

# Screen-positive adult attention-deficit/hyperactivity disorder (ADHD) symptoms and associated functional impairments: a cross-sectional study in Peshawar

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## ABSTRACT

**Background:** Attention-Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental condition that frequently persists into adulthood. In low-resource settings, symptoms often go unrecognized due to limited mental health awareness, sociocultural stigma, and a lack of routine screening infrastructure. Our aim was to evaluate the frequency of screen-positive adult ADHD symptoms and identify associated self-reported functional impairments among an adult urban cohort.

**Methods:** A cross-sectional study was conducted in urban Peshawar from February to June 2025. A total of 349 adults aged 20–40 years were recruited via convenience sampling. Participants completed the World Health Organization Adult Self-Report Scale (ASRS v1.1) screener alongside a validated supplementary section ( $\alpha = 0.84$ ) assessing functional difficulties in daily responsibilities, social interactions, emotional regulation, and task persistence. Data were analyzed using IBM SPSS v25, employing descriptive statistics, Pearson's Chi-square tests ( $\chi^2$ ), degrees of freedom ( $df$ ), Fisher's exact tests, and multinomial logistic regression.

**Results:** Screen-positive ADHD symptoms were identified in 50.4% ( $n = 176$ , borderline) and 4.6% ( $n = 16$ , high symptom / moderate ADHD) of participants. Statistically significant associations were observed between ADHD symptom levels and educational attainment ( $\chi^2 = 7.34$ ,  $df = 2$ ,  $p = 0.025$ ) as well as occupational groups ( $\chi^2 = 7.72$ ,  $df = 2$ ,  $p = 0.021$ ). Elevated symptom frequencies were observed among undergraduate medical students (64.2%) and postgraduate medical trainees (16.0%). Functional impairments were significantly more prevalent among screen-positive individuals ( $p < 0.001$ ), with emotional dysregulation reported by 94.1% ( $n = 16$ ) of participants in the high symptom burden tier. Age and gender were not significantly associated with symptom classification.

**Conclusion:** A substantial proportion of university-educated adults and medical trainees in Peshawar exhibit screen-positive adult ADHD symptoms accompanied by marked functional impairments. Implementation of routine institutional screening and accessible mental health support services is strongly indicated.

**Keywords:** Attention Deficit Hyperactivity Disorder, Adult ADHD, Functional Impairment, Emotional Dysregulation

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**Introduction**

Attention-Deficit/Hyperactivity Disorder (ADHD). It is a highly researched but often misunderstood neuro developmental disorder, characterized by chronic patterns of inattention, hyperactivity, and impulsivity. It often leads to substantial impairments in academic, occupational, and social functioning. (1,2) Traditionally, it was thought to be an early childhood disorder, but now, ADHD is recognized to persist into adolescence and adulthood in a significant majority of cases, leading to a widespread functional impairment that frequently remains underdiagnosed or even misdiagnosed (2).

Clinically, it is classified into three broad subtypes based on the predominant symptom: predominantly inattentive type (e.g., having difficulty sustaining attention and completing tasks), predominantly hyperactive-impulsive type (e.g., restlessness, excessive talking), and the combined type, sharing features of both (2). The diagnostic difficulty presented by ADHD lies in its symptomatic overlap with other behavioral and psychological disorders, varying expression over the lifetime, and high comorbidity with anxiety, depression, and learning disorders.

Epidemiological data show that the condition is more frequently diagnosed in men than in women, and the trend is attributed to a complex interplay of neurobiological, hormonal, behavioral, and cultural factors [3]. Recent evidence, however, reveals that female ADHD is underreported, perhaps due to differences

in gender-specific symptom expression. Girls and women may be less hyperactive but more internally symptomatic, with the symptoms easily overlooked or misdiagnosed as anxiety or mood disorders (3). This distinction gives rise to the necessity for gender-sensitive diagnostic approaches.

