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Original Article

Assessment of Personality Traits and Their Changes Over the Undergraduate Medical Course: A Pseudo-Longitudinal Analysis Among Indian Medical Students

Alapan Bandyopadhyay,[1] Arup J. Rout,[2] Mabel Das,[3] Debajyoti Das.[3]

Abstract

Background: Personality traits of medical students have been shown to affect both their academic performance as well as their capabilities to develop rapport with patients, with evidence that they change through the medical course. This research aimed to explore the personality traits of undergraduate medical students and assess whether personality parameters changed throughout the medical education course. **Methods:** A pseudo-longitudinal design was utilized for this study. A total of 346 MBBS. students studying in a Medical College of Eastern India were recruited at different stages of their coursework. These participants were similar in their sociodemographic makeup and differed only with respect to their year of MBBS study. The personality characteristics were assessed among these participants using the short-form revised Eysenck personality inventory. **Results:** The minimum possible score for each subscale was 0, and the maximum was 12. Mean scores of the participants for the extraversion, neuroticism, psychoticism, and lie scales were 6.17±3.09, 7.51±3.16, 3.40±1.61, and 4.98±2.48, respectively. Females scored significantly higher in neuroticism and lie dimensions. There were significant differences of psychoticism scores between participants with rural and urban backgrounds. A significant negative trend was seen from the first to the final year of study in the extraversion dimension (Kendall's tau =-0.094, p-value=0.025). **Conclusion:** Medical students in India scored higher on the neuroticism and lower on the psychoticism scales of personality with a trend of increasing extraversion over the years of their coursework.

Key Words: Extraversion (Psychology); Medical Education; Neuroticism, Personality; Social Desirability (Source: MeSH-NLM).

Introduction

A physician's mannerism and personality help build rapport with their patients. It has been observed that physicians with personality characteristics complimentary to that of their patients reported better clinical outcomes and vice versa.[1] Therefore, it is important to assess and understand the personality characteristics of medical students as they enroll in and progress through their medical coursework to ensure better doctor-patient interactions in the future.

Studies conducted internationally have shown that students who opt to pursue medical education differ significantly in personality traits as compared to their peers studying in other fields such as engineering, commerce, and the arts. For example, Lievens F. et al. reported that medical students in Belgium were among the highest scorers in extraversion when compared to other majors.[2] Another study done in Singapore by Lean L.L. et al. found that medical students scored lower in neuroticism and higher in extraversion.[3] It has also been observed that over time, the personality traits of a person can change due to the influence of external factors.[4] Thus, knowledge about the baseline personality traits of medical students and their changes throughout the coursework can not only contribute more information about the people entering the stream, but also provide valuable insights to the traits that are amenable to change during the course of their study. This knowledge can be translated into curriculum development and integration of skills training that would help medical students develop a stronger rapport with their patients, in the future, as physicians.

However, data on the personality characteristics of medical students is difficult to obtain in the Indian subcontinent. In India, there is no documentation or assessment of personality parameters of medical students during their enrollment to a medical course. It was noted that only one study explored the personalities of medical students at the time of admission.[5] Furthermore, research regarding the gradual change of personality characteristics of college students as their courses progress is scarce,[6] with no research investigating this particular aspect among medical students of India. This study aimed to assess the prevalent personality traits of medical students enrolled in the MBBS course in an Indian medical institute and to

[1] MBBS. Post Graduate (MD) Student. Department of Community Medicine, North Bengal Medical College and Hospital, Darjeeling, India

[2] MD. Assistant Professor. Department of Community Medicine, North Bengal Medical College and Hospital, Darjeeling, India

[3] MBBS. Third Year Medical Student. North Bengal Medical College and Hospital, Darjeeling, India

About the Author: *Alapan Bandyopadhyay is currently a third-year post-graduate trainee of North Bengal Medical College, Darjeeling, India of a 3.5 years M.D program in Community Medicine and Public Health. He is also a recipient of the Indian Association of Preventive and Social Medicine West Bengal Chapter's Best Original Research Paper award for the year 2021.*

Correspondence:

Alapan Bandyopadhyay

Address: D-5 Quarter Sushruta Nagar, Dist, Siliguri, West Bengal 734012, India

Email: alapanbanerjee96@gmail.com

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determine any existing change in personality traits from the first to the final year of the course.

Methods

In this study, an observational, descriptive study with a pseudo-longitudinal design was conducted at a tertiary care teaching hospital located in the state of West Bengal of Eastern India from April to June 2020.[7] Medical students enrolled in the MBBS course at the hospital formed the study sample.

