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

3

4 **Article type:** Original Article

5

6 **Author names:**
7 1. Alapan Bandyopadhyay
8 2. Arup Jyoti Rout
9 3. Mabel Das
10 4. Debajyoti Das

11

12 **Degrees and Affiliations:**
13 1. MBBS. Post Graduate (MD) Student. Department of Community Medicine, North Bengal Medical
14 College and Hospital, Darjeeling, India
15 2. MD. Assistant Professor. Department of Community Medicine, North Bengal Medical College and
16 Hospital, Darjeeling, India
17 3. MBBS. Third Year Medical Student. North Bengal Medical College and Hospital, Darjeeling, India
18 4. MBBS. Third Year Medical Student. North Bengal Medical College and Hospital, Darjeeling, India

19

20 **ORCID (Open Researcher and Contributor Identifier):**
21 https://orcid.org/0000-0002-7004-4901
22 https://orcid.org/0000-0002-1353-8489
23 https://orcid.org/0000-0001-9613-1889
24 https://orcid.org/0000-0003-1898-6544

25

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

30 **Corresponding author email:** alapanbanerjee96@gmail.com

33 **Conflict of interest statement by authors:** The authors would like to declare no known conflicts of interest

34 **Compliance with ethical standards:** The current study was conducted after obtaining proper ethical clearance
35 from the Institutional Ethics Committee of the North Bengal Medical College and Hospital. [IEC/NBMC/2020-
36 21/11]

37 **Authors Contribution Statement:**

| Contributor Role | Role Definition | Authors | | | | | |
|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| **Conceptualization** | Ideas; formulation or evolution of overarching research goals and aims. | X | X | | | | |
| **Data Curation** | Management activities to annotate (produce metadata), scrub data and maintain research data (including software code, where it is necessary for interpreting the data itself) for initial use and later reuse. | X | | | | | |

| | | | | |
|---|---|---|---|---|
| **Formal Analysis** | Application of statistical, mathematical, computational, or other formal techniques to analyze or synthesize study data. | X X X | | |
| **Funding Acquisition** | Acquisition of the financial support for the project leading to this publication. | - - - | | |
| **Investigation** | Conducting a research and investigation process, specifically performing the experiments, or data/evidence collection. | X   X X | | |
| **Methodology** | Development or design of methodology; creation of models | X | | |
| **Project Administration** | Management and coordination responsibility for the research activity planning and execution. |   X | | |
| **Resources** | Provision of study materials, reagents, materials, patients, laboratory samples, animals, instrumentation, computing resources, or other analysis tools. |    X X | | |
| **Software** | Programming, software development; designing computer programs; implementation of the computer code and supporting algorithms; testing of existing code components. | X | | |
| **Supervision** | Oversight and leadership responsibility for the research activity planning and execution, including mentorship external to the core team. |   X | | |
| **Validation** | Verification, whether as a part of the activity or separate, of the overall replication/reproducibility of results/experiments and other research outputs. |    X X | | |
| **Visualization** | Preparation, creation and/or presentation of the published work, specifically visualization/data presentation. | X X X X | | |
| **Writing – Original Draft Preparation** | Creation and/or presentation of the published work, specifically writing the initial draft (including substantive translation). | X | | |
| **Writing – Review & Editing** | Preparation, creation and/or presentation of the published work by those from the original research group, specifically critical review, commentary or revision – including pre- or post-publication stages. |   X | | |

**Manuscript word count:** 2488

**Abstract word count:** 199

**Number of Figures and Tables:** 4


**Personal, Professional, and Institutional Social Network accounts.**

- **Facebook:**
    - https://www.facebook.com/alapan.bandyopadhyay.73
    - https://www.facebook.com/mabel.das.39
    - https://www.facebook.com/debojyoti.das.52687
- **Twitter:**
- **Instagram:**
    - https://www.instagram.com/alapanwrites/
    - https://www.instagram.com/_mabel5_/
- **Linkedin:**
    - https://www.linkedin.com/in/dralapanbanerjee/


**Discussion Points:**

- What are the most prevalent personality traits among Indian undergraduate medical students?
- Do these traits change over the course of their curriculum?
- If these personality traits change over time, what trends of change do they show?