ADHD symptomatology shifts throughout the lifespan. Motor hyperactivity typically diminishes with age, but executive function impairment, attentional control, and problems with emotional regulation are frequently shown to remain or even increase in adulthood (4,5). In youth, ADHD is often shown to be present as underachievement in school, peer relationship disturbance, and oppositionality (6,7). Adult-onset symptoms, in contrast, are more likely to be characterized by disorganization, emotional dysregulation, impulsivity, distractibility, and difficulty sustaining professional and interpersonal responsibilities (5).

Adult ADHD has an estimated global prevalence of 2.5–5%, but within most low- and middle-income countries such as Pakistan, the disorder is highly underdiagnosed (4). Lack of mental health literacy, poor clinical training, the stigma of psychiatric diagnosis, and the invisible nature of symptoms in adults may influence the under recognition of adult ADHD. Comorbid condition masking effects, such as depression or anxiety, which usually distract clinical observation, further contribute to diagnostic difficulty (8). Most adults with ADHD remain undiagnosed and are even perceived as lazy, unmotivated, or emotionally unstable labels that mask the neurodevelopmental basis of their impairments and these adults may endure chronic stress, decreased self-esteem, drug

abuse, social isolation, and even arrest by the criminal justice system (9).

In the educational context, particularly at the undergraduate level, the impact of undiagnosed ADHD can be profound. Such students are constantly subjected to intense cognitive demands, changing routines, and emotional stressors, which can exacerbate previously unsuspected ADHD symptoms. Teens are characterized by heightened expectations for executive functioning and autonomy, which may reveal underlying neurodevelopmental issues. Other risk factors like irregular sleep patterns, poor coping strategies, inadequate support systems, and continued exposure to academic stress can threaten functioning and disrupt early identification of ADHD.

There is a lack of epidemiological data from Pakistan, especially from urban locations like Peshawar, regarding the unknown frequency and effects of ADHD among undergraduate students, despite the growing global awareness of adult ADHD. Establishing efficient screening and intervention programs with location-specific relevance is challenging due to the dearth of regional studies.

In order to close this gap, this project investigates two key research questions: How common is undiagnosed ADHD among Peshawar University students? What are the behavioral, contextual, and learning correlates of ADHD symptoms in this susceptible group? By investigating these issues, the study hopes to advance evidence-based mental health therapies in higher education, increase awareness, and add to the local body of knowledge.

### Methods

Ethical approval was granted by the Institutional Review Board (IRB) of Northwest School of Medicine (Ref: No

175/RC/NWSM/2024) on 20th February 2025. Informed verbal consent was obtained from all participants prior to data collection, and confidentiality was maintained throughout. A cross-sectional survey was conducted between 21st February and 21st June 2025 in urban Peshawar, Khyber Pakhtunkhwa, Pakistan.

The target population comprised adults aged 20–40 years residing in Peshawar. Convenience sampling was utilized across university campuses, teaching hospitals, and community centers. Individuals with a prior formal clinical diagnosis of ADHD were excluded to limit the evaluation to unrecognized symptom presentation. The final analyzed sample (N = 349) consisted of three distinct occupational groups:

1. Undergraduate Medical Students (MBBS Years 1–5): n = 224 (64.2%)
2. Postgraduate Medical Trainees & House Officers: n = 56 (16.0%)
3. Non-Medical University Students & Professionals: n = 69 (19.8%)

The primary screening tool was Part A of the WHO Adult Self-Report Scale (ASRS v1.1), consisting of six 5-point Likert items (0 = Never to 4 = Very Often). In accordance with WHO guidelines, responses meeting threshold frequency yielded 1 point toward the screener score. Participants were operationalized into three symptom burden tiers:

- *Screen-Negative / Minimal Symptoms (0–1 points)*: Low probability of adult ADHD symptoms.
- *Screen-Positive / Borderline Symptom Burden (2–3 points)*: Moderate probability of ADHD symptoms.
- *Screen-Positive / High Symptom Burden ('Moderate ADHD') (4–6 points)*: High probability of adult ADHD symptoms per WHO criteria. (Note: These operational

tiers reflect self-reported symptom frequencies on a screening instrument and do not constitute formal DSM-5 clinical diagnoses).

