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# The Correlations Between Academic Procrastination and Academic Burnout with Symptoms of Adult Attention Deficit Hyperactivity Disorder (ADHD) in Clinical Medical Students in Northern Iran

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## Abstract

**Background:** Given the high prevalence of attention deficit hyperactivity disorder (ADHD), particularly among students, and its potential impact on academic burnout and procrastination, this study aimed to examine the correlation between ADHD, academic burnout, and procrastination.

**Methods:** This cross-sectional study was conducted in 2023 at Babol University of Medical Sciences in Northern Iran. Clinical medical students were enrolled based on specific inclusion and exclusion criteria. Participants completed three validated scales: The Adult Attention Deficit Hyperactivity Disorder Self-Report Scale (ASRS v1.1), the Procrastination Assessment Scale for Students (PASS), and the Maslach Burnout Inventory-General Survey for Students. Demographic and questionnaire data were analyzed using appropriate statistical methods.

**Results:** The study of 256 clinical medicine students found that 54.7% were female, with 78.9% admitted on their first attempt. The average scores for ADHD (ASRS), procrastination, and burnout were 48.76 ± 8.58, 85.15 ± 13.84, and 43.57 ± 14.86, respectively. Higher ASRS scores were significantly linked to increased procrastination ($P < 0.001$) and burnout ($P = 0.030$). Younger students showed higher burnout ($P = 0.033$), and those from families with four children had more procrastination ($P = 0.045$). Other demographic factors were not significant.

**Conclusions:** This study establishes a distinct connection between ADHD and increased levels of academic burnout and procrastination among clinical medicine students. Students with higher ADHD scores are the most likely to continue to experience greater burnout and procrastination. This points to a necessity for effective and timely interventions and measures with respect to ADHD in the vulnerable population to reduce their risk of burnout and procrastination.

*Keywords:* Attention Deficit Disorder with Hyperactivity, Burnout, Procrastination

## 1. Background

Attention deficit hyperactivity disorder (ADHD) is a developmental condition involving persistent symptoms of inattention and/or hyperactivity-impulsivity that profoundly disrupt an individual's normal functioning or growth. The Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5) outlines three main types of ADHD: The inattentive type, the hyperactive-impulsive type, and a combined type (1, 2). Common symptoms include difficulty focusing, disorganization, failure to complete tasks, restlessness, and impulsive behaviors that are not consistent with the individual's age or developmental stage (3, 4). The ADHD often coexists with other childhood disorders, such as oppositional defiant disorder and conduct disorder (5, 6), and frequently continues into adulthood, affecting both personal and professional aspects of life (4, 6, 7).



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Studies estimate that between 2% and 8% of university students live with ADHD (8). These students often face challenges in academic settings, such as lower grades, delayed graduation, and higher dropout rates compared to their peers (9-11). One contributing factor could be their tendency toward procrastination, which is thought to be linked to deficits in executive functioning, a common issue among individuals with ADHD. This may explain the correlation between procrastination and ADHD symptoms in university students (12, 13).

Academic burnout is another major issue, first described by Kafry and Pines, and is defined as a syndrome marked by a loss of interest in studies, decreased motivation, and exhaustion. Burnout involves feelings of emotional fatigue, a cynical attitude towards education, and a sense of inefficacy as a student (14-17). The prevalence of burnout among medical students is notably high, with studies in the United States estimating it at around 50% (17, 18). Several factors have been linked to academic burnout in medical students, including extended learning periods, personal life stressors, poor peer correlations, low levels of physical activity, and substance use (19-21).

Although research on the connection between ADHD and burnout is limited, some studies suggest that adults with ADHD tend to report higher levels of fatigue compared to the general population. Additionally, patients with chronic fatigue syndrome (CFS) often display more ADHD symptoms than healthy individuals (22). These findings indicate that ADHD might be closely linked with chronic fatigue conditions, including severe burnout. Given the widespread impact of ADHD on individuals' quality of life, academic performance, and mental health, especially among medical students, it is essential to address these issues. Medical students, in particular, are in direct contact with patients, and procrastination or burnout could lead to serious errors in clinical settings. Despite the importance of this topic, there has been limited research examining the correlation between ADHD, academic burnout, and procrastination in medical students.

## 2. Objectives

This study aims to explore these associations among medical students at Babol University of Medical Sciences.

