010). Compared with traditional categorical systems, the dimensional approach provides a more explanatory framework for understanding co-occurrence patterns (Krueger and Markon 2006). Notably, the association of ADHD with both dimensions reveals a bidirectional tendency in terms of concurrent conditions, highlighting the complexity of psychiatric comorbidities (Michelini et al. 2016).

Sex differences represent essential variables that should be considered in this framework. The reasons for sex differences in ADHD during various developmental periods are not fully understood (Stibbe et al. 2020). Some studies have shown that the persistence of this disorder in adulthood varies by sex, with 60% in women and 35% in men (Stibbe et al. 2020). Meta-analytic findings further support the age-dependent decline in ADHD, highlighting that persistence rates into adulthood differ across subgroups, including by sex (Faraone et al. 2006). In childhood, girls with ADHD experience less aggression and other destructive behaviors (Rucklidge 2008). In adolescence, they experience more internalized depression and anxiety problems than boys with ADHD do

(Rucklidge 2008). Although girls with ADHD experience at least as much loss of functioning as boys do, boys are referred to clinics more often than girls during this period because of excess externalizing symptoms (Ginsberg et al. 2014). In adulthood, the male-to-female ratio of ADHD prevalence decreases to approximately 1.6:1 (Willcutt 2012). The increased number of diagnoses of ADHD in women among psychiatric patients in adulthood may be related to this clinical referral bias in childhood (Ginsberg et al. 2014). That is, underdiagnosis of ADHD in girls in childhood may lead to more women being diagnosed in adulthood than in childhood (Ginsberg et al. 2014). Little is known about the persistence of ADHD among older adults. However, evidence suggests that ADHD may persist in middle-aged and older individuals, although symptoms tend to decline. The male–female population prevalence and referral rate to clinics may become more equal as age increases (Bramham et al. 2012, Michielsen et al. 2012, Young et al. 2020).

In addition to different symptom presentations between sexes, distinct patterns of psychiatric co-occurrence have also been observed (Stibbe et al. 2020). In males, ADHD is diagnosed more frequently in childhood, and externalizing symptoms are at the forefront (Ginsberg et al. 2014, Quinn and Madhoo 2014). In women, ADHD is usually diagnosed in adulthood, and internalizing symptoms, attention deficits, and emotional dysregulation are more common (Ginsberg et al. 2014, Quinn and Madhoo 2014). In adulthood, men are more likely to have 'externalizing' disorders (e.g., substance and alcohol abuse, antisocial personality disorder, conduct disorder). In contrast, women are more likely to have 'internalizing' disorders (e.g., anxiety, depression, somatic symptoms, bulimia). These concurrent psychiatric conditions may lead to the misdiagnosis of adult patients with ADHD, particularly women (Young et al. 2020, Babinski 2024). In particular, confusing ADHD symptoms with borderline personality disorder or bipolar disorder is a common diagnostic problem in clinical practice (Miller et al. 2008).

Adult patients with ADHD present a unique psychiatric picture that requires multidimensional evaluation. High rates of psychiatric co-occurrence, a complex neurobiological basis, and sex-based variability characterize it. In this context, a detailed examination of psychiatric comorbidity patterns may contribute to the diagnosis and treatment of ADHD. This study aimed to examine the prevalence of psychiatric comorbidities in adult patients with ADHD, focusing on the patterns of internalizing and externalizing disorders between the sexes.

By presenting data from a Turkish clinical sample, this study contributes to the limited national and international literature on sex-specific psychiatric comorbidities in adults with ADHD. Adopting an internalizing–externalizing framework allows for a dimensional understanding of comorbidity patterns beyond traditional diagnostic categories. This study hypothesized that internalizing disorders would be more prevalent in female patients, whereas externalizing disorders would be more prevalent in male patients.

Methods

Sample

This cross-sectional observational study was conducted at the Psychiatry Outpatient Clinic of Koru Ankara Hospital, a private tertiary care center located in Ankara, Türkiye. The hospital was accredited by the Joint Commission International (JCI) in 2024, ensuring adherence to international standards of healthcare quality and patient safety. All clinical data were extracted from the hospital's centralized electronic health record system, which provides verifiable and chronologically organized documentation. Psychiatrists with at least 5 years of work experience in adult psychiatry who were employed at the psychiatric outpatient clinic conducted psychiatric evaluations and diagnoses. The retrospective file review and data extraction were performed by the author, who was affiliated with the outpatient clinic at the time.