1   **Dates**
2   Submission: 12/26/2021
3   Revisions: 02/13/2022, 08/15/2022
4   Responses: 02/14/2022, 08/15/2022
5   Acceptance: 08/29/2022
6   Publication: 08/31/2022
7
8   **Editors**
9   Associate Editor/Editor:  Francisco J. Bonilla-Escobar
10  Student Editors: Ahmed Nahian, Francisco J. Barrera
11  Copyeditor: Mohamed Fahmy Doheim
12  Proofreader:
13  Layout Editor:
14
15  **Publisher's Disclosure:** *This is a PDF file of an unedited manuscript that has been accepted for*
16  *publication. As a service to our readers and authors we are providing this early version of the manuscript.*
17  *The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published*
18  *in its final citable form. Please note that during the production process errors may be discovered which*
19  *could affect the content, and all legal disclaimers that apply to the journal pertain.*
20
21

1    **ABSTRACT.**

2

3    **Background:** Personality of medical students have been shown to affect both their academic performance as

4    well as their capabilities to develop rapport with patients, with evidence that they change through the medical

5    course. This research aimed to explore the personality traits of undergraduate medical students and assess

6    whether personality parameters changed throughout the medical education course.

7

8    **Methods:** A pseudo-longitudinal design was utilized for this study. A total of 346 MBBS students studying in a

9    Medical College of Eastern India were recruited at different stages of their coursework. These participants were

10   similar in their sociodemographic makeup and differed only with respect to their year of MBBS study. The

11   personality characteristics were assessed among these participants using the short-form revised Eysenck

12   personality inventory.

13

14   **Results:** The minimum possible score for each subscale was 0, and the maximum was 12. Mean scores of the

15   participants for the extraversion, neuroticism, psychoticism, and lie scales were 6.17±3.09, 7.51±3.16,

16   3.40±1.61, and 4.98±2.48, respectively. Females scored significantly higher in neuroticism and lie dimensions.

17   There were significant differences of psychoticism scores between rural and urban background participants.

18   Significant negative trend was seen from the first to the final year of study in the extraversion dimension

19   (Kendall's tau =-0.094, p-value=0.025).

20

21   **Conclusion:** Medical students in India scored high on the neuroticism and low on the psychoticism scales of

22   personality with a trend of increasing extraversion over the years of their coursework.

23

24   **Key Words**: Extraversion (Psychology), Medical Education, Neuroticism, Personality, Social Desirability

25

1    **INTRODUCTION.**

2

3    A physician's mannerism and personality help build rapport with their patients. It has been seen that physicians

4    with personality characteristics complimentary to that of their patients reported better clinical outcomes and vice

5    versa.[1] Therefore, it is important to assess and understand the personality characteristics of medical students

6    as they enroll and progress through their medical coursework to ensure better doctor-patient interactions in the

7    future.

8    Studies conducted internationally have shown that students who opt to pursue medical education differ

9    significantly in personality traits as compared to their peers studying in other streams such as engineering,

10   commerce, and arts. For example, Lievens F et al. reported that medical students in Belgium were among the

11   highest scorers in extraversion when compared to other majors.[2] Another study done in Singapore by Lean LL

12   et al. found that medical students scored low in neuroticism and higher in extraversion.[3] It has also been

13   observed that over time, personality traits of a person can change due to the influence of external factors.[4] Thus,

14   knowledge about the baseline personality traits of medical students and their changes through the coursework

15   can not only contribute more information about the people entering the stream, but also provide valuable insights

16   to the traits that are amenable to change during the course of their study. This knowledge can be translated into

17   better curriculum development and integration of skill training that helps medical students develop better rapport

18   with their patients in the future as physicians.

19   However, data on the personality characteristics of medical students is hard to come by in the context of medical

20   education in the Indian subcontinent. In India, there is no provision for documentation and assessment of various

21   personality parameters of medical students during their entry to the medical course. It was seen that only one

22   study explored the personalities of medical students at the time of their admission to the MBBS course..[5]

23   Furthermore, research regarding the gradual change of personality characteristics of college students as their

24   courses progress is scarce,[6] with no research being found that investigated this particular aspect among medical

25   students of India. The present study aimed to assess the prevalent personality traits of medical students enrolled

26   in the MBBS course in an Indian medical institute and to determine any existing trend of change of personality

27   traits from the first to the final years of the course.