The pseudo-longitudinal design of the current study enabled the identification trends in personality traits from the first through the final year MBBS students. Pseudo-longitudinal studies are performed when it is not possible to follow the same individuals over time. Then, researchers can carry out a comparison of cross-sectional studies of different groups of students at different stages of development (with regards to the age, proficiency, and exposure to certain conditions). This generates an effect where "time" (which is accounted for directly in longitudinal studies) is measured by a proxy such as proficiency level or age. These groups, while consisting of different participants, often share some characteristics to have homogeneity and hence, mimic a cohort. Pseudo-longitudinal or quasi-longitudinal studies are uncommon, but not unknown in medical sciences.[9-10]

The selection procedure for MBBS courses in India is merit-based, multiple-choice, all-India examination. This ensures that similar groups of students are admitted to the course every year. Due to the nature of the exam itself as well as the college-allotment processes (which are online and choice-based), each batch of students entering a medical college approximates a random sample drawn from all medical students in the country. Therefore, the personality scores obtained by a cross-sectional assessment of Indian medical students in different course years is equivalent to assessing random samples of the country's medical student population. This provides data that is fairly similar to that observed in a true longitudinal study design, where a single random sample of undergraduate medical students is followed throughout the course. This made a pseudo-longitudinal design a viable study design for the current research.

Data was collected from the participants using an anonymized, self-administered online questionnaire consisting of two parts. The first part contained eight sociodemographic questions followed by the short-form revised Eysenck personality questionnaire (EPQR-S).[11] The latter consisted of forty-eight yes/no questions that assessed individual personalities across four distinct dimensions: extraversion-introversion, neuroticism-stability, psychoticism, and lie dimensions. Each dimension was assessed by twleve yes/no questions. Participants who scored less than six were considered to have a low score in that particular dimension of interest, and a high score if scored more than six. For example, a participant scoring two out of twelve in the extraversion-introversion dimension was considered to be more introverted than extraverted. The questionnaire also included an Instructional Manipulation Check (IMC) question to check whether the participants were paying attention to individual questions.[12] The IMC included was a yes/no question where only the participants who responded 'yes' were included. Participants who answered 'no' were not included in the analysis.

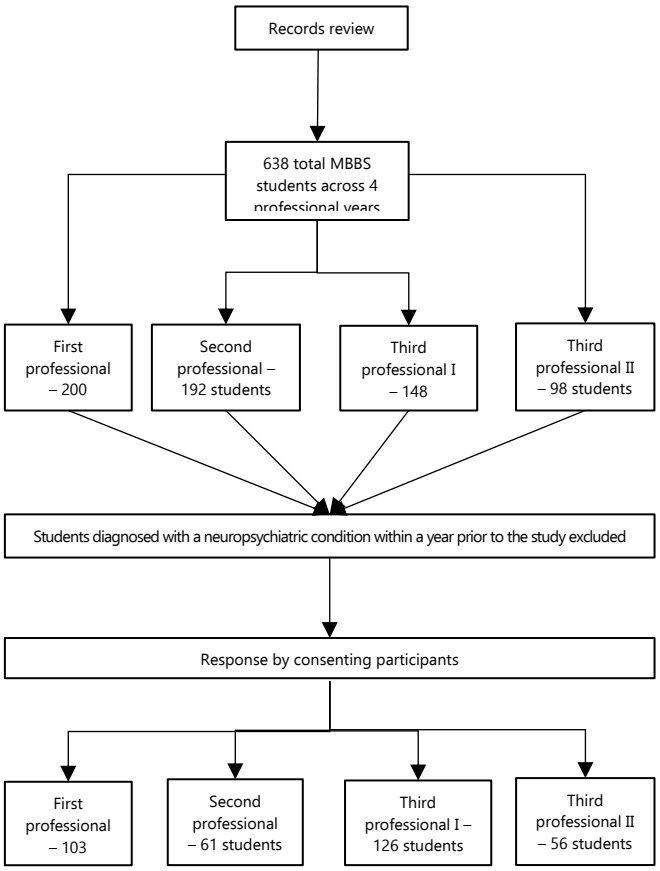
Review of the records showed that there was a total of 638 MBBS students in the medical college at the time of the study. Of them, 200 students (31.3%) were enrolled in their first professional year, 192 students (30.1%) in the second professional year, 148 (23.2%) students in third professional year (Part – I), and 98 students (15.4%) in their final year (Third Professional Year Part – II). All students were selected for the MBBS course through a pan-India, multiple choice question examination. Therefore, we approached all 638 students to participate in the study. Those who were unwilling or incapable of giving informed consent, and those that were diagnosed with a neuropsychiatric condition in the year prior to the study were excluded from the study.