Patients aged 18 years and older who presented to the adult psychiatry outpatient clinic between April 2022 and September 2023 were screened retrospectively. The study population consisted of individuals who had received a clinical diagnosis of ADHD according to the DSM-5 criteria. To be included in the study, patients were required to be between 18 and 60 years old; to have completed standardized ADHD screening tools, namely, the Adult ADHD Self-Report Scale (ASRS-v1.1) and the Wender Utah Rating Scale (WURS-25); and to have sufficient clinical documentation, including psychiatric evaluation, developmental history, and family history. Patients were excluded if their ADHD diagnosis was not finalized, if their primary diagnosis changed during follow-up, if medical records were incomplete or inconsistent, or if a comorbid intellectual or neurological disorder precluded reliable clinical assessment. A total of 102 patients were initially screened. After the exclusion criteria were applied, 32 patients were excluded: 13 due to incomplete or inconsistent diagnostic data, 8 because the diagnosis was not finalized or was changed during follow-up, and 11 because of insufficient clinical documentation. Consequently, 70 adult patients (aged 18–60 years) were included in the final analysis.

Although the sample size was primarily determined by data availability, power analyses were conducted to assess statistical adequacy. An a priori power analysis via G*Power (version 3.1.7) suggested that, assuming a moderate effect size (Cohen's d = 0.5), a minimum of 54 participants (27 per group) would be needed to detect group differences at 80% power with a 95% confidence level. Additionally, a one-sample proportion estimation for detecting a 70% comorbidity prevalence with ±10% precision required a minimum of 81 participants. Although the sample size in this study (n = 70) was slightly below that threshold, it was considered acceptable for exploratory analysis. A post hoc power analysis further confirmed a power of 0.74 for detecting moderate differences in the prevalence of externalizing disorders between sex groups.

Procedure

This study was approved by the Koru Ankara Hospital Ethics Committee on October 13, 2023 (approval number: 2413). All ADHD diagnoses were made according to the DSM-5 criteria, following a structured but clinically routine workflow. Each patient underwent a detailed psychiatric interview conducted by an experienced psychiatrist. These interviews assessed the patient's clinical history, developmental course, functional impairment, and symptomatology. As part of the diagnostic process, two validated self-report scales were administered: the Adult ADHD Self-Report Scale (ASRS-v1.1) and the Wender Utah Rating Scale (WURS-25). Although the ASRS was initially based on the DSM-IV criteria, it remains widely used because of its strong reliability and clinical utility. The WURS-25, used to assess retrospective childhood symptoms, was included to ensure alignment with the DSM-5 age-of-onset criterion. In addition to self-reported data, available family interviews, neuroevelopmental history, and neuropsychological test results were reviewed when necessary to support diagnostic consistency. Diagnostic confirmation was based on the psychiatrist's clinical judgment, which was supported by multisource data and the congruence between reported symptoms and clinical observations.

Considering that ICD diagnosis codes may be limited, concurrent conditions were identified on the basis of the clinical judgment of the clinician and electronic file review. Structured diagnostic interviews such as the Structured Clinical Interview for DSM-5 (SCID-5) or the Mini International Neuropsychiatric Interview (MINI) were not utilized. While this approach reflects real-world diagnostic procedures in routine clinical settings, it introduces a potential risk of diagnostic bias due to the lack of standardized assessment tools. Nonetheless, all diagnostic decisions were thoroughly documented in the hospital's electronic system, ensuring traceability and diagnostic reliability.

Measures

Adult ADHD Self–Report Scale (ASRS-v1.1)

The ASRS is an 18-item self-reported and widely used instrument based on DSM criteria for assessing ADHD symptoms in adults. It consists of two subscales: the ASRS-A (items 1–6) assesses inattention symptoms, whereas the ASRS-B (items 7–18) evaluates hyperactivity and impulsivity symptoms. Each item is rated on a 5-point Likert scale from 0 (never) to 4 (very often) on the basis of symptom frequency over the past six months. The total ASRS score reflects the overall severity of ADHD symptoms. The ASRS showed high internal consistency (Cronbach's $\alpha = 0.88$), both in the original validation (Kessler et al., 2005) and Turkish adaptation studies (Doğan et al., 2009).