28

1  **METHODS.**

2  For the current study, we conducted an observational, descriptive study with a pseudo-longitudinal design.[7] It

3  was conducted at a tertiary care teaching hospital located in the state of West Bengal of Eastern India from

4  April to June 2020. Medical students enrolled in the MBBS course at the hospital formed our study sample.

5  The pseudo-longitudinal design of the current study allowed us to look for trends in personality characters from

6  the first through the final year MBBS students. Pseudo-longitudinal studies are done when it is not possible to

7  follow the same individuals over time. Then, researchers can carry out a comparison of cross-sectional studies

8  of different groups of learners at different stages of development (age, proficiency, exposure to certain

9  conditions). This generates an effect where "time" (which is accounted for directly in longitudinal studies) is

10 measured by a proxy such as proficiency level or age. Those groups, while containing different participants,

11 often share some characteristics to have some homogeneity and therefore mimic a cohort.[8] Pseudo-longitudinal

12 or quasi-longitudinal studies are uncommon, but not unknown in medical sciences.[9, 10]

13 The selection procedure for MBBS courses in India is through a merit-based, multiple-choice question, all-India

14 examination. This ensures that almost similar groups of students get admission to the course every year.

15 Furthermore, by virtue of the nature of the exam itself as well as the college-allotment processes, which are

16 also online, choice-based, each batch of students entering a medical college approximates a random sample

17 drawn from all medical students in the country. Therefore, the personality scores obtained by a cross-sectional

18 assessment of students studying in different course years in an Indian medical college is equivalent to assessing

19 random samples of the country's medical student population over the course years. This provides data which is

20 fairly similar to that observed in a true longitudinal design where a single random sample of undergraduate

21 medical students is followed from their first to final years of MBBS course. This made a pseudo-longitudinal

22 design a viable study design for the current research.

23 We collected data from the participants using an anonymized self-administered online questionnaire consisting

24 of two parts. The first part contained 8 sociodemographic questions followed by the short-form revised Eysenck

25 personality questionnaire (EPQR-S).[11] The latter consists of 48 yes/no questions that assess the individual

26 personalities of the participants across four distinct dimensions extraversion-introversion, neuroticism-stability,

27 psychoticism, and lie dimensions. Each dimension is assessed by 12 yes/no questions. Those participants who

28 scored less than 6 were considered to have a low score in that particular dimension of interest, and a high score

29 in the opposite direction. For example, a participant scoring 2 out of 12 in the extraversion-introversion

30 dimension were considered to be more introverted than extraverted in their personality. The questionnaire also

31 included an Instructional Manipulation Check (IMC) question to check whether the participants were paying

32 attention to individual questions.[12] The IMC included in this question was a yes/no question where the participant

33 was instructed to answer with the 'yes' option only. Participants who answered to the 'no' were not included in

34 the analysis.

35 Records review showed that from first to the final year, 638 MBBS students were studying in the medical college

36 at the time of study. Of them, 200 students (31.3%) were enrolled in their first professional year, 192 students

37 (30.1%) were enrolled in Second Professional year, 148 (23.2%) students in Third Professional Year (Part – I)

38 and 98 students (15.4%) in their final year (Third Professional Year Part – II) of their MBBS curriculum. All

39 students were selected into the MBBS course through a pan-India multiple choice question-based selection

40 examination. Therefore, we approached all 638 students to take part in the study. Of these students, those who

1  were unwilling or incapable of giving informed consent and those who were diagnosed with a neuropsychiatric

2  condition in the year prior to the study were excluded from the study.

