Personality Predictors of Stress, Burnout, and Academic Outcomes in Medical Students: A Big Five Trait Analysis

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ABSTRACT

Background: Personality traits influence how individuals handle stress, burnout, and academic challenges, particularly in high-pressure fields like medicine. Objective: To examine the relationship between personality traits and levels of stress, burnout, and academic performance among medical students. Study Design: Cross-sectional study. Settings: Isra University, Hyderabad Pakistan. Duration: From June to November 2024. Methods: This study was conducted among 360 medical students, assessing personality traits using the Big Five framework. Perceived stress, burnout, and academic performance (GPA) were measured through validated questionnaires and institutional records. Associations between personality traits and outcome variables were analyzed using chi-square tests. Results: Agreeableness was the most prevalent trait (32%), followed by conscientiousness (27%). Neuroticism showed a strong positive association with high stress (χ^2 = 15.4, p < 0.001) and burnout (χ^2 = 12.8, p = 0.002), while conscientiousness and extroversion were linked to lower stress ($\chi^2 = 10.2$, p = 0.014). Academic performance was highest among conscientious ($\chi^2 = 9.6$, p = 0.021) and agreeable (χ^2 = 8.1, p = 0.032) individuals, whereas neuroticism and extroversion were negatively associated with GPA. Women scored higher in neuroticism (38%, p = 0.004) and agreeableness (34%, p = 0.009) than men. Conclusion: Personality traits significantly influence stress, burnout, and academic performan8ce in medical students. Identifying these associations can guide tailored interventions, such as stress management for neurotic students and structured productivity plans for conscientious individuals, to enhance resilience and academic success.

Keywords: Personality, Burnout, Stress, Academic performance, Medical students, Medical education.

INTRODUCTION

Tedical school is known for its rigorous academic Memands, high levels of stress, and intense workload, often leading to burnout among students.¹⁻³ Research suggests that up to 50% of medical students experience burnout, with stress being a significant contributor to mental health struggles.4 However, individuals respond to stress differently based on personality traits, which influence emotional resilience, stress levels, and academic performance.5 Understanding these differences is essential for developing personalized strategies to support students' mental well-being.

Personality is a set of enduring traits that influence how individuals think, feel, and behave. The Big Five Personality Traits, Openness (O), Conscientiousness (C), Extraversion (E), Agreeableness (A) and Neuroticism (N), also known as the Five Factor Model (FFM) and the OCEAN Model, proposed by Lewis Goldberg (1993), provide a widely accepted framework for assessing personality differences.^{5,6} Openness to experience is associated with creativity and curiosity, often linked to a willingness to explore new ideas. Conscientiousness encompasses traits such as organization, responsibility, and goal-orientation, contributing to strong academic performance and effective time management. Extraverted individuals tend to be sociable, energetic, and assertive,

thriving in social settings and group-based learning. Agreeableness reflects compassion and cooperativeness, fostering strong interpersonal relationships. Neuroticism, on the other hand, is characterized by emotional instability, anxiety, and a heightened vulnerability to stress and burnout.⁵

Given the high-pressure environment of medical school, these personality-driven differences can significantly impact students' ability to handle stress and maintain academic success. Those with high neuroticism may struggle with excessive worry and emotional distress, while students with lower conscientiousness may face challenges in maintaining focus and meeting deadlines.⁷ Conversely, highly agreeable and extroverted individuals may benefit from strong social support networks, which help them manage academic pressures more effectively.⁸ Recognizing these personality-related variations is essential in identifying students at greater risk of stress and burnout and in formulating targeted interventions that enhance resilience.

The objective of this study is to assess the prevalence of different personality traits among medical students. This study also aims to examine the relationship between personality traits and levels of stress, burnout, and academic performance among medical students. By analyzing how personality affects students' ability to manage academic demands, this research aims to highlight psychological challenges in medical education. Understanding these associations can inform targeted interventions to enhance student well-being, academic success, and resilience in high-pressure learning environments.