Wender Utah Rating Scale (WURS)

The WURS is a 25-item, retrospective self-report scale used to assess ADHD symptoms experienced during childhood. It is frequently employed in adult ADHD evaluations to provide historical symptomatology that supports diagnostic criteria. The items are rated on a 5-point Likert scale ranging from 0 (not at all or very slightly) to 4 (very much), with higher scores indicating greater symptom burden. A cutoff score of 46 is commonly used for screening purposes. The WURS-25 has demonstrated excellent reliability (Ward et al., 1993). The Turkish version also yielded strong internal consistency ($\alpha = 0.84$) (Öncü et al., 2005).

Statistical Analysis

For the statistical analyses, the conformity of the variables to a normal distribution was evaluated both visually (histograms and probability graphs) and analytically (Kolmogorov–Smirnov and Shapiro–Wilk tests) before parametric or non-parametric tests were performed. For descriptive statistics, the mean ± standard deviation was used for variables that conformed to a normal distribution, and the median and interquartile range (IQR) were used for those that did not. Categorical variables are summarized as frequencies and percentages. Group comparisons were conducted to examine sex-based differences in age, years of education, medication use, ADHD

scale scores, and psychiatric comorbidities. For continuous variables (e.g., ASRS and WURS scores, age, years of education), an independent samples t test was used when the data met parametric assumptions, whereas Mann–Whitney U tests were used otherwise. For categorical variables (e.g., medication usage, presence of psychiatric comorbidities, and comorbidity subtypes), Pearson's chi-square test was employed when assumptions were met; otherwise, Fisher's exact test was applied. To evaluate the magnitude of group differences, effect sizes were calculated. Cohen's d was reported for continuous variables, and Cramér's V was used for categorical comparisons. Interpretation followed conventional thresholds: 0.2 (small), 0.5 (moderate), and 0.8 (large) for Cohen's d; and 0.1 (small), 0.3 (moderate), and 0.5 (large) for Cramér's V. All tests were two-tailed, and the significance level was set at $p < 0.05$. Owing to the exploratory nature of the study, adjustments for multiple comparisons were not applied; however, effect sizes were provided to support interpretation.

Results

Among the 70 patients included in the study, 60% were female (n=42), and 40% were male (n=28). The median age was 27 years, and the age range was 18–60 years. A total of 71.4% were single, and 28.6% were married. All the patients were high school graduates, and the median duration of education was 15 years (11–22 years). Overall, 17.1% were unemployed, 47.1% were employed, and 35.7% were students. Among the participants, 38.6% (n=27) were smokers. Among the participants, 14.3% were diagnosed with ADHD during childhood.

Regarding medication, 61.4% (n=43) of patients did not receive pharmacological treatment at the time of diagnosis. A total of 8.6% (n=6) of the participants used methylphenidate, 28.6% (n=20) used antidepressants, and 1.4% (n=1) used a combination of antidepressants and antipsychotics. The ASRS-A score was 16.86 ± 0.396; the ASRS-B score was 30.17 ± 0.879; the ASRS total score was 47.16 ± 1.137; and the WURS score was 48.54 ± 1.939. There were no significant differences between the sexes in terms of age, years of education, medication use, or ADHD self-assessment scale scores (p>0.05) (Table 1).

Table 1. Sociodemographic and clinical variables by sex

	Male (n=28)	Female (n=42)	x2/z/t	p value
Age (median, IQR)	28.5 (20.0–34.5)	27.0 (21.8–32.2)	-0.042	0.966*
Education years (median, IQR)	15.0 (14.0–16.0)	15.0 (13.8–16.0)	-0.123	0.902*
No Medication (%)	64.3	59.5	5.040	0.144**
ASRS-A (mean ± SD)	16.46 ± 3.34	17.12 ± 3.31	-0.808	0.422***
ASRS-B (mean ± SD)	29.50 ± 8.78	30.62 ± 6.31	-0.621	0.537***
ASRS-Total (mean ± SD)	45.96 ± 10.26	47.95 ± 9.01	-0.855	0.395***
WURS-25 (mean ± SD)	49.61 ± 18.42	47.83 ± 14.77	0.445	0.657***

ASRS: Adult ADHD Self-Rating Scale, IQR = Interquartile Range, SD = Standard Deviation, WURS-25: Wender Utah Rating Scale (25-item); *The Mann–Whitney U test was used. ** Chi-square test was used. *** T-test was used.

At least one concurrent psychiatric condition was identified in 71.4% of the patients (n=50). The frequency of co-occurrence was 69% in women and 75% in men. This difference between the sexes was not statistically significant (p=0.589). There was one diagnosis in 35.7% (n=25) of the patients, two diagnoses in 27.1% (n=19), three diagnoses in 7.1% (n=5), and four diagnoses in 1.4% (n=1). Those with more than one concurrent condition constituted 35.7% (n=25) of the patients.