3  We aimed to include the total student population for the current study. To that effect, we employed a complete

4  enumeration sampling technique for the study. Of the 638 currently enrolled students contacted, a total of 391

5  students gave informed consent to participate in the study. We excluded 39 students who had been diagnosed

6  with a neuropsychiatric condition such as depressive disorders, anxiety disorders, cyclothymia and bipolar

7  disorders in the past one year (six from first professional year, nine from second professional year, 13 from third

8  professional year part I and the rest from final year). This resulted in a final sample of 352 participants. (Figure

9  1)

10  Personality parameters of the participants as per the EPQR-S questionnaire (Extraversion, Introversion,

11  Neuroticism, Psychoticism, and Lie) at each course year were the outcome variables of the study. Socio-

12  demographic factors of the study population like age, sex, socioeconomic status, and residence as well as the

13  course year of study of MBBS for each participant were considered as explanatory variables.

14  After collecting all data, they were entered in a spreadsheet. For the statistical analysis, we used the Statistical

15  Package for the Social Sciences (SPSS) version 25 (IBM corp.). We used descriptive statistics, such as

16  frequency, percentage, frequency, mean, median, and standard deviation to look at the data. The scores of

17  each subscale of the EPQR-S were found to be non-normally distributed as per the Shapiro-Wilk's test.

18  Therefore, we considered median scores as the measure for central tendency and thus used non-parametric

19  tests for their analyses. For non-normally distributed variables, Jonckheere-Terpstra test for trends and

20  Kendall's tau-b test for correlation were used to look for the presence of trends in the observed data and their

21  direction and strength, respectively. The analysis of categorical variables was performed using Chi-Square test.

22  All statistical tests performed were two-tailed, with a statistical significance level was considered as p-value of

23  <0.05.

24  This study was conducted after obtaining proper ethical clearance from the Institutional Ethics Committee of the

25  North Bengal Medical College and Hospital. [IEC/NBMC/2020-21/11]

26

27

1 **RESULTS.**

2 Of the 352 participants, six (1.7%) answered the IMC question as 'no' and were therefore excluded, resulting in

3 346 respondents; 167 (48.3%) men and rest women. **(Table 1)** The mean age of the participants was 20.99 ±

4 1.46 years. Majority of the respondents were from the pre-final year of their course (3rd Professional Part I)

5 (36.4%), followed by the first years, second years and final years respectively. Of the participants, 198 (57.2%)

6 were from an urban residential background. When socio-economic background of the participants was

7 considered, a majority of them hailed from families belonging to the Class I (Upper class) of the Modified B. G.

8 Prasad Scale for Socioeconomic status (SES) updated with the All India Consumer Price Index (AICPI) for

9 January 2020.[13] It was followed closely by the Class II (29.2%), III (13.6%), IV (13.6%), and V (9.3%),

10 respectively. All respondents were unmarried. Participants of the four academic years included in the study

11 differed in their age, which showed a statistically significant increase over the years (p-value = 0.00003*,

12 Pearson's r = 0.712). However, we did not observe any statistically significant differences between the analyzed

13 groups with respect to sex, socioeconomic status, and residence. **(Table 1)**

14 We observed that women scored significantly higher than men in the neuroticism (Mann-Whitney U test statistic

15 = -3.783, p-value=0.000) and lie subscales (Mann-Whitney U test statistic = -3.364, p-value=0.001). There was

16 no difference in the scores with respect to the participants' socioeconomic status. However, we observed a

17 statistically significant difference in psychoticism scores between participants hailing from rural and urban

18 backgrounds (Mann-Whitney U test statistic = 2.342, p-value=0.019). **(Table 2)**

19 A Jonckheere Terpstra test for trends was used to look for any existing trend of scores in each personality

20 subscale across the academic years. We found that there existed a significant negative trend in the extraversion

21 scores from the first to the final year ($T_{JT}$ = 19,306.5, z = -2.235, Kendall's tau-b correlation coefficient= -0.094,

22 p-value=0.025). However, no significant trend was seen for the other subscale scores across the years of study.

23 **(Table 3)**

24

1 **DISCUSSION.**

2 Personalities are amenable to change depending on the environment.[4] Over the course of their medical training,

3 certain personality traits among medical students might get modified from when they were enrolled in the course.