METHODS

This cross-sectional study was conducted from June to November 2024 among medical students to assess the association of personality traits with stress, burnout, and academic performance. The study was approved by the Isra University Ethical Review Board (ERB letter # IU/RR-10-IRC-24/N/2024/032), and informed consent was obtained from all participants prior to data collection.

The study population consisted of medical students from different academic years. Sample-size requirements were calculated with the single-population-proportion formula $n=Z^2_{1-\alpha/2}p^2p(1-p)/d^2$, using a two-sided 95 % confidence level (Z=1.96) and a margin of error of 5 % (d=0.05). We adopted the burnout prevalence of 58% reported in a recent study,² giving $n=1.96^2\times0.58\times0.42/0.05^2\approx360$. Allowing 10 % for non-response raised the target to 413. After data cleaning, incomplete forms were excluded. The study ultimately analyzed 360 complete questionnaires

Inclusion criteria encompassed students currently enrolled in the medical program, irrespective of gender, study year, or residency status. Exclusion criteria included students with diagnosed psychiatric disorders, those on psychotropic medications, and those unwilling to participate.

Data collection was conducted using a structured online questionnaire distributed via Google Forms. The questionnaire comprised validated scales, including the Big Five Inventory for personality traits, the Perceived Stress Scale for stress assessment, and the Maslach Burnout Inventory for burnout evaluation. Additional demographic and academic data, such as gender, residence (urban or rural), accommodation (on-campus or off-campus), and GPA from the last academic examination, were collected through self-reporting.

Statistical analysis was performed using SPSS software. Descriptive statistics were used to summarize categorical variables in terms of frequencies and percentages. The chi-square test was applied to determine associations between personality traits and demographic, stress, burnout, and academic performance variables. ANOVA was conducted to compare mean differences across multiple groups where applicable. The significance level of p < 0.05 was considered statistically significant.

RESULTS

The study included a total of 360 participants, with a mean age of 20.9 ± 1.6 years, comprising 136 males and 224 females. Most were from urban areas (229), while 131 were from rural backgrounds. The distribution across academic years was fairly balanced, with 98 first-year, 135 second-year, and 127 third-year students. Regarding accommodation, 218 resided on campus and 142 off-campus. Stress levels were low in 126 students, moderate in 118, and high in 116. Burnout was classified as low in 63, moderate in 155, and high in 142 students. GPA was below 3.0 in 121 students, while 239 had a GPA of 3.0 or higher. The most common personality trait was agreeableness (97), followed by conscientiousness (88), openness (81), neuroticism (53), and extraversion (41).

Gender differences were observed in personality traits. Openness was more common in males (43%) than females (10%), while females exhibited higher agreeableness (31% vs. 21%), conscientiousness (29% vs. 17%), and neuroticism (18% vs. 9%). Extraversion was similar across genders.

ANOVA revealed significant differences in GPA, stress, burnout, and study hours across personality traits. GPA was highest among conscientious individuals (3.70 ± 0.20 , p = 0.001), while neuroticism was associated with the highest stress (25.0 ± 8.0) and burnout levels (30.0 ± 10.0) (p = 0.001). On chi-square analysis, Age was significantly

associated with conscientiousness (χ^2 =22.08, p<0.001), agreeableness (χ^2 =9.42, p=0.008), openness (χ^2 =8.83, p=0.012), and neuroticism (χ^2 =15.03, p<0.001), but not extraversion. Study year influenced agreeableness (χ^2 =18.12, p<0.001), conscientiousness (χ^2 =33.07, p<0.001), openness (χ^2 =7.93, p=0.01), and neuroticism (χ^2 =9.42, p=0.008), with personality traits shifting as students progressed academically.

Accommodation type was significantly associated with agreeableness (χ^2 =5.06, p=0.024), conscientiousness (χ^2 =7.22, p=0.007), openness (χ^2 =52.47, p<0.001), and neuroticism (χ^2 =4.41, p=0.035), with off-campus students showing lower agreeableness and conscientiousness. Residence (urban vs. rural) had no significant association with most traits, except for conscientiousness (χ^2 =6.52, p=0.01), which was more prevalent in urban students.