This study aimed to include the total student population. To that effect, a complete enumeration sampling technique was employed for the study. Of the 638 enrolled students, a total of 391 students provided informed consent to participate in the study. A total of 39 students who had been diagnosed with neuropsychiatric conditions such as depressive disorders, anxiety disorders, cyclothymia, and bipolar disorders in the past one year (6 students in their first professional year, 9 students in their second professional year, 13 students in their third professional year part I, and the remaining 11 students in their final year) were excluded. This resulted in a final sample size of 352 participants (***Figure 1***).

Personality parameters of the participants as per the EPQR-S questionnaire (extraversion, introversion, neuroticism, psychoticism, and lie) in each course year were the outcome variables of the study. Socio-demographic factors of the study population like age, sex, socioeconomic status, and residence, as well as the year of study, for each participant were considered as explanatory variables.

The data collected was sorted in a spreadsheet. For statistical analysis, the Statistical Package for the Social Sciences (SPSS) version 25 (IBM corp.) was used. Descriptive statistics, such as frequency, percentage, mean, median, and standard deviation were applied to observe the trend in the data collected. The scores of each subscale of the EPQR-S were found to be non-normally distributed as per the Shapiro-Wilk's test. Therefore, the median scores were considered as the measure for central tendency and non-parametric tests were used for analyses. For non-normally distributed variables, Jonckheere-Terpstra test for trends and Kendall's tau-b test for correlation were used to identify trends in the observed data and the direction and strengths, respectively. The analysis of categorical variables was performed using Chi-Square test. All statistical tests performed were two-tailed, with a statistical significance level considered as *P*-value of <0.05.

Figure 1. Data Collection Protocol for the Study.



This study was conducted after obtaining formal ethical clearance from the Institutional Ethics Committee of the North Bengal Medical College and Hospital, IEC/NBMC/2020-21/11.

Results

Of the 352 participants, 6 (1.7%) answered the IMC question as 'no' and were therefore excluded, resulting in 346 respondents; of which, 167 (48.3%) were men (***Table 1***). The mean age of the participants was 20.99 ± 1.46 years. The majority of the respondents were in their pre-final year of the course (3rd Professional Part I) (36.4%), followed by the first years, second years, and final years, respectively. 198 (57.2%) of the participants were from an urban residential background. When the socio-economic background of the participants was considered, a majority came from families belonging to the Class I (upper class) of the Modified B. G. Prasad Scale for Socioeconomic status (SES) updated with the All-India Consumer Price Index (AICPI) for January 2020. It was followed closely by the Class II (29.2%), III (13.6%), IV (13.6%), and then, Class V (9.3%). All respondents were unmarried. The participants included in the study differed in their ages, which showed a statistically significant increase over the course years (*P*-value = 0.00003*, Pearson's r = 0.712). However, no statistically significant differences between the analyzed groups with respect to sex, socioeconomic status, and residence, were observed (***Table 1***).

Table 1. Table Showing the Socio-demographic Characteristics of the Study Participants (n=346).

Parameters n (%)	Total	1st Professional	2nd Professional	3rd Professional Part I	3rd Professional Part II	p-value
	346 (100)	103 (29.77)	61 (17.63)	126 (36.42)	56 (16.18)	-
Age (Years)						
Mean	20.99	19.51	20.92	21.61	22.39	<0.001*
SD	1.46	0.97	1.14	1.03	0.95	
Sex						
Male	167 (48.27)	51 (49.52)	31 (50.82)	60 (47.62)	31 (55.36)	0.91
Female	179 (51.73)	52 (50.48)	30 (49.18)	66 (52.38)	25 (44.64)	
Socioeconomic Status						
I (>₹7532)	119 (34.39)	39 (37.87)	16 (26.23)	43 (34.12)	21 (37.50)	0.82
II (₹3766 - ₹7532)	101 (29.19)	25 (24.27)	19 (31.15)	41 (32.54)	16 (28.57)	
III (₹ 2260 - ₹3765)	47 (13.58)	11 (10.68)	9 (14.75)	19 (15.08)	8 (14.29)	
IV (₹1130 - ₹2259)	47 (13.58)	18 (17.47)	10 (16.39)	13 (10.32)	6 (10.71)	
V (<₹1130)	32 (9.26)	10 (9.71)	7 (11.48)	10 (7.94)	5 (8.93)	
Residence						
Urban	198 (57.23)	60 (58.25)	37 (60.66)	67 (53.18)	34 (60.71)	0.69
Rural	148 (42.77)	43 (41.75)	24 (39.34)	59 (46.82)	22 (39.29)	

Legend: *Statistically significant

It was observed that women scored significantly higher than men in the neuroticism (Mann-Whitney U test statistic = -3.783, *P*-value=0.000) and lie subscales (Mann-Whitney U test statistic = -3.364, *P*-value=0.001). There was no difference in the scores with respect to the participants' socioeconomic status. However, a statistically significant difference in psychoticism scores between participants hailing from rural and urban backgrounds (Mann-Whitney U test statistic = 2.342, p-value=0.019) was observed (***Table 2***).