4 We postulate that this could be due to increased stress, length and difficulty of course, or from increasing

5 exposure to clinical scenarios involving significant mortality and morbidity, etc. Studies done *a priori* have

6 provided some evidence in favor of this assertion, such as Gough HG et al. whose study found significant

7 changes in personality traits as medical students move through the years of their study.[14] A study conducted in

8 Malaysia found that final year medical students had lower scores in neuroticism when compared to students

9 enrolled in other years.[15] A longitudinal study done on pharmacy and medical students of Malta also reported

10 the shifting of certain personality traits from their baseline at the time of their enrollment.[16]

11 *Background characteristics of the participants*

12 One of the primary assumptions of a pseudo-longitudinal design is that the groups selected for the study should

13 be similar to each other in their background characteristics except the time of exposure to the risk factor under

14 observation.[8] In this study, we corroborated this assumption, as the analysis of the different socio-demographic

15 variables showed that the four primary groups of students were like each other in their socio-demographic

16 characteristics except their age, which, as expected, increased from the first to final year.

17 *Neuroticism*

18 We found that medical students scored on the higher end of the neuroticism scale, with a median score of 8.

19 This is higher than the median score of 5 reported by Kuriata et al. in their study done in Poland[17] and differs

20 from the findings of Lean et al. in Singapore, who reported medical students to be less neurotic as compared to

21 their non-medical peers.[3] This discrepancy compared to international research needs to be explored in detail

22 especially in the Indian context, as there are conflicting reports of the effect of higher neuroticism on the

23 performance of medical students in their course.[18] The higher scores of neuroticism among medical students

24 can be explained by the unique, highly competitive entrance tests to the medical courses, where

25 competitiveness and cognitive function are rewarded. The fact that neuroticism has been positively correlated

26 with competitiveness as well as academic achievement in medical schools also lends support to this

27 assumption.[19] However, our observation that women scored significantly higher in the neuroticism subscale

28 than their male counterparts is in line with previous research done on this subject.[20]

29 *Social Desirability*

30 Another finding of male-female difference in personality traits was seen in the case of the lie subscale scores,

31 where women scored significantly higher than men. Social desirability bias, the factor assessed by the Eysenck

32 lie subscale is complex in its interpretation and association with the other three subscales. However, it has been

33 seen that there is a distinct relationship between the Eysenck neuroticism and the lie subscales.[21] Jackson and

34 Francis demonstrated that people who scored high in the neuroticism subscale also had high scores in the lie

35 subscale, indicating a higher social desirability bias.[21] By that measure, we expected that women, who scored

36 higher in the neuroticism scale would also do the same in the lie scale, an assumption that was reinforced by

37 the current study.

38 *Psychoticism*

39 We found that psychoticism was low in medical students across all academic years, implying lower aggression,

40 recklessness, and impulsiveness. However, even at that low score threshold, participants from an urban

41 background scored significantly higher than their rural counterparts. This is consistent with previous research

9

IJMS

1    that suggests a link between urbanicity and risk for psychosis, a character represented by higher psychoticism

2    scores.[22]

3    *Introversion-extraversion*

4    With a minimum score of 0, a maximum score of 12, and a median score of 6, it can be said that medical

5    students are equally likely to be introverted as they are to be extraverted. However, our subgroup analyses

6    showed that there existed a significant trend towards introversion from the first through the final years. This can

7    be explained as being a result of increased stress and increased exposure to significant morbidity and mortality

8    as students move up the academic years. Research done *a priori* has found that with increased clinical

9    exposure, medical students become less empathetic, as they suffer from increased stress and distress

10    associated with it.[23] Some authors explain this negative coping mechanism as being resultant of the fact that

11    more often than not medical students have to deal with these stressors alone, which lead to detached concern

12    and increased carefulness and anxiety, which are characteristics of introversion.[24]

13    Since we conducted this study among voluntary willing participants, the data collection was prone to volunteer

14    bias, which could've skewed the results obtained. Furthermore, the absence of a control group further limits the

15    study to only describing the observed personalities among medical students, which cannot be compared to

16    those of their non-medical peers. Finally, personality change over the years can be best observed by a

17    prospective design, although the pseudo-longitudinal design of the current study aimed to mimic a prospective

18    design, it is less powerful than a true longitudinal design due to the underlying principle of the study design

19    being substituting a single group followed-up over time with similar group data examined with time taken as a

20    proxy. However, even with these limitations, to our knowledge, this is the first study that analyses the personality

21    traits of undergraduate MBBS students studying in India. This is also the first study that looks at the trends of

22    change of those personality traits throughout the course years of MBBS. The main strength of the study was

23    the pseudo-longitudinal research design which made trend analyses possible.

