The Relationship Between Big Five Personality Traits and Academic Performance of Asian Medical Students

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Abstract

Introduction : Personality traits have been shown to influence the individual's critical thinking, learning strategies, and motivation, resulting in the overall student's academic performance. Academic performance is an important factor among medical students to ensure their success in long-term medical education, training and work performance as medical doctors. This study aims to evaluate the relationship between personality traits and academic performance among medical students.

Methods : The study was conducted among preclinical medical students from the Medical Schools of Pelita Harapan University, Indonesia. The personality traits were assessed using the NEO Five-Factor Inventory-3 (NEO-FFI-3), which consists of 60 items assessing the five personality traits (neuroticism, extraversion, openness, agreeableness, and conscientiousness). The academic performance was evaluated using the cumulative grade point average (CGPA) score.

Results : A total of 224 participants were included in this study. The mean age of the participants was 19.8 years old (SD±1.3). Neuroticism was the predominant personality trait among medical students and was found to be negatively associated with CGPA in univariable and multivariable analyses ($p<0.05$).

Conclusion : This study reveals that neuroticism personality traits are prevalent among preclinical medical students and adversely affect their academic performance. Understanding the general personality traits present among medical students and its relationship with academic performance can provide valuable input for further medical education programme development.

Introduction

Academic performance relies on cognitive and non-cognitive attributes, including motivation, learning strategies and environments, socioeconomic status, health status, and personality traits.[1] Personality traits are one of the non-cognitive factors that stands out as a pivotal element that influences educational success.[2,3] Previous studies have underscored the substantial impact of personality traits on critical thinking abilities, learning strategies, and overall academic motivation.[4-7]

The Big Five model of personality traits has emerged as an international,

well-established framework for understanding the relationship between individual personality traits and various academic behaviours and educational outcomes.[2,3] Conscientiousness is a personality trait characterized by being self-disciplined, organized, and prioritizing learning tasks, and has consistently been shown as a stable predictor of academic performance.[2,3] The weak to moderate positive correlation of openness personality traits with academic performance has been shown in prior studies.[2,3] The findings for the other Big Five personality traits (agreeableness, extraversion, and neuroticism) are mixed and inconclusive for showing a significant correlation with academic performance.[2,3,8]

However, most previous studies examining the relationship between personality traits and academic performance were carried out in Western countries, in which differences in social, economic, and political contexts that have been known resulted in the geographical variation in personality traits.[2,9] Thus, the relationship between personality traits and academic performance in the Asian population is still unclear. In this study, we aim to explore the association between the personality traits of the Big Five model and academic performance among medical students at the University of Pelita Harapan, one of the prominent private medical schools in the Southeast Asia region, Indonesia.

Methods

Study design, participants, and procedure

This cross-sectional study was performed between December 2022 and May 2023. It was approved by the Pelita Harapan University research ethics committee (No: 197/K-LKJ/ETIK/XI/2022). Participants were preclinical medical students in the Faculty of Medicine of Pelita Harapan University. They were asked to complete the questionnaire disseminated through Google Forms or social media platforms like Line and WhatsApp.

Data collection

The study sample size was determined using Slovin's formula, described as follows: $N/(1+Ne^2)$, where N is the population number and e is the margin of error in percentage value. According to the faculty's database, until January 2022, the total of preclinical medical students at the Faculty of Medicine of Pelita Harapan University was about 500 individuals. This number was used as the total number of populations in Slovin's formula, and the margin error was set as 5%. As a result, this study's minimum required sample size was 222 individuals. Convenience sampling was used to select the participants. Written informed consent was obtained from the

individuals who decided to participate in the study.

The academic performance was evaluated using the cumulative grade point average (CGPA) score. The CGPA score and demographic information were collected using a questionnaire. The individual's personality trait was evaluated using the NEO Five-Factor Inventory-3 (NEO-FFI-3) consisting of 60 items to assess the five personality traits according to the five-factor models, namely, neuroticism (N), extraversion (E), openness (O), agreeableness (A), and conscientiousness (C). The answer format for each item is scored on a five-point Likert scale response, ranging from 0-4 or 4-0 for reverse-scored items. The participants are instructed to circle the correct box for each item: SD if they strongly disagree, or the statement is definitely false; D if they disagree or the statement is mostly false; N if they are neutral on the statement; if they cannot decide, or if the statement is about equally true or false; A if they agree or the statement is mostly true; SA if they strongly agree, or the statement is definitely true. The score of each personality trait was calculated by summing the 12 items that were allocated to evaluate each personality trait and converted into standardized T-scores.