Anxiety disorders were diagnosed in 34.3% (n=24), mood disorders in 20% (n=14), obsessive–compulsive and related disorders in 12.9% (n=9), eating disorders in 11.4% (n=8), alcohol and substance use disorders in 11.4% (n=8), neurodevelopmental disorders in 11.4% (n=8), personality disorders in 7.1% (n=5), and impulse control disorders in 4.3% (n=3). The frequencies determined when the comorbidity groups were divided into subdiagnostic groups are shown in Table 2.

When men and women were compared in terms of comorbidities, alcohol/substance use disorders were significantly more common in men than in women (p=0.011). After the diagnostic groups were divided into internalizing disorders (anxiety disorders, depressive disorders, eating disorders, obsessive-compulsive and related disorders) and externalizing disorders (alcohol/substance use disorders, impulse control disorders, personality disorders), female and male patients with ADHD were compared. Externalizing disorders were significantly more common in males (χ^2=7.202, p=0.007). Internalizing disorders were slightly more common in women (57.1%) than in men (53.6%); however, this difference was not statistically significant (χ^2=0.087, p=0.768). Patients with both internalizing and externalizing disorders were more frequently male (χ^2=5.955, p=0.015) (Table 3).

Table 2. Psychiatric comorbidities in patients with ADHD		
Diagnosis	**N**	**(%)**
Anxiety disorders	24	35.6
Generalized anxiety disorder	15	21.4
Social anxiety disorder	8	11.4
Specific phobia	1	1.4
Other anxiety disorders	1	1.4
Mood disorders	14	20.0
Bipolar disorder	2	2.9
Major depression	11	15.7
Dysthymia	1	1.4
Obsessive-compulsive and related disorders	9	12.9
Obsessive-compulsive disorder	6	8.6
Trichotillomania	3	4.3
Eating disorders	8	11.4
Neurodevelopmental disorders	8	11.4
Autism spectrum disorder	2	2.9
Specific learning disorder	6	8.6
Alcohol and substance use disorders	8	11.4
Alcohol use disorder	3	4.3
Substance use disorder	5	7.1
Personality disorders	5	7.1
Antisocial personality disorder	2	2.9
Borderline personality disorder	3	4.3
Impulse control disorders	3	4.3
Externalizing disorders (ED)	14	20.0
Internalizing disorders (ID)	39	55.7
ED + ID	10	14.3

ADHD: Attention Deficit Hyperactivity Disorder, APD: Antisocial Personality Disorder, BPD: Borderline Personality Disorder, ED:Externalizing Disorders, ID: Internalizing Disorders.

Table 3. Psychiatric comorbidities by sex in patients with ADHD					
Diagnosis	**All patients (n= 70)**	**Male (n=28)**	**Female (n=42)**	**χ^2**	**p value**
Anxiety disorders	24 (34.3%)	11 (39.3%)	13 (31.0%)	0.518	0.472
Mood disorders	14 (20.0%)	5 (17.9%)	9 (21.4%)	0.134	0.714
Obsessive-compulsive and related disorders	9 (12.9%)	4 (14.3%)	5 (11.9%)	0.000	1.000
Eating disorders	8 (11.4%)	1 (3.6%)	7 (16.7%)	1.699	0.192
Neurodevelopmental disorders	8 (11.4%)	2 (7.1%)	6 (14.3%)	0.288	0.591
Alcohol and substance use disorders	8 (11.4%)	7 (25.0%)	1 (2.4%)	6.404	0.011
Personality disorders	5 (7.1%)	4 (14.3%)	1 (2.4%)	2.019	0.155
Impulse control disorders	3 (4.3%)	1 (3.6%)	2 (4.8%)	0.000	1.000
Externalizing disorders (ED)	14 (20.0%)	10 (35.7%)	4 (9.5%)	7.202	0.007
Internalizing disorders (ID)	39 (55.7%)	15 (53.6%)	24 (57.1%)	0.087	0.768
ED + ID	10 (14.3%)	8 (28.6%)	2 (4.8%)	5.595	0.015

ADHD: Attention Deficit Hyperactivity Disorder, ED: Externalizing Disorders, ID: Internalizing Disorders.

Figure 1 shows sex-based differences in ADHD scales and the prevalence of major co-occurrence dimensions among adults with ADHD.