Section 3 of the questionnaire evaluated functional impairments across four domains (task completion, daily chores, social interaction, and emotional regulation). Internal consistency for Section 3 was confirmed with Cronbach's alpha ( $\alpha = 0.84$ ). A pilot study (N = 30, excluded from final dataset) verified instrument feasibility and clarity. The survey was administered in English (the instructional medium in higher education), with standardized verbal translations in Urdu or Pashto provided by trained collectors when requested.

Data were analyzed using IBM SPSS v25. Categorical variables were evaluated using Pearson's Chi-square ( $\chi^2$ ) test with degrees of freedom ( $df$ ) reported. Fisher's exact test was applied when expected cell counts were  $<5$  in  $> 20\%$  of cells. Multinomial logistic regression was performed to adjust for potential demographic confounders (age and gender). Statistical significance was defined as  $p < 0.05$ .

### Results

A total of 349 individuals completed the evaluation. Demographic analysis showed that the majority of respondents were aged 20–25 years [285 (81.7%)]. Those aged 26–30 years comprised 41 (11.7%) participants, while the 31–40 years category accounted for 23 (6.6%) participants. Males constituted 178 (51.0%) and females 171 (49.0%) of the cohort. Educational attainment included 282 (80.8%) undergraduates and 67 (19.2%) postgraduates (Table 1).

**Table 1: Demographic characteristics of study participants (n = 349)**

| Demographic Variable                           | Frequency (n) | Percentage (%) |
|------------------------------------------------|---------------|----------------|
| Age Group                                      |               |                |
| 20–25 years                                    | 285           | 81.7           |
| 26–30 years                                    | 41            | 11.7           |
| 31–40 years                                    | 23            | 6.6            |
| Gender                                         |               |                |
| Male                                           | 178           | 51.0           |
| Female                                         | 171           | 49.0           |
| Educational Attainment                         |               |                |
| Undergraduate                                  | 282           | 80.8           |
| Postgraduate                                   | 67            | 19.2           |
| Occupational Category                          |               |                |
| Medical Students (Undergraduate)               | 224           | 64.2           |
| Medical Trainees (Postgraduate/House Officers) | 56            | 16.0           |
| Non-Medical Participants                       | 69            | 19.8           |

A statistically significant association was observed between ADHD symptom levels and educational attainment ( $\chi^2 = 7.34$ ,  $df = 2$ ,  $p = 0.025$ ). Borderline symptom burden was reported by 141 (50.0%) undergraduates and 35 (52.2%) postgraduates. High symptom burden ('Moderate ADHD') was present in 9 (3.2%) undergraduates and 7 (10.4%) postgraduates.

Similarly, occupational grouping demonstrated a statistically significant relationship with symptom levels ( $\chi^2 = 7.72$ ,  $df = 2$ ,  $p = 0.021$ ). Screen-positive borderline symptoms were reported in 53.9% ( $n = 151$ ) of medical participants compared to 36.2% ( $n = 25$ ) of non-medical participants. A total of 16 participants exhibited high symptom burden (11 medical, 5 non-medical) (Table 2)