24    We found that medical students studying in India without overt psychiatric illnesses scored high in neuroticism

25    and low in psychoticism dimensions of the Eysenck Personality Inventory. Furthermore, there was an increasing

26    trend towards introversion from the first to the final years of their study. Women were more likely than men to

27    have personalities high in the neuroticism and social desirability traits.

28

1 **REFERENCES.**

[1] Tiwari PM, Bimal A, Gupta L, Gupta A, Gupta R, Rohit S. Factors influencing patients' preference and confidence in a surgeon. Ind J Bas Appl Med Res. 2015;4(4): 693-7.

[2] Lievens F, Coetsier P, De Fruyt F, De Maeseneer J. Medical students' personality characteristics and academic performance: A five-factor model perspective. Med Educ. 2002;36(11):1050-6.

[3] Lean LL, Hong RY, Ti LK. How the personalities of medical students at the National University of Singapore differ from those of the local non-medical undergraduate population: a cross-sectional study. Singapore Med J. 2018;59(12):656.

[4] Roberts BW, Walton KE, Viechtbauer W. Patterns of mean-level change in personality traits across the life course: a meta-analysis of longitudinal studies. Psychol Bull. 2006;132(1):1-25.

[5] Sivakumar G. Screening of Basic Personality Traits of First Year Medical Students at Entry Level to Assess Their Academic Acquaintance in an Indian Medical School. J Psychol Psychother. 2019;9(2)356.

[6] Nichols RC. Personality change and the college. Am Educ Res J. 1967 May;4(3):173-90.

[7] Porta M, editor. A dictionary of epidemiology. Oxford university press; 2014 May 23.

[8] Meunier F. Developmental patterns in learner corpora. In: Granger S, Gilquin G, Meunier F, editors. The Cambridge Handbook of Learner Corpus Research. Cambridge: Cambridge University Press; 2015.

[9] Prell T, Gaur N, Steinbach R, Witte OW, Grosskreutz J. Modelling disease course in amyotrophic lateral Sclerosis: pseudo-longitudinal insights from cross-sectional health-related quality of life data. Health Qual Life Outcomes. 2020;18(1):1-5.

[10] Leone T, Alburez-Gutierrez D, Gandour R, Coast E, Giacaman R. Maternal and child health outcomes and intensity of conflict in the occupied Palestinian territory in 2000–14: a pseudo longitudinal analysis. Lancet. 2018;391:S48.

[11] Eysenck S, Barrett P. Re-introduction to cross-cultural studies of the EPQ. Pers Individ Dif. 2013 Mar 1;54(4):485-9.

[12] Oppenheimer DM, Meyvis T, Davidenko N. Instructional manipulation checks: Detecting satisficing to increase statistical power. J Exp Soc Psychol. 2009;45(4):867-72.

[13] Debnath DJ, Kakkar R. Modified BG Prasad socio-economic classification, updated–2020. Indian J Comm Health. 2020;32(1):124-5.

[14] Gough HG, Hall WB. A prospective study of personality changes in students in medicine, dentistry, and nursing. Res High Educ. 1973;1(2):127-40.

[15] Mustaffa MB, Nasir R, Khairudin R, Zainah AZ, Shahrazad WW, Salim SS. Understanding the personality traits of medical students using the five factor model. Asian Soc Sci. 2012;8(9):17.

[16] Cordina M, Lauri MA, Buttigieg R, Lauri J. Personality traits of pharmacy and medical students throughout their course of studies. Pharm Pract (Granada). 2015;13(4).

[17] Kuriata A, Borys E, Misiołek U, Gałczyński A, Runowska K, Krupa A, Cyranka K, Mielimąka M, Rutkowski K. Choice of medical specialty and personality traits measured with the EPQ-R (S) in medical students and specialist doctors. Arch Psychiatry Psychother. 2019;21(2): 56-70.