To assess clinical relevance beyond statistical significance, effect sizes (Cohen's d, Cramer's V) were calculated for key comparisons. In the comparison of ASRS-Total scores between male and female participants, the observed difference was not statistically significant. However, the effect size was calculated via Cohen's d (d = 0.21), indicating a small effect. Although this suggests a minimal sex-based difference in ADHD symptom severity as self-reported, it may still hold clinical relevance in larger or stratified samples.

For statistically significant sex differences observed in alcohol/substance use, externalizing disorders, and combined internalizing/externalizing disorders, effect sizes were calculated via Cramér's V. The effect size estimates ranged from 0.28 to 0.30, suggesting a moderate degree of association strength.

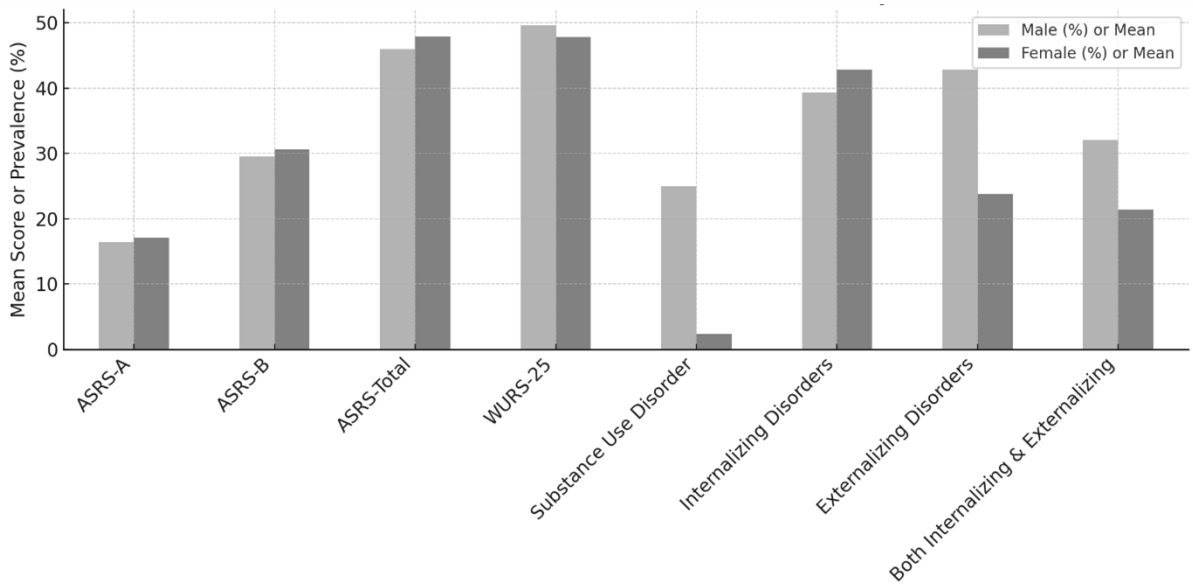

Figure 1. Sex-based differences in ADHD scales and psychiatric comorbidity dimensions

Discussion

In this study, 71.4% of the adult patients with ADHD had at least one concurrent psychiatric condition, and 35.7% had multiple psychiatric conditions. This rate is broadly consistent with the high co-occurrence rates reported in previous studies. This finding indicates that ADHD is frequently observed along with other psychiatric disorders (Kessler et al. 2006, Michelini et al. 2016). The most common psychiatric concurrent conditions were anxiety disorders, mood disorders, obsessive–compulsive and related disorders, eating disorders, neurodevelopmental disorders, and alcohol–substance use disorders. Among these, the most common disorders accompanying ADHD were anxiety (35.6%) and mood disorders (20.0%), which is consistent with the findings of previous studies (Kessler et al. 2006, Mayes 2015).

In our sample, the proportion of female patients diagnosed with ADHD was higher than that of male patients (female-to-male ratio: 1.5:1). While our data do not include information on the age or timing of diagnosis, previous studies have reported that ADHD in females is more likely to be underdiagnosed during childhood and identified later in adulthood (Ginsberg et al. 2014, Attoe and Climie 2023). However, this hypothesis cannot be tested with the current dataset and should be examined in future studies.