**Table 2: Screen-Positive ADHD Symptom Levels by Educational Attainment and Occupational Group (n = 349)**

| EDUCATIONAL ATTAINMENT                        |                                 |                              |           |             |                             |         |
|-----------------------------------------------|---------------------------------|------------------------------|-----------|-------------|-----------------------------|---------|
| ASRS v1.1 Symptom Classification              | Undergraduate (n)               | Postgraduate (n)             | Total (n) | % of Cohort | Test Statistic ( $\chi^2$ ) | p-value |
| Minimal / Screen-Negative (0–1 pts)           | 132                             | 25                           | 157       | 45.0%       | $\chi^2 = 7.34$<br>(df = 2) | 0.025 * |
| Borderline Symptom Burden (2–3 pts)           | 141                             | 35                           | 176       | 50.4%       |                             |         |
| High Symptom Burden / Moderate ADHD (4–6 pts) | 9                               | 7                            | 16        | 4.6%        |                             |         |
| Total                                         | 282                             | 67                           | 349       | 100%        |                             |         |
| OCCUPATIONAL CATEGORY                         |                                 |                              |           |             |                             |         |
| ASRS v1.1 Symptom Classification              | Medical Trainees & Students (n) | Non-Medical Participants (n) | Total (n) | % of Cohort | Test Statistic ( $\chi^2$ ) | p-value |
| Minimal / Screen-Negative (0–1 pts)           | 118                             | 39                           | 157       | 45.0%       | $\chi^2 = 7.72$<br>(df = 2) | 0.021 * |
| Borderline Symptom Burden (2–3 pts)           | 151                             | 25                           | 176       | 50.4%       |                             |         |
| High Symptom Burden / Moderate ADHD (4–6 pts) | 11                              | 5                            | 16        | 4.6%        |                             |         |
| Total                                         | 280                             | 69                           | 349       | 100%        |                             |         |

\* Statistically significant at  $p < 0.05$  (Pearson's Chi-square / Fisher's Exact Test).

Note 1: Percentages are calculated based on the total analyzed study sample (N = 349).

Note 2: Screening classifications are based on WHO Adult Self-Report Scale (ASRS v1.1) Part A score thresholds:

- Screen-Negative / Minimal Symptoms: 0–1 threshold point

- Screen-Positive / Borderline Symptom Burden: 2–3 threshold points

- Screen-Positive / High Symptom Burden ('Moderate ADHD'): 4–6 threshold points

Note 3: Medical category comprises undergraduate MBBS students (n = 224, 64.2%) and postgraduate medical trainees / house officers (n = 56, 16.0%).

Because some contingency table cells had small expected frequencies, Fisher's Exact

test was applied where appropriate to validate associations. Additionally, multinomial logistic regression analysis was conducted to assess independent predictors of ADHD symptom levels. Educational status and occupation remained significant predictors of borderline/moderate ADHD after adjustment for age and gender.

Participants were questioned about typical functioning challenges that might be connected to symptoms of ADHD. Difficulties with uninteresting work, daily activities, social interactions and emotional regulation were the four specific areas evaluated. There was a statistically significant correlation ( $p < 0.001$ ) between ADHD levels and each of these dimensions.

Compared to people without ADHD, more people with borderline or moderate ADHD reported difficulties in these areas. Notably, all 16 (6.7) people with moderate ADHD and 135 (56.2) people with borderline ADHD reported having trouble controlling their

emotions. In a similar vein, individuals with ADHD symptoms had trouble with social and routine functioning and found tedious or repeated tasks more difficult to finish (Table 3).

**Table 3: Participants reported functional challenges according to ADHD classification**

| ADHD LEVEL                                                                         |         |                 |               |       |                                      |
|------------------------------------------------------------------------------------|---------|-----------------|---------------|-------|--------------------------------------|
|                                                                                    | No ADHD | Borderline ADHD | Moderate ADHD | Total | Chi-Square Value/Fisher's Exact Test |
| 1. Are tasks you find boring difficult to perform for you?                         |         |                 |               |       |                                      |
| No                                                                                 | 92      | 61              | 5             | 158   | 0.000                                |
| Yes                                                                                | 65      | 115             | 11            | 191   |                                      |
| 2. Do you find it difficult to perform daily tasks?                                |         |                 |               |       |                                      |
| No                                                                                 | 80      | 59              | 1             | 140   | 0.000                                |
| Yes                                                                                | 77      | 117             | 15            | 209   |                                      |
| 3. Do you find it difficult to handle situations that require social interactions? |         |                 |               |       |                                      |
| No                                                                                 | 83      | 61              | 3             | 147   | 0.001                                |
| Yes                                                                                | 74      | 115             | 13            | 202   |                                      |
| 4. Do you find it difficult to control your emotions?                              |         |                 |               |       |                                      |
| No                                                                                 | 68      | 41              | 0             | 109   | 0.000                                |
| Yes                                                                                | 89      | 135             | 16            | 240   |                                      |