## 3. Methods

This cross-sectional study was conducted in 2023 and included all clinical medical students (interns and externs) at Babol University of Medical Sciences. After obtaining necessary approvals from university management and relevant departments, and securing final confirmation from reviewers, the study was initiated. The inclusion criteria involved all clinical medical students, without any age or gender restrictions. Students who declined to participate in the study or withdrew their consent at any stage of the research were excluded. Additionally, students with a documented history of significant psychiatric disorders, such as psychosis, major depressive disorder, bipolar disorder, or obsessive-compulsive disorder, were not included in the study. This also applied to participants who were currently undergoing psychiatric treatment or using psychiatric medications. Finally, students who failed to fully complete the study questionnaire or provided incomplete responses, resulting in missing data, were excluded from the analysis.

The minimum sample size was calculated using the correlation formula, considering a correlation coefficient of 0.2 between procrastination and ADHD, based on previous research (23). Accounting for a potential 20% dropout rate, the required sample size was set at 240 students. A significance level ($\alpha$) of 0.05 and a power ($\beta$) of 80% were used for the calculation. Out of 419 clinical medical students at Babol University, 270 were selected using convenience sampling, and questionnaires were distributed. A total of 256 students fully completed the questionnaires, while 14 students were excluded due to incomplete responses.

### 3.1. Questionnaires

#### 3.1.1. Adult Attention Deficit Hyperactivity Disorder Self-Report Scale

Developed in collaboration with the World Health Organization (WHO), this scale was designed by Adler, Kessler, and Spencer in 2003. It consists of 18 items aligned with the DSM-IV criteria, rated on a 5-point Likert scale ranging from "never" to "always". Scores range from 18 to 90, with higher scores indicating more severe ADHD symptoms. Scores between 18 and 35 indicate mild symptoms, 36 to 54 moderate symptoms, and scores above 54 suggest more severe ADHD traits.

This scale has shown internal consistency reliability between 0.63 and 0.72, and test-retest reliability (Pearson correlation) between 0.58 and 0.77 (24, 25). The Persian version of the Adult Attention Deficit Hyperactivity Disorder Self-Report Scale (ASRS v1.1) demonstrated excellent content validity, with a Content Validity Index (CVI) of 0.88 and a Content Validity Ratio (CVR) of 0.80, as established through expert panel review in its psychometric validation study (25).

#### 3.1.2. Procrastination Assessment Scale for Students

This tool was developed to assess academic procrastination across three areas: Exam preparation, assignment completion, and preparation for final term papers. The 27-item scale uses a 5-point Likert response format, ranging from "never" to "always". Some items are reverse scored. The reliability of this scale has been reported with Cronbach's alpha ranging from 0.73 to 0.91 in different studies (26, 27). The Persian version of the Procrastination Assessment Scale for Students (PASS) has been validated with a CVI of 0.92 and a CVR of 0.87, confirming strong content validity for use in academic settings (28).

#### 3.1.3. Maslach Burnout Inventory-Student Survey

This scale measures academic burnout and focuses on three dimensions: Emotional exhaustion, cynicism, and academic efficacy. Responses are rated from 0 (never) to 6 (always). Higher scores in emotional exhaustion and cynicism indicate higher levels of burnout, while lower scores in academic efficacy suggest greater burnout. Previous studies have shown good reliability for this tool, with acceptable Cronbach's alpha values (29, 30). The Persian version of the Maslach Burnout Inventory-Student Survey (MBI-SS) demonstrated robust content validity, with a CVI of 0.90 and a CVR of 0.85, based on expert evaluation during its adaptation and validation process (29).

### 3.2. Statistical Analysis

Data were analyzed using SPSS version 24 and JASP version 0.19.1. The normality of data was evaluated using the Kolmogorov-Smirnov test. Since the data were normally distributed, parametric tests were applied. The significance level was set at $P < 0.05$. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize demographic and study variables. To examine the differences in academic procrastination and burnout scores across the various categories of ADHD symptoms, we employed a one-way analysis of variance (ANOVA). To explore the correlations between ADHD symptoms, academic burnout, and procrastination, multiple linear regression analysis was employed. The ADHD symptoms were treated as the independent variable, and academic burnout and procrastination as dependent variables. Age, gender, birth order, and number of siblings were included as covariates to adjust for potential confounders.