Stress was strongly associated with neuroticism (χ^2 =50.13, p<0.001), conscientiousness (χ^2 =44.57, p<0.001), and agreeableness (χ^2 =76.12, p<0.001). Higher stress levels correlated with neuroticism, while lower stress was linked to conscientiousness and agreeableness. Burnout also had significant associations with all personality traits, particularly neuroticism (χ^2 =26.84, p<0.001), conscientiousness (χ^2 =21.36, p<0.001), and agreeableness (χ^2 =52.89, p<0.001). Higher burnout was observed in neurotic individuals, whereas conscientious students were less likely to report burnout.

GPA was significantly associated with agreeableness (χ^2 =19.59, p<0.001), conscientiousness (χ^2 =10.66, p=0.001), and neuroticism (χ^2 =36.49, p<0.001). Conscientious and agreeable students had higher GPAs, while neuroticism was linked to lower academic performance. No significant associations were found for openness (χ^2 =0.74, p=0.388) or extraversion (χ^2 =29.94, p=0.000).

Table 1: Distribution of demographic and psychological variables among participants

Vari	Number	Percentage			
	Agreeableness	97	26.94		
D 126	Conscientiousness	88	24.44%		
Personality Traits	Openness	81	22.50%		
Traits	Neuroticism	53	14.72%		
	Extraversion	41	11.38%		
Gender	Male	136	37.77%		
Gender	Female	224	62.22%		
Residence	Urban	229	63.61%		
Residence	Rural	131	36.38%		
Accommodation	On-campus	218	60.55%		
Accommodation	Off-campus	142	38.44%		
	Low stress	126	35.00%		
Stress	Moderate stress	118	32.77%		
	High stress	116	32.22%		
	Low burnout	63	17.50%		
Burnout	Moderate burnout	155	43.05%		
	High burnout	142	39.44%		
GPA	>3.0	239	66.38%		
GFA	<3.0	121	33.61%		

Figure 1: Gender Distribution of Study Participants

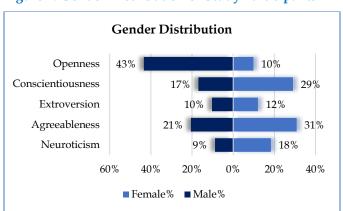


Table 2: Chi-Square analysis of associations between demographic factors, personality traits, stress, burnout, and GPA

Variables	Agreeableness		Conscie	entiousness	ousness Openness			Neuroticism			Extraversion			
Absent	Present χ^2 tes	t Absent	Present	χ² test	Absent	Present	χ² test	Absent	Present	χ² test	Absent	Present	χ² test	
n (%)	n (%) p- valu	n (%)	n (%)	p-value	n (%)	n (%)	p- value	n (%)	n (%)	p- value	n (%)	n (%)	p- value	
Age group														
≤20 years	68 13 9.42 (25.85) (13.40)	70 (25.7	73) 11 (12.5)	22.08	62 (22.22)	19 (23.45)	8.83	61 (19.86)	20 (37.73)	15.00	63 (19.74)	18 (43.90)	13.13	
21-22 years	103 35 (39.16) (36.08) 0.00 8	8* 114 (41.	91) 24 (27.27)	0.000*	97 (34.76)	41 (50.61)	0.012*	114 (37.13)	24 (45.28)	0.000*	124 (38.87)	14 (34.16)	0.001*	
>22 years	92 49 (34.98) (50.51)	88 (32.3	35) $\frac{53}{(60.22)}$		120 (43.01) 21 (25.92)		132 (42.99)	9 (16.98)		132 (41.37)	9 (21.95)		
Gender														
Male	108 28 (41.06) (28.86) 4.48	113 (41.	.54) 23 (26.13)	6.71	77 (27.59)	59 (72.83)	54.65	124 (40.39)	12 (22.64)	6.05	122 (38.24)	14 (34.14)	0.25	
Female	155 69 0.03 (58.93) (71.13)	* 159 (58.	45) 65 (70.45)	0.00*	202 (72.40	$\frac{22}{(27.16)}$	0.00*	183 (59.60)	41 (77.35)	0.01*	197 (61.75)	27 (65.85)	0.61	
Residence														
Urban	164 65 (62.35) (67.01) 0.66	163 (59.	92) 66 (75.0)	6.52	172 (61.64) 57 (70.37)	2.06	214 (69.70)	15 (28.30)	33.47	203 (63.63)	26 (63.41)	0.08	
Rural	99 32 (37.64) (32.98) 0.4 1	109 (40.	07) 22 (25.0)	0.01*	107 (38.35) 24 (29.62)	0.15	93 (30.29)	38 (71.69)	0.000*	116 (36.36)	15 (36.58)	0.97	