The symptoms of ADHD and concurrent psychiatric disorders often overlap. Their shared symptoms suggest possible similarities at the biological level, particularly with respect to shared genetic risk factors (Franke et al. 2012, Lee et al. 2013, Katzman et al. 2017). In our study, approximately one-third (35.6%) of the adult patients with ADHD had comorbid anxiety disorders. This rate is consistent with the rates reported in our country and the international literature (Kessler et al. 2006, Van Ameringen et al. 2011, Süzer Gamlı and Tamam 2016, Fayyad et al. 2017). Anxiety disorders are frequently associated with ADHD, particularly with the predominantly inattentive subtype. They have come to the fore with diagnoses such as social phobia and generalized anxiety disorder (Kessler et al. 2006, Martel and Nigg 2006). Although this may be related to a constant feeling of failure and social difficulties caused by attention problems, there is also a strong genetic association between these disorders (Faraone et al. 1997, Tuğlu and Şahin 2010, Süzer Gamlı and Tamam 2016).

The prevalence of ADHD co-occurring with mood disorders in adults has been reported to be 38% (Kessler et al. 2006). In the present study, the prevalence of mood disorders was 20%. This included major depression (15.7%), bipolar disorder (2.9%), and dysthymia (1.4%). This rate is lower than that reported in studies on lifetime prevalence (Kessler et al. 2006, Fayyad et al. 2017). This may be due to the cross-sectional evaluation of comorbidities in our study. Several studies have demonstrated an association between major depression and ADHD (Faraone et al. 1997, Sobanski 2006). In an extensive epidemiological study conducted in 20 countries, the 12-month prevalence of major depression in adults with ADHD was 15% (Fayyad et al. 2017). In Turkish clinical settings, comorbidity with internalizing disorders—especially anxiety and mood symptoms—has been noted as a diagnostic challenge owing to overlapping symptom profiles (Koyuncu et al. 2022). This finding supports the need for dimensional diagnostic approaches and careful differential diagnosis when ADHD co-

occurs with internalizing psychopathology. Depression prevalence rates in individuals diagnosed with ADHD have been reported to be in the range of 18.6–53.3% (Katzman et al. 2017). Major depressive disorder is a significant disorder that can accompany ADHD, particularly in female patients, and the overlap between mood fluctuations and attention problems can create diagnostic uncertainties (Castellanos and Proal 2012, Martin et al. 2018).

In our sample, 11.4% of adult patients with ADHD were diagnosed with co-occurring alcohol or substance use disorders, which is somewhat lower than what has been reported in recent international studies (Kessler et al. 2006). Alcohol and substance use disorders are among the most frequently reported concurrent conditions in adult patients with ADHD (Luderer et al. 2021). The fact that this co-occurrence was significantly higher in males in our study is consistent with externalizing tendencies (Biederman 2004, Faraone et al. 2006, Luderer et al. 2021). Substance use has also been reported to be more strongly associated with hyperactive-impulsive subtypes (Ohnishi et al. 2019). A meta-analysis by Rohner et al. (2023) revealed that the pooled prevalence of ADHD among individuals with substance use disorders was 21%, with higher rates among alcohol users (25%), followed by cocaine (19%) and opioid users (18%). This substantial overlap suggests that ADHD and substance use disorders may share common vulnerability pathways, such as impaired self-regulation and altered reward processing. In support of this view, Hartman et al. (2023) showed in a large population-based cohort that childhood ADHD symptoms predict increased alcohol consumption in adolescence and early adulthood, which is mediated by behavioral disinhibition and externalizing behaviors.

The relatively lower prevalence in our clinical sample may be explained by referral patterns, underreporting of alcohol/substance use, or the general psychiatric outpatient setting, which does not specialize in addiction. However, consistent with prior findings, the presence of alcohol/substance use disorders was more frequently observed in male patients, reinforcing the well-established link between ADHD, externalizing psychopathology, and sex-related expression of risk. These findings emphasize the importance of routine screening for substance use in adult ADHD populations, particularly among males, and the value of incorporating longitudinal developmental frameworks into clinical evaluation.

In our study, 12.9% of the patients had concurrent obsessive–compulsive and related disorders, including 8.6% with obsessive–compulsive disorder (OCD) and 4.3% with trichotillomania. OCD may be accompanied by ADHD, especially with cognitive flexibility difficulties and control of thought patterns (Mersin Kilic et al. 2020). Some studies have shown that compulsions may be confused with impulsivity in ADHD and OCD co-occurrence (Katzman et al. 2017). This may have led to diagnostic difficulties. ADHD symptoms in adolescence may be a marker for future OCD symptoms, and OCD symptoms may be a marker for ADHD symptoms (de Mathis et al. 2013). There are more publications on ADHD-OCD comorbidity in children and adolescents than in adults. The prevalence of OCD accompanying adult ADHD has been reported to be 2.7% (Kessler et al. 2006, Abramovitch et al. 2015). Studies have shown that trichotillomania is more frequently associated with ADHD than in the general population (Süzer Gamlı and Tamam 2016). Serotonergic and dopaminergic dysfunction in the pathophysiology of trichotillomania may also be related to a common etiology (Golubchik et al. 2011). The co-occurrence of trichotillomania in patients with ADHD has been reported at a rate of 1.2% (Porteret et al. 2016).