Statistical analysis

The numeric variables were described as mean with the standard deviations (SD), and the nominal variables were shown as counts and percentages. GraphPad Prism (version 9.0) was used for statistical analysis and graph drawing. In all analyses, a two-tailed p-value of less than 0.05 was considered statistically significant.

Results

A total of 224 participants were included in this study, consisting of 59 (26%) male and 165 (74%) female participants. The mean (SD) age of participants was 19.8 (1.3). The T-score results of five personality traits from all participants are shown in **Table 1**. Neuroticism was the predominant personality trait for this study participant, with the highest mean (SD) T-score results being 68.2 (5.1), and most participants (72.3%) were amongst the very high groups of T-score categories.

Table 1. The profile of participants' personality traits

NEO-FFI	T-scores categories	N (%)	T-scores
Agreeableness	Very low	0 (0)	59.9 (6.0)
	Low	4 (1.8)	
	Average	44 (19.6)	
	High	142 (63.4)	
	Very high	34 (15.2)	

Conscientiousness	Very low	0 (0)	59.7 (5.5)
	Low	0 (0)	
	Average	38 (17.0)	
	High	156 (69.6)	
	Very high	30 (13.4)	
Extraversion	Very low	0 (0)	60.3 (8.4)
	Low	10 (4.4)	
	Average	55 (24.6)	
	High	73 (32.6)	
	Very high	86 (38.4)	
Neuroticism	Very low	0 (0)	68.2 (5.1)
	Low	0 (0)	
	Average	3 (1.3)	
	High	59 (26.4)	
	Very high	162 (72.3)	
Openness	Very low	0 (0)	63.2 (5.4)
	Low	0 (0)	
	Average	14 (6.3)	
	High	135 (60.3)	
	Very high	75 (33.4)	

The difference in mean T-scores between females and males was analysed using the Mann-Whitney U test. Data are presented in mean (SD), **p<0.01, ns; not significant.

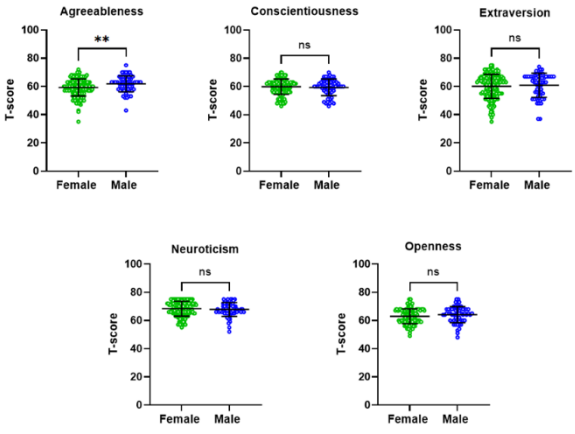

Figure 1. Comparison of personality traits between female and male

Male subjects had a higher T-score of agreeableness personality traits than female subjects (mean T-score: 61.8 vs. 59.2, p<0.01), and no significant difference between females and males was observed for the other T-score personality traits (**Figure 1**). Of 224 participants, 198 (88.4%) participants had a Cumulative Grade Point Average (CGPA) of 3 or higher, whereas 26 (11.6%) participants had a CGPA below 3.

The difference in mean T-scores between participants with CGPA<3 and CGPA≥3 was analysed using the Mann-Whitney U test. Numerical data are presented in mean (SD), *p<0.05, ns; not significant.

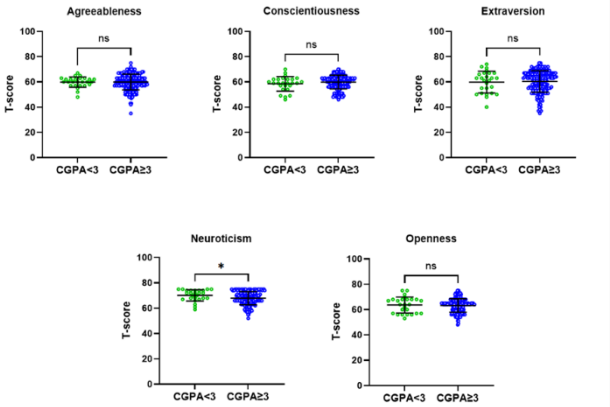

Figure 2. Comparison of personality traits according to Cumulative Grade Point Average (CGPA) results.

As shown in **Figure 2**, participants with CGPA<3 had a significantly higher mean T-score of neuroticism personality traits compared to participants with CGPA≥3 (70.2 vs. 67.9, P<0.05). No significant difference in the mean T-scores between participants with CGPA<3 and CGPA≥3 was observed for the

agreeableness, conscientiousness, extraversion, and openness personality traits (**Figure 2**). Furthermore, on the multivariable analysis, the higher T-score of neuroticism personality trait remained the significant independent factors associated with CGPA score <3 (**Table 2**).