Study year													
1 st year	85 13 (32.31) (13.40)	18.12	87 (31.98) 11 (12.5)	33.07	79 (28.31)	19 (23.45)	7.93	78 (25.40)	20 (37.73)	9.42	80 (25.07)	18 (43.90)	7.19
2 nd year		0.000*	111 (40.80) ²⁴ _(27.27)	0.000*	94 (33.69)	41 (50.61)	0.01*	111 (36.15)	24 (45.28)	0.008*	121 (37.93)	14 (34.16)	0.027*
3 rd year	78 49 (29.65) (50.51)	ı	74 (27.20) 53 (60.22)		106 (37.99)	21 (25.92)		118 (38.43)	9 (16.98)		118 (36.99)	9 (21.95)	
Accommodation													
On-campus	150 68 (57.03) (70.10)	5.06	154 (56.61) ⁶⁴ (72.72)	7.22	197 (70.60)	21 (25.92)	52.47	179 (58.30)	39 (73.58)	4.41	192 (60.18)	26 (63.41)	0.15
Off-campus	113 29 (42.96) (29.89)	0.024*	118 (43.38) 24 (27.27)	0.007*	82 (29.39)	60 (74.07)	0.000*	128 (41.69)	14 (26.41)	0.035*	127 (39.81)	15 (36.58)	0.690
Stress													
Low Stress	115 11 (43.72) (11.34)	76.12	72 (26.47) 54 (61.36)	44.57	105 (37.63)	21 (25.92)	50.13	118 (38.43)	8 (15.09)	29.43	94 (29.46)	32 (78.04)	38.71
Moderate Stress	97 21 (36.88) (21.64)	0.000*	91 (33.45) 27 (30.68)	0.000*	66 (23.65)	52 (64.19)	0.000*	107 (34.85)	11 (20.75)	0.000*	(34.79)	7 (17.07)	0.000*
High Stress	51 65 (19.39) (67.01)		109 (40.07) 7 (7.95)		108 (38.70)	8 (9.87)		82 (26.71)	34 (64.15)		114 (35.73)	2 (4.87)	
Burnout													
Low Burnout	57 (21.67) 6 (6.18)	52.89	50 (18.38) 13 (14.77)	21.36	53 (18.99)	10 (12.34)	26.84	58 (18.89)	5 (9.43)	18.40	34 (10.65)	29 (70.73)	91.21
Moderate Burnout			99 (36.39) 56 (63.63)	0.000*	100 (35.84)	55 (67.90)	0.000*	(46.23)	13 (24.52)	0.000*	(46.08)	8 (19.51)	0.000*
High Burnout	74 68 (28.13) (70.10)		123 (45.22) 19 (21.59)		126 (45.16)	16 (19.75)		107 (34.85)	35 (66.03)		138 (43.26)	4 (9.75)	
GPA													
<2.5	106 15 (40.30) (15.46)	19.59	104 (38.23) 17 (19.31)	10.66	97 (34.76)	24 (29.62)	0.74	84 (27.36)	(09.01)	36.49	93 (29.15)	28 (68.29)	29.94
>2.5	157 82 (59.69) (84.53)	0.000*	168 (61.76) ⁷¹ (80.68)	0.001*	182 (65.23)	57 (70.37)	0.388	223 (72.63)	16 (30.18)	0.000*	226 (70.84)	13 (31.70)	0.000*