In this study, the co-occurrence of eating disorders was 11.4%. It has been reported that eating disorders co-occur more frequently in patients with ADHD than in the general population (Ptacek et al. 2016, Sobanski 2006). In the adult ADHD group, approximately 10% of eating disorders, most commonly binge eating disorders, were reported (Mattos et al. 2004).

Owing to the lack of systematic neurodevelopmental evaluations in adult psychiatry, concurrent neurodevelopmental disorders are underreported (Lahey et al. 2008). In our study, 11.4% of the patients had neurodevelopmental disorders, including specific learning disabilities (8.6%) and autism spectrum disorders (2.9%). Although the co-occurrence of neurodevelopmental disorders is rarely emphasized in studies on adult ADHD in Turkey, developmental disorders were reported at a rate of 24.7%, and learning disorders were reported at a rate of 1.57% in a survey by Ohnishi et al. (2019). To avoid overlooking neurodevelopmental disorders accompanying ADHD, it is essential to systematically evaluate the details of learning disabilities, social communication problems, and developmental history (Katzman et al. 2017, Ohnishi et al. 2019). This study contributes to the limited literature from Turkey on adult ADHD, particularly by reporting on underinvestigated concurrent conditions such as trichotillomania and specific learning disabilities in a real-world clinical sample.

In our study, personality disorders and impulse control disorders were observed in 7.1% and 4.3% of the patients, respectively. In adult patients with ADHD, personality disorders co-occur in 10–75% of patients (Matthies and Philipsen 2016). It has been suggested that ADHD prepares the ground for an individual to develop a personality disorder and can be considered a risk factor (Matthies and Philipsen 2014). In particular,

borderline and antisocial personality patterns may lead to misdiagnosis, owing to symptoms that often overlap with ADHD (Lilienfeld 2003, Stibbe et al. 2020). Therefore, a detailed examination of these disorders is necessary for clinical evaluation. Studies have shown that women with ADHD tend to be diagnosed with borderline personality disorder (BPD) and that men tend to be diagnosed with antisocial personality disorder (ASPD) (Weiner et al. 2019).

In our study, externalizing disorders were more common in males, whereas internalizing disorders occurred at similar rates in both sexes. The co-occurrence of internalizing and externalizing disorders was also more common in males. These findings are consistent with previous research indicating a male predominance in externalizing psychopathology (Rucklidge 2010, Williamson and Johnston 2015, Cortese et al. 2016, Solberg et al. 2018). Although some studies have reported higher rates of internalizing disorders among women (Biederman 2004, Quinn 2008, Choi et al.2022), our data suggest a more balanced distribution in this domain. These results highlight the importance of sex-specific assessment strategies: male patients may require more thorough evaluation for substance use, impulse control problems, and antisocial traits (Choi et al. 2022), whereas in female patients, careful screening for depression, anxiety, and eating disorders could improve diagnostic accuracy and treatment outcomes (Stibbe et al. 2020, Choi et al. 2022).

Although prior research on adult ADHD comorbidities in Turkey is scarce, national data from pediatric and youth populations provide a helpful context. A study on Turkish children linked internalizing symptoms, particularly anxiety and depression, to ADHD presentations with slow cognitive tempo (Uytun et al. 2023). However, unlike youth samples, where females present higher rates of both internalizing and externalizing disorders (Uygun et al. 2025), our adult sample revealed no significant sex differences in internalizing disorders, whereas externalizing comorbidities were more common in males. This discrepancy may reflect developmental shifts in the expression of comorbidities or differences in help-seeking behavior and diagnostic practices across the lifespan. Additionally, earlier findings on trauma-related externalizing behaviors overlapping with ADHD symptoms in Turkish clinical settings (Ünaldı et al. 2018) are consistent with our observation that males more frequently present with both internalizing and externalizing comorbidities. Taken together, these results support the need for sex-sensitive, developmentally informed, and dimensional approaches in adult ADHD assessment and treatment within Turkish psychiatric contexts.