A Jonckheere Terpstra test for trends was used to determine any existing trend in scores of each personality subscale. It was found that there was a significant negative trend in the extraversion scores from the first to the final years (TJT = 19,306.5, z = -2.235, Kendall's tau-b correlation coefficient= -0.094, p-value=0.025). However, no significant trend was observed in the other subscale scores (***Table 3***).

Discussion

Personalities are amenable to change depending on the environment.[4] Over the course of their medical training, certain personality traits among medical students may develop or change from the day of enrollment. It can be postulated that this could be due to increased stress, length and difficulty of course, or from increasing exposure to clinical scenarios involving significant mortalities and morbidities. Prior studies have provided some evidence in favor of this assertion, such as Gough H.G. et al. whose study found significant changes in personality traits as medical students advance in the years of their study. A study conducted in Malaysia found that final year medical students had lower scores in neuroticism as compared to students enrolled in other years. A longitudinal study performed on pharmacy and medical students of Malta also reported the shifting of certain personality traits from their baseline at the time of enrollment.

Background characteristics of the participants

One of the primary assumptions of a pseudo-longitudinal design is that the groups selected for the study should be similar to each other in their background characteristics, except for the time of exposure to the risk factor under observation.[8] In this study, this assumption was corroborated as the analysis of the different socio-demographic variables showed that the four primary groups of students had similar socio-demographic characteristics except for their ages, which, as expected, increased from the first to final years.

Neuroticism

It was found that medical students scored on the higher end of the neuroticism scale, with a median score of 8. This is higher than the median score of 5 reported by Kuriata et al. in their study done in Poland, and differs from the findings of Lean et al. in Singapore, who reported medical students to be less neurotic as compared to their non-medical peers.[3] This discrepancy, compared to international research, needs to be explored in detail, especially in the Indian context, as there are conflicting reports of the effect of higher neuroticism on the performance of medical students in their course. The higher scores of neuroticism among medical students can be explained by the unique and highly competitive entrance examinations to the medical courses, where competitiveness and cognitive function are rewarded. The fact that neuroticism has been positively correlated with competitiveness as well as academic achievement in medical schools also supports this assumption. However, the significantly higher scores of women in the neuroticism subscale than their male counterparts is in line with previous research done on this subject.[20]

Social Desirability

Another finding of male-female difference in personality traits was seen in the case of the lie subscale scores, where women scored significantly higher than men. Social desirability bias, the factor assessed by the Eysenck lie subscale, is complex in its

Table 2. Table Showing the Differences in Personality Traits and Demographic Characters of Participants (n=346).

Characters	Extraversion (median)	p[a]	Neuroticism (median)	p[a]	Psychoticism (median)	p[a]	Lie (median)	p[a]
Sex								
Female	7	0.147	9	0.000*	3	0.259	6	0.001*
Male	6		7		3		4	
Socioeconomic Status								
I	6		8		3		5	
II	7		8		3		5	
III	7	0.676	9	0.454	4	0.971	6	0.51
IV	6		7		3		5	
V	6		7		3		5	
Residence								
Urban	6	0.831	8	0.656	3	0.019*	5	0.323
Rural	7		8		4		5	

Legend: [a] Kruskall-Wallis H test and Mann-Whitney U test for independent samples, wherever appropriate. *Statistically significant

Table 3. Table Showing the Difference in Subscale Scores of Participants According to their Academic Year of Study (n=346).