The results from this study highlight some key factors related to undiagnosed ADHD, its prevalence, and its functional impacts among adults in Peshawar, Pakistan, offering insight into a population largely understudied in this context. Our study's results show that a statistically significant proportion of educated persons have ADHD symptoms, particularly in the educational and occupational domains where statistically significant correlations were found ( $\chi^2 = 7.34$ ,  $df = 2$ ,  $p = 0.025$  and  $\chi^2 = 7.72$ ,  $df = 2$ ,  $p = 0.021$  respectively). The main conclusions of this study relate to the paradox of ADHD's frequently undiscovered existence in high achievers as well as the functional deficits linked to the disorder. Academic and professional stress may be associated with the expression of core symptoms of ADHD in high-achieving

individuals including inattention, impulsivity, and emotional dysregulation which remain masked by external performance yet erode internal well-being and day-to-day functioning.

### Discussion

The results of this research point to significant relationships among screen-positive ADHD symptoms and educational, occupational, and functional factors in the adult population. There was a statistically significant correlation between education level and ADHD symptoms ( $\chi^2 = 7.34$ ,  $df = 2$ ,  $p = 0.025$ ), with screen-positive borderline symptom burden as the most frequent presentation among both the undergraduate and postgraduate groups. The fact that postgraduates had screen-positive moderate symptom burden (10.4%) indicates that the continuation of studies does not always

mean an absence of ADHD symptoms. This is in alignment with the idea that individuals may have acquired compensatory strategies or struggled silently without an official diagnosis (10).

A previous Pakistani study found a 34.8% prevalence of ADHD among medical students as assessed using the ASRS v1.1 instrument, from data gathered in all four provinces (8). Conversely, our research illustrated a greater borderline ADHD rate of 53.9%. This can be seen to be representative of regional differences or could be due to the targeted sampling of individuals from Peshawar. Worldwide, the prevalence of ADHD has differed greatly 23.7% in Kenya, 5.5–4.7% in Korea, 16.5% in Iran, 10% in Riyadh, 16.6% in Iraq, and 4.4% in the US (8). The high prevalence in our study could be attributed to self-reporting biases inherent in ASRS, educational pressure, or low mental health literacy.

Among graduate students, higher levels of screen-positive high symptom burden / 'moderate ADHD' tier (10.4%) were found compared to undergraduate students (3.2%). This challenges the belief that academic achievement insulates against executive function or attention problems. It can rather be reflective of unaddressed symptoms compensated for by adaptive coping mechanisms. These findings are in line with earlier studies showing that, despite seeming effectiveness, ADHD may be functionally detrimental (11).

Additionally, there was a significant association between ADHD levels and vocational position ( $\chi^2 = 7.72$ ,  $df = 2$ ,  $p = 0.021$ ). Undergraduate medical students and postgraduate medical trainees had somewhat greater rates of screen-positive borderline ADHD symptoms (53.9%) compared to their non-medical counterparts

(36.2%). These results support research showing that demanding clinical training and practice environments are significantly associated with higher self-reported ADHD symptom burden (12). A prevalence of 31.6% was identified in Turkish research of surgical trainees, which correlated with higher symptoms of ADHD in difficult areas of medical practice (13).