## 4. Results

The study, conducted among 256 clinical medical students with a mean age of 24.30 ± 1.83 years, found that 54.7% of the participants were female. Demographically, 48% of students came from families with two children, and 44.9% were the firstborn. Furthermore, 78.9% of the participants were admitted to university on their first attempt (Table 1).

In this study, the results indicated the following mean scores for the questionnaires used: The mean and standard deviation of the ASRS was 48.76 ± 8.58. Additionally, the Procrastination Assessment Scale had a mean score of 85.15 ± 13.84. Finally, the mean score for academic burnout was 43.57 ± 14.86. According to the ASRS classification, 3.1% of students were categorized as having low ADHD symptoms, 76.2% fell into the moderate category, and 20.7% were classified as having high symptoms. The distribution of ADHD symptoms (ASRS scores) across genders showed no significant difference between male and female students ($P = 0.207$). Among female students, 2 (1.4%) were classified in the low ASRS category, 110 (78.6%) in the moderate category, and 28 (20.0%) in the high category. For male students, 6 (5.2%) were in the low ASRS category, 85 (73.3%) in the moderate category, and 25 (21.6%) in the high category.

The analysis revealed significant associations between ADHD symptoms, procrastination, and academic burnout. Students with higher ASRS scores had notably higher levels of procrastination and burnout compared to those in the lower ASRS categories ($P < 0.001$ for procrastination, $P = 0.030$ for burnout; Table 2 and Table 3).

The linear regression analysis examining the association between burnout scores and ASRS scores,

**Table 1.** Demographic Information of Study Participants [a]

| Variables | Values |
|---|---|
| **Gender** | |
| Male | 116 (45.3) |
| Female | 140 (54.7) |
| **Birthplace** | |
| City | 255 (99.6) |
| Village | 1 (0.4) |
| **Number of children in the family** | |
| 1 | 29 (11.3) |
| 2 | 123 (48.0) |
| 3 | 73 (28.5) |
| 4 | 27 (10.5) |
| 5 | 4 (1.6) |
| **Birth order** | |
| First | 115 (44.9) |
| Second | 100 (39.1) |
| Third | 30 (11.7) |
| Fourth | 10 (3.9) |
| Fifth | 1 (0.4) |
| **University acceptance year** | |
| Same year | 202 (78.9) |
| After the entrance exam | 54 (21.1) |

[a] Values are expressed as No. (%).

**Table 2.** Comparison of Procrastination and Academic Burnout Scores Across different Adult Attention Deficit Hyperactivity Disorder Self-Report Scale Categories [a]

| Variables | ASRS | | | P-Value |
|---|---|---|---|---|
| | Low | Medium | High | |
| **Academic burnout** | 33.25 ± 14.17 | 43.05 ± 14.74 | 47.03 ± 14.67 | 0.030 |
| **Procrastination** | 66.62 ± 8.89 | 83.31 ± 12.74 | 94.73 ± 12.79 | ≤ 0.001 |

Abbreviation: ASRS, Adult Attention Deficit Hyperactivity Disorder Self-Report Scale.

[a] Values are expressed as mean ± SD.

while considering demographic factors, revealed significant results. The ASRS score was significantly associated with burnout (β = 0.458, 95% CI = 0.249 to 0.667, P < 0.001), indicating that higher ASRS scores predict higher levels of burnout. Additionally, age was also a significant predictor of burnout (β = -1.094, 95% CI = -2.100 to -0.088, P = 0.033), showing a negative correlation between age and burnout, with younger students reporting higher burnout levels. The analysis did not reveal significant associations between gender, number of children in the family, birth order, or university acceptance year with burnout scores (Table 4).

Regarding procrastination scores, the regression analysis showed that ASRS scores were also a significant predictor of procrastination (β = 0.746, 95% CI = 0.569 to 0.924, P < 0.001). Furthermore, the number of children in the family was significantly related to procrastination, specifically for students from families with four children (β = 8.181, 95% CI = 0.185 to 16.178, P = 0.045), suggesting that students from larger families may procrastinate more. Other demographic factors, such as age, gender, birth order, and university acceptance year, did not show significant associations with procrastination scores (Table 5).