Subscale Score	Total	Academic Year (n) 1st Professional	2nd Professional	3rd Professional Part I	3rd Professional Part II	τb[a]	p-value
	(346)	(103)	(61)	(126)	(56)		
Extraversion							
Mean	6.17	6.54	6.46	6.02	5.52		
SD	3.09	3.15	3.30	2.99	2.92	-0.094	0.025*
Median	6	7	7	6	5		
Neuroticism							
Mean	7.51	7.36	7.16	7.66	7.80		
SD	3.16	3.19	3.29	3.22	2.60	0.040	0.341
Median	8	8	8	8	8		
Psychoticism							
Mean	3.40	3.52	3.13	3.43	3.39		
SD	1.61	1.78	1.49	1.63	1.73	-0.004	0.921
Median	3	3	3	3	3		
Lie							
Mean	4.98	5.14	5.31	4.62	5.13		
SD	2.48	2.58	2.22	2.48	2.55	-0.041	0.339
Median	5	5	5	4	5		

Legend: [a]Kendall's tau-b correlation coefficient. *Statistically significant

interpretation and association with the other three subscales. However, a distinct relationship between the Eysenck neuroticism and the lie subscales has been identified. Jackson and Francis demonstrated that people who scored high in the neuroticism subscale also had high scores in the lie subscale, indicating a higher social desirability bias.[21] Likewise, it was expected that women, who scored higher in the neuroticism scale would also do the same in the lie scale, an assumption that was reinforced by the current study.

Psychoticism

It was found that psychoticism was low in medical students across all academic years, implying lower aggression, recklessness, and impulsiveness. However, even at that low score threshold, participants with an urban background scored significantly higher than their rural counterparts. This is consistent with previous research that suggested a link between urbanicity and risk for psychosis, a feature represented by higher psychoticism scores.

Introversion-extraversion

With a minimum score of 0, a maximum score of 12, and a median score of 6, it can be generalized that medical students are equally likely to be introverted as they are to be extraverted. However, the subgroup analyses showed that a significant trend existed towards introversion from the first through the final years. This could be due to increased stress levels and increased exposure to significant morbidities and mortalities as students advance through course. Prior researches have found that with increased clinical exposure, medical students become less empathetic, as they suffer from increased stress levels and distress associated with it. Some authors explained this negative coping mechanism as a result of medical students having to deal with these stressors alone, which lead to a sense of detachment, increased carefulness, and anxiety, which are the characteristics of introversion.[24]

Since this study was conducted with participants who volunteered, the data collection was prone to volunteer bias, which could have influenced the obtained results. Furthermore, the absence of a control group further limits this study to only describing the observed personalities among medical students, without any comparisons to non-medical students. Finally, a personality change over the years can be best observed by a prospective design; although the pseudo-longitudinal design of this study aimed to mimic a prospective design. It is less effective than a true longitudinal design as this study substituted a single group followed-up over time with similar group data examined with time taken as a proxy. However, even with these limitations, to our knowledge, this is the first study that analyzed the personality traits of undergraduate MBBS students in India. This is also the first study that observed the trends of change of those personality traits throughout the course years of the MBBS program. The main strength of the study was the pseudo-longitudinal research design, which made trends analyses possible.

It was found that medical students in India, without overt psychiatric illnesses, scored higher in neuroticism and lower in the psychoticism dimension of the Eysenck Personality Inventory. Furthermore, there was a positive trend in introversion from the first to the final years of their study. Women were more likely to have personalities rich in the neuroticism and social desirability traits than men.

Summary – Accelerating Translation

Title: Assessment of Personality Traits and Their Changes Over the Undergraduate Medical Course: A Pseudo-longitudinal Analysis among Indian Medical Students

Main problem to solve: What kinds of personalities do Indian students entering the undergraduate medical course possess? Do their personalities change as they progress through their course?

Aim of the study: This research was conducted with an aim of identifying the most common personality traits among MBBS students enrolled at an Indian medical institute and to observe any changes in their personality traits from the first to the final years of the MBBS course.

Methodology: A descriptive, pseudo-longitudinal study was conducted. A personality assessment questionnaire was completed by MBBS students in different academic years. Their personality traits were assessed under four parameters: extraversion-introversion, neuroticism, psychoticism, and lie or social desirability. Each parameter was assessed by a scoring system, ranging from 0 to 12. After the relevant data was collected, statistical analyses were applied to determine which personality traits were the most commonly observed among the students. Furthermore, personality traits were also analyzed to find out whether or not there was any significant changes in the traits of medical students over the course-years.

Results: It was observed that medical students scored on the higher end of the neuroticism trait and lower on the psychoticism and social desirability (lie) trait, and were equally likely to be introverted as they were extroverted. However, women scored much higher than men in the neuroticism trait, as well as in the social desirability parameter.

As for the trends of change of personality traits over the years, only the extraversion trait showed any change. It was seen that as the medical students progressed through their coursework, they become more introverted. This has been explained by some authors a result of a negative coping mechanism, where the students become more detached and anxious in response to the various stressful situations that they experience in their course of study.

Conclusion: Undergraduate medical students in India have personalities high in neuroticism and low in psychoticism and social desirability traits. However, as they progress through their MBBS course, they become more introverted as compared to their time of enrollment.

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