Table 2. Univariable and multivariable analysis of variables associated with CGPA score <3

	Univariable			Multivariable		
Variables	OR	95% CI	p-value	OR	95% CI	p-value
Age	1.06	0.78-1.41	0.65	1.05	0.74-1.42	0.74
Gender (Female vs. male)	0.78	0.32-2.00	0.58	0.68	0.26-1.82	0.42
Personality traits						
Agreeableness	0.99	0.93-1.07	0.95	0.97	0.91-1.05	0.56
Conscientiousness	0.95	0.89-1.02	0.22	0.94	0.87-1.01	0.13
Extraversion	0.99	0.94-1.04	0.76	0.97	0.93-1.03	0.40
Neuroticism	1.10	1.01-1.21	0.03*	1.12	1.03-1.25	0.02*
Openness	1.01	0.94-1.09	0.71	1.02	0.94-1.11	0.51

Abbreviations: OR, odds ratio; CI, confidence interval; *p<0.05

Discussion

The present study evaluated the association between personality traits and academic performance among preclinical medical students. The academic performance was measured using the CGPA, which was calculated based on all GPAs obtained by the students throughout their learning process. This score will describe medical students' long-term academic performance that can be affected by their personality traits. The findings of this study support the hypothesis that personality trait is significantly associated with academic performance.[2,8,10,11] In line with previous studies,[10,11] our study found that the neuroticism personality trait was associated with lower academic performance. Additionally, we observed that many preclinical medical students had T-scores under very high neuroticism personality traits.

Several features of the neuroticism personality trait that adversely impact academic performance have been described. First, individuals with neuroticism are prone to emotional instability, characterized as being anxious, emotional, nervous, and jealous, resulting in difficulty in handling stress, concentrating during the learning process, and tend to procrastinate academically.[10, 12-14] Second, individuals with neuroticism are positively associated with the avoidance coping strategy, in which an individual tries to avoid or escape from a stressor rather than deal with it.[15,16] The avoidance coping strategy has been considered a maladaptive coping strategy because it often generates more significant psychological distress.[17] As a result, individuals with high neuroticism

are more prone to experience negative feelings, such as depression and anxiety, that interfere with their learning capacity, disrupt their ability to overcome obstacles or failures during the medical education process, and negatively impact their life quality.[18] Third, individuals with neuroticism tend to have low self-efficacy, possibly due to minimal confidence and low self-esteem, making them lack motivation to learn and participate in academic activities.[18-20]

Furthermore, due to emotional instability, poor coping strategy, and low self-esteem, individuals with neuroticism personality traits tend to avoid the risk of making mistakes in learning tasks. Therefore, they prefer the surface learning approach, which is characterized by minimal motivation to meet the requirement and memorization as a primary strategy to produce the results.[21] Since the problem-based learning (PBL) educational approach has been widely implemented in medical education and emphasizes the constructive, self-directed, collaborative, and contextual learning process, the PBL learning method will likely not greatly support the learning process for individuals with high neuroticism.[22, 23]

Although females have been found to score higher than men in neuroticism, [24, 25] we have not observed a significant difference between females and males in neuroticism personality trait scores. Moreover, in contrast with previous studies,[26, 27] the agreeableness personality trait related to behaviours of altruism was scored higher in men than women. The subtle impact of gender variations on personality traits has been reported,[28, 29] and external factors, such as environmental influences and parenting, more determined the personality trait development and stability.[30, 31]

Limitations in the current study can be attributed to the cross-sectional study design for establishing causal relationships between personality traits and academic performance. However, it is worth noting that the neuroticism personality trait consistently affects academic performance, as described in previous findings.[10, 11] The assessment of personality traits and academic performance is self-reported. These self-reported data are more likely to introduce potential response bias, as participants may offer socially desirable responses that are not actual and may recall the information inaccurately. Moreover, the current study does not evaluate factors that may impact academic performance more than personality traits, such as motivation, study habits, social environment, and cognitive factors. On the other hand, the strength of this study is that the homogenous samples, therefore, moderator variables like age and education level, may not interfere with the

association between personality traits and academic performance.

Conclusion

In conclusion, neuroticism personality traits have been found in a large number of preclinical medical students and negatively impact their academic performances. The findings of this study provide significant input for those involved in medical education to deliver the learning subjects, design a more conducive medical curriculum and develop the counselling program for preclinical medical students to improve their academic performance and well-being.

Conflict of interest statement

The authors have declared no conflicts of interest.

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