DISCUSSION

This study examined the prevalence of different personality traits among medical students and their association with stress, burnout, and academic performance. Agreeableness was the most prevalent trait, followed by conscientiousness, aligning with findings by Manohar *et al.*, which suggested that students with high agreeableness are more inclined toward medical professions.¹⁰

The results demonstrated notable variations in personality traits with age. Extraversion declined as students aged, likely due to increasing academic and family responsibilities, consistent with findings by Mammadov *et al.* and Noftle *et al.*^{8,11} However, this contradicts Magan *et al.*, who reported a rise in assertiveness and decisiveness with age.¹² Neuroticism showed a steady decline, reflecting improved emotional stability and coping mechanisms over time. Openness peaked during adolescence and declined in later years as individuals shifted focus from exploration to goal-directed tasks, mirroring Noftle *et al.*'s findings.¹¹

Women scored higher in neuroticism, agreeableness, and conscientiousness, consistent with Britwum *et al.* and Laouiti *et al.*^{13,14} These differences may be attributed to hormonal influences, socialization patterns, and cultural expectations. Higher neuroticism in females may be driven by greater societal pressure and emotional sensitivity, whereas their elevated agreeableness may stem from evolutionary caregiving roles. ^{13,14}

Extraverted and conscientious individuals exhibited better stress management, likely due to strong social support and structured coping strategies, as supported by Manohar *et al.*¹⁰ Neuroticism, on the other hand, was strongly linked to heightened stress, driven by emotional instability and a tendency toward overthinking, consistent with Yusoff *et al.*¹⁵ Interestingly, agreeableness was positively associated with stress, as highly agreeable individuals often prioritize others' needs over their own, leading to emotional exhaustion.¹⁶

Burnout was most strongly associated with neuroticism, reinforcing its link to emotional distress and vulnerability to academic pressure. This aligns with Angelini et al. and Pérez-Fuentes et al., who identified neuroticism as a major risk factor for burnout due to heightened sensitivity to negative stimuli.17,18 In contrast, extraversion and openness were protective factors, with extraverts benefiting from social connectedness and openness fostering resilience through intellectual curiosity. Conscientiousness also reduced burnout risk, as structured individuals are less likely to feel overwhelmed by workload. Interestingly, agreeableness was positively correlated with burnout, consistent with Bahadori et al., suggesting that highly agreeable individuals may sacrifice personal well-being in their efforts to meet social expectations.19

Agreeableness and conscientiousness were associated with academic success, consistent with findings by Sakata *et al.*²⁰ These traits contribute to discipline, responsibility, and collaborative learning, all of which enhance academic achievement. In contrast, neuroticism negatively

impacted performance due to excessive stress and emotional instability, as supported by Gomathi *et al.* and Moti Gelata Sakata *et al.*^{20,21} Extroversion also showed a negative correlation with academic success, potentially due to greater engagement in extracurricular activities over structured academic tasks, as noted by Mammadov *et al.* and Osamika *et al.*^{8,22} However, while some studies have identified conscientiousness as the strongest factor linked to academic achievement,⁸ Our findings emphasize the additional significance of agreeableness. These discrepancies may stem from variations in study populations and cultural contexts.

CONCLUSION

Personality traits significantly shape stress, burnout, and academic performance among medical students. Conscientiousness and agreeableness are linked to academic success, while neuroticism increases vulnerability to stress and burnout. Extroversion and openness show mixed effects, influencing resilience and academic engagement. These insights can inform targeted interventions to enhance student well-being and performance in medical education.

LIMITATIONS

While this study highlights the influence of personality traits on stress, burnout, and academic performance, its generalizability may be limited by cultural and socioeconomic factors. The reliance on self-reported data introduces potential response bias, and the cross-sectional design prevents establishing causality. Despite these limitations, the findings provide valuable insights for tailored interventions in medical education.

SUGGESTIONS / RECOMMENDATIONS

Stress management training for neurotic individuals, structured productivity plans for conscientious students, and mindfulness programs for agreeable individuals could enhance well-being and resilience. Encouraging peer support networks may further benefit extroverts, fostering a more adaptive learning environment.

CONFLICT OF INTEREST / DISCLOSURE

None.

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