On the other hand, according to global data from the WHO World Mental Health Survey, 3.5% of workers satisfied DSM-IV criteria for ADHD (14). Significantly higher than global rates derived from diagnostic interviews, 36.2% of our non-medical cohort and 53.9% of medical respondents exhibited screen-positive borderline symptom burden, while 7.2% and 3.9%, respectively met threshold for high symptom burden. Sample bias, academic constraints, and cultural factors can all contribute to variation. On the other hand, studies conducted in Mexico found that non-medical students were more likely to experience symptoms of ADHD, particularly in sectors with lower academic requirements (15). Such disparity attests to the impact of situational academic stressors. One of the significant contributions of this research is introducing a third section of the ASRS that targets functional difficulties (validated with high internal consistency, Cronbach's  $\alpha = 0.84$ ). The screen-positive borderline and moderate ADHD participants all reported high levels of difficulty with completing tasks, interacting with others, daily functioning, and managing emotions. These results are consistent with findings that suggest adults with ADHD will also experience difficulty with mind wandering, motivation, and executive functioning (16).

Emotional regulation also proved to be a very important area: 135 (56.2) of those with borderline ADHD and all 16 (6.7) participants with moderate ADHD experienced emotional dysregulation. This is in agreement with earlier studies pointing to emotional instability as a feature of adult ADHD, where estimates varied from 34–70% (17). Social functional impairments were also observed, which aligns with research associating ADHD with impaired emotion recognition and social interaction (18). Social camouflage and fear of stigmatization, especially for women, could further complicate diagnosis and add to the large undiagnosed burden of ADHD (19). These coping strategies can lead to underreporting and under-detection in standard tests.

Our gender distribution results showed no gender correlation with ADHD classification ( $\chi^2 = 0.071$ ,  $p = 0.965$ ). This is per several Pakistani studies reporting a reduction in gender disparity in adult prevalence of ADHD (20). While some studies still imply male predominance (21), other research indicates females could have an increased frequency of symptoms but are underdiagnosed because of cultural stigma and symptom presentation (11,22). In addition, diagnostic bias—such as that present with self-report instruments compared to DSM-5 interviews—can affect the perception of gender difference (22).

Age was not found to have a statistically significant correlation with levels of ADHD; nevertheless, the highest prevalence of symptoms occurred in the 20–25-year-old age group (81.7%). This is as explained by research indicating increased symptoms of ADHD during the transition to adulthood (23) due to increased academic as well as psychosocial stress at this stage. Our results

indicate the persistence of symptoms in young adulthood as well as the necessity for age-specific screening.

Studies indicate that approximately 46% of children with ADHD persist in showing symptoms through adulthood (24). Our study's high percentage of undiagnosed ADHD is probably a sign of long-lasting but undetectable childhood symptoms. Inadequate mental health knowledge, cultural stigma, and a lack of diagnostic treatments are probably contributing causes (25). These findings emphasize the importance of early diagnosis and treatment of adult ADHD, particularly in demanding professional and educational settings where it may be disregarded or attributed to other factors.

### Future Recommendations

Institutions should train teachers and supervisors to identify ADHD-related issues and implement validated tools such as the ASRS v1.1. In order to lessen stigma and encourage early intervention, awareness initiatives and easily accessible mental health services should be given top priority. Lastly, future studies are advised to investigate the long-term effects of undiagnosed ADHD and to assist Pakistan in developing evidence-based policies.

### Limitations:

Several limitations must be considered when interpreting these findings:

1. Due to the observational, cross-sectional design, directional causality between academic stress and ADHD symptoms cannot be established.
2. The study utilized self-reported ASRS v1.1 screener scores without structured clinical diagnostic interviews (e.g., DIVA 2.0). Results

reflect screen-positive symptom burden rather than confirmed psychiatric diagnoses.

3. The cohort was predominantly composed of medical students and trainees (\$80.2\%\$), which may limit generalizability to the broader non-academic adult population of Peshawar.

### Conclusion

This study indicates that there is a high incidence of undiagnosed ADHD among adults in Peshawar, with borderline and moderate symptoms present in all educational and occupational sectors, particularly among young adults and medical professionals. The disorder's effects the significant functional impairments, especially in social interaction, daily task management, and emotional control. Importantly, without a correct diagnosis or support, many afflicted individuals continue to work in difficult environments while concealing their symptoms. The ideas that ADHD only affects youngsters or that academic success rules it out are called into question by these findings.

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