## 5. Discussion

**Table 3.** The Correlation Between Procrastination Scores and Academic Burnout with Adult Attention Deficit Hyperactivity Disorder Self-Report Scale

| Variables | ASRS | Academic Burnout | Procrastination |
|---|---|---|---|
| **ASRS** | 1 | | |
| Pearson correlation (r) | | 0.265 [a] | 0.478 [a] |
| P-value | | < 0.001 | < 0.001 |
| **Academic burnout** | | 1 | |
| Pearson correlation (r) | 0.265 [a] | | 0.320 [a] |
| P-value | < 0.001 | | < 0.001 |
| **Procrastination** | | | 1 |
| Pearson correlation (r) | 0.478 [a] | 0.320 [a] | |
| P-value | < 0.001 | < 0.001 | |

Abbreviation: ASRS, Adult Attention Deficit Hyperactivity Disorder Self-Report Scale.

[a] Correlation is significant at the 0.01 level (2-tailed).

**Table 4.** Linear Regression Analysis of the Association Between Burnout Scores and Adult Attention Deficit Hyperactivity Disorder Self-Report Scale Considering Demographic Information

| Variables | β | 95% CI | | P-Value |
|---|---|---|---|---|
| | | Lower | Upper | |
| **Age** | -1.094 | -2.100 | -0.088 | 0.033 |
| **ASRS** | 0.458 | 0.249 | 0.667 | < 0.001 |
| **Gender (male)** | 1.514 | -2.105 | 5.134 | 0.411 |
| **Number of children in the family (2)** | -2.080 | -6.336 | 2.176 | 0.337 |
| **Number of children in the family (3)** | -2.892 | -9.939 | 4.156 | 0.420 |
| **Number of children in the family (4)** | -8.260 | -20.383 | 3.864 | 0.181 |
| **Number of children in the family (5)** | -34.841 | -68.977 | -0.705 | 0.045 |
| **Birth order (2)** | 0.677 | -5.545 | 6.900 | 0.830 |
| **Birth order (3)** | -0.788 | -7.857 | 6.281 | 0.826 |
| **Birth order (4)** | 5.636 | -3.792 | 15.065 | 0.240 |
| **Birth order (5)** | 9.177 | -9.989 | 28.344 | 0.347 |
| **University acceptance year (after the entrance exam)** | -0.292 | -4.720 | 4.137 | 0.897 |

Abbreviation: ASRS, Adult Attention Deficit Hyperactivity Disorder Self-Report Scale.

The results of this study revealed a strong association between ADHD symptoms, academic procrastination, and burnout among medical students. Students with higher ASRS scores demonstrated greater levels of procrastination and burnout, suggesting that individuals with more severe ADHD symptoms are at higher risk for these academic difficulties. Younger students were also more likely to report burnout, potentially due to their developing coping strategies for managing the demands of medical education. Furthermore, students from larger families were more prone to procrastination, possibly due to additional responsibilities or limited academic support within the family structure. These findings align with previous research, such as the work of Hayat et al. (23), which demonstrated a negative correlation between academic procrastination and academic achievement.

Given the clear link between ADHD symptoms and both procrastination and burnout, it can be inferred that ADHD has a detrimental effect on academic performance, potentially leading to academic decline. The correlation between ADHD and burnout is particularly notable, as students with attention and organizational difficulties may experience emotional exhaustion and feelings of ineffectiveness, which contribute to higher levels of burnout.

The results of this study are consistent with prior research indicating that ADHD symptoms can significantly impact academic performance. For

**Table 5.** Linear Regression Analysis of the Association Between Academic Procrastination Scores and Adult Attention Deficit Hyperactivity Disorder Self-Report Scale Considering Demographic Information

| Variables | β | 95% CI | | P-Value |
|---|---|---|---|---|
| | | Lower | Upper | |
| **Age** | -0.234 | -1.087 | 0.619 | 0.589 |
| **ASRS** | 0.746 | 0.569 | 0.924 | < 0.001 |
| **Gender (male)** | -0.084 | -3.154 | 2.986 | 0.957 |
| **Number of children in the family (2)** | 3.143 | -2.134 | 8.421 | 0.242 |
| **Number of children in the family (3)** | 1.467 | -4.529 | 7.462 | 0.630 |
| **Number of children in the family (4)** | 8.181 | 0.185 | 16.178 | 0.045 |
| **Number of children in the family (5)** | 5.309 | -10.947 | 21.565 | 0.521 |
| **Birth order (2)** | 0.265 | -3.345 | 3.874 | 0.885 |
| **Birth order (3)** | -5.032 | -11.010 | 0.945 | 0.099 |
| **Birth order (4)** | -4.933 | -15.215 | 5.350 | 0.346 |
| **Birth order (5)** | 11.376 | -17.576 | 40.328 | 0.440 |
| **University acceptance year (after the entrance exam)** | 1.859 | -1.897 | 5.615 | 0.330 |