Overall, psychiatric comorbidity is highly prevalent in adults with ADHD, with approximately 80% experiencing at least one co-occurring disorder, most commonly mood, anxiety, or substance use disorders (Choi et al. 2022). Recent evidence further suggests that these comorbidity patterns differ by sex and across developmental stages. In a nationwide cohort, Kao et al. (2025) reported that while ADHD is more prevalent in males during childhood and adolescence, adult females were more likely to present with internalizing conditions such as anxiety and depression, whereas males demonstrated higher rates of externalizing disorders, including oppositional defiant disorder and substance use. These findings reinforce our results and underscore the need for sex-informed, dimensional diagnostic approaches in adult ADHD assessment.

These findings support the relevance of sex-specific screening strategies in clinical practice. In particular, clinicians may benefit from routinely considering externalizing disorders, such as substance use, in male patients while maintaining vigilance for internalizing symptoms such as depression and eating disorders in female patients, especially in those with late-diagnosed ADHD. These observations, together with our findings, suggest that sex-related differences in comorbidities across developmental stages remain an important avenue for future research in adults with ADHD.

Although the relatively small sample size may have reduced the power of the analyses, the results of our study once again show that ADHD presents a multidimensional clinical picture. This picture is not limited to attention deficit and hyperactivity symptoms. However, our study has several limitations. Given the retrospective and cross-sectional design, the study cannot establish causal inferences or determine temporal relationships between ADHD and psychiatric concurrent conditions (e.g., whether depression developed before or after ADHD diagnosis). While our findings provide valuable insights into the co-occurrence patterns of adults with ADHD, the limited sample size and low representation of specific diagnostic subgroups restrict the generalizability of the results. Future studies with larger, multicenter samples are needed to enable adequately powered subgroup analyses and more definitive conclusions. One limitation of this study is that psychiatric diagnoses were based on clinical judgment and medical records rather than structured interviews, such as the SCID-5 or MINI. This may reduce diagnostic reliability and introduce bias in concurrent condition assessment. Future studies should incorporate structured diagnostic tools to achieve more objective precision. Another limitation is the absence of subtype-specific analysis for ADHD presentations (predominantly inattentive, hyperactive–impulsive, combined). Research indicates that the inattentive subtype is more strongly associated with internalizing

disorders, whereas the hyperactive–impulsive subtype is more closely linked with externalizing conditions (Faraone et al. 2006, Martel and Nigg 2006, Ohnishi et al. 2019). Subtype-related psychopathological profiles can provide valuable insights for diagnosis, individualized treatment planning, and prognosis (Sonuga-Barke et al. 2010). National data also support these distinctions: in Turkish pediatric samples, combined-type ADHD had the highest rates of externalizing comorbidities (70.2%), whereas inattentive-type ADHD was more strongly associated with internalizing symptoms (Inci et al. 2019, Uygun et al. 2025). Therefore, stratified analyses by subtype could enhance the interpretability and clinical applicability of future research.

Although multiple comparisons were conducted in this study, no formal correction (e.g., Bonferroni adjustment) was applied. This decision was based on the descriptive and exploratory nature of the study. To mitigate the risk of inflated Type I error, effect sizes were reported alongside p values, and the results were interpreted with caution. In addition, while regression analysis was not applied due to sample size limitations and study design, future studies should employ multivariate modeling to identify independent predictors of comorbidity profiles.

Conclusion

This study offered preliminary evidence that sex-sensitive approaches, considered through internalizing–externalizing dimensions, could improve our understanding of comorbidity patterns in adults with ADHD. By drawing on data from a Turkish clinical population, this study also added perspective to the limited national and cross-cultural literature, underscoring the importance of context in both diagnosis and treatment. Future research could benefit from larger, multicenter, and longitudinal designs that can trace the developmental trajectories of comorbidities across the lifespan. Using structured diagnostic tools and dimensional symptom measures may strengthen reliability and allow for more nuanced analyses, including the role of ADHD subtypes. Bringing together biological markers with psychosocial and cultural factors may also help clarify the mechanisms behind sex differences and enrich translational models of ADHD. Finally, it will be important for future studies to explore how different comorbidity profiles influence treatment response, daily functioning, and quality of life while considering sex- and culture-specific moderators. Insights from such work could guide more personalized, equitable, and clinically meaningful care for adults with ADHD in diverse contexts.

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