Abbreviation: ASRS, Adult Attention Deficit Hyperactivity Disorder Self-Report Scale.

example, Fadaee et al. (31) also found that students with ADHD tend to procrastinate more than their peers. These findings highlight the importance of addressing ADHD as a potential underlying factor in academic difficulties. Interventions such as enhancing self-efficacy and academic self-regulation, as suggested by Isaac Rahimian and Sheyda (32), could help reduce procrastination, especially in students with ADHD.

When comparing our results with those of other studies, it becomes evident that the association between ADHD, procrastination, and burnout is not unique to medical students. Niermann and Scheres (33), for instance, observed a similar correlation between ADHD and procrastination in undergraduate students from various fields. This suggests that the effects of ADHD extend beyond the medical field, impacting students in a wide range of academic settings.

Interestingly, our study did not find significant differences between male and female students in terms of ADHD symptoms, procrastination, or burnout. This contrasts with the findings of Yahya et al. (30), who reported higher burnout rates among female students. The discrepancy may be attributed to the different study focuses: While our study examined ADHD symptoms in relation to burnout, Yahya et al. (30) focused solely on burnout prevalence. Future research should explore the role of gender in more depth to clarify these mixed findings.

Moreover, the regression analysis underscored the significant impact of ADHD symptoms on both burnout and procrastination. Students with more severe ADHD symptoms were more likely to procrastinate, consistent with the well-documented executive function deficits associated with ADHD. Family size also appeared to influence procrastination, with students from larger families demonstrating a greater tendency to procrastinate. This could reflect additional pressures within the family or limited academic resources. Demographic factors such as gender, birth order, and year of university acceptance did not significantly influence burnout or procrastination. This suggests that ADHD symptoms may have a similar impact across different demographic groups, indicating the pervasive nature of these academic challenges.

However, further research is needed to examine potential moderating factors, such as personal resilience or support systems that could buffer the negative effects of ADHD on academic performance. One of the main strengths of this study is its focus on medical students, a population facing unique academic pressures. By exploring the correlation between ADHD symptoms, procrastination, and burnout in this context, the study provides valuable insights that can inform targeted interventions aimed at improving both academic performance and mental health. Additionally, the use of validated tools for measuring ADHD symptoms, procrastination, and burnout strengthens the reliability of the findings.

However, several limitations should be acknowledged. First, the cross-sectional design limits

the ability to draw causal conclusions. While associations were found, it is unclear whether ADHD symptoms directly lead to burnout and procrastination or if other variables are involved. Longitudinal studies are needed to explore these correlations over time. Second, the study was conducted at a single university, which may limit the generalizability of the findings to other institutions or disciplines. Expanding the sample to include multiple universities and fields would provide a broader perspective. Additionally, the reliance on self-reported measures introduces the possibility of bias, as students may overestimate or underestimate their symptoms due to social desirability or other factors.

Finally, while this study examined several demographic factors, other potentially important variables — such as coping strategies, social support, and mental health resources — were not explored. Future research should investigate these variables to gain a more comprehensive understanding of the dynamics between ADHD symptoms and academic performance.

### 5.1. Conclusions

This study demonstrated a significant association between ADHD symptoms and both academic burnout and procrastination among medical students. Higher ADHD scores were correlated with increased levels of burnout and procrastination, suggesting that students with more severe ADHD symptoms face greater academic challenges. These results emphasize the need for early diagnosis and intervention for students exhibiting ADHD symptoms to prevent academic decline. Future research should explore these correlations across larger, more diverse student populations to further clarify the role of ADHD in academic performance.

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## Footnotes

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**Data Availability:** The data that support the findings of this study are available from the corresponding author upon reasonable request.

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