[18] Bhagat V, Nayak RD. Neuroticism and academic performance of medical students. Int J Humanit Soc Sci Invent. 2014;3(1):51-5.

IJMS

[19] Ferguson E, James D, Madeley L. Factors associated with success in medical school: systematic review of the literature. BMJ. 2002;324(7343):952-7.

[20] Weisberg YJ, DeYoung CG, Hirsh JB. Gender differences in personality across the ten aspects of the Big Five. Front Psychol. 2011;2:178.

[21] Jackson CJ, Francis LJ. Interpreting the correlation between neuroticism and lie scale scores. Pers Individ Differ. 1998;26(1):59-63.

[22] Fett AK, Lemmers-Jansen IL, Krabbendam L. Psychosis and urbanicity: a review of the recent literature from epidemiology to neurourbanism. Curr Opin Psychiatry. 2019;32(3):232-41.

[23] Hojat M, Shannon SC, DeSantis J, Speicher MR, Bragan L, Calabrese LH. Does empathy decline in the clinical phase of medical education? A nationwide, multi-institutional, cross-sectional study of students at DO-granting medical schools. Academic Medicine. 2020;95(6):911.

[24] Werner ER, Korsch BM. The vulnerability of the medical student: Posthumous presentation of LL Stephens' ideas. Pediatrics. 1976;57(3):321-8.

12

1 **SUMMARY - ACCELERATING TRANSLATION**

2 **Title:** Assessment of Personality Traits and Their Changes Over the Undergraduate Medical Course: A Pseudo-

3 longitudinal Analysis among Indian Medical Students

4 **Main problem to solve:** What sort of personalities do Indian students entering the undergraduate medical

5 course possess? Do their personalities change as they progress through their course?

6 **Aim of the study:** This research was conducted with an aim of identifying the most common personality traits

7 among MBBS students enrolled at an Indian medical institute and to see if there was any trend of change of

8 their personality traits from the first to the final years of the MBBS course

9 **Methodology:** A descriptive, pseudo-longitudinal study was conducted. A personality assessment

10 questionnaire was filled up by MBBS students studying at different academic years. There personality traits

11 were assessed under 4 parameters, i.e. Extraversion-Introversion, Neuroticism, Psychoticism, and Lie or social

12 desirability. Each parameter was assessed by a scoring system, ranging from 0 to 12. After their personality

13 related data was collected, statistical analyses were applied to see which personality traits were the most

14 commonly observed among the students. Furthermore, it was also analyzed whether any, or all of the

15 personality traits of the medical students changed meaningfully over the course-years.

16 **Results:** It was seen that medical students scored on the higher end of the Neuroticism trait and low on the

17 psychoticism and social desirability (lie) trait and were equally likely to be introverted as they were extroverted.

18 However, women scored much higher than men in the neuroticism trait, and also in the social desirability

19 parameter.

20 As for the trends of change of personality traits over the years, only extraversion trait showed any change. It

21 was seen that as the medical students progressed through their coursework, they become more introverted.

22 This has been explained by some authors a result of a negative coping mechanism, where the students become

23 more detached and anxious in response to the various stressful situations that they encounter in their course.

24 **Conclusion:** Undergraduate medical students studying in India have personalities high in neuroticism and low

25 in psychoticism and social desirability traits. As they progress through their MBBS course, however, they

26 become more introverted than when they begun their coursework.

1   **Tables and Figures**

2   **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) | |

3   *Statistically significant

4

5

6

14

1 **Table 2. Table showing the differences in personality traits and demographic characters of participants**

2 **(n=346)**

| Characters | Extraversion (median) | p-value[a] | Neuroticism (median) | p-value[a] | Psychoticism (median) | p-value[a] | Lie (median) | p-value[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 | |

3 [a] Kruskall-Wallis H test and Mann-Whitney U test for independent samples, wherever appropriate

4 *statistically significant

5
6
7
8
9
10
11
12
13
14

15

**Table 3. Table showing the difference in subscale scores of participants according to their academic year of study (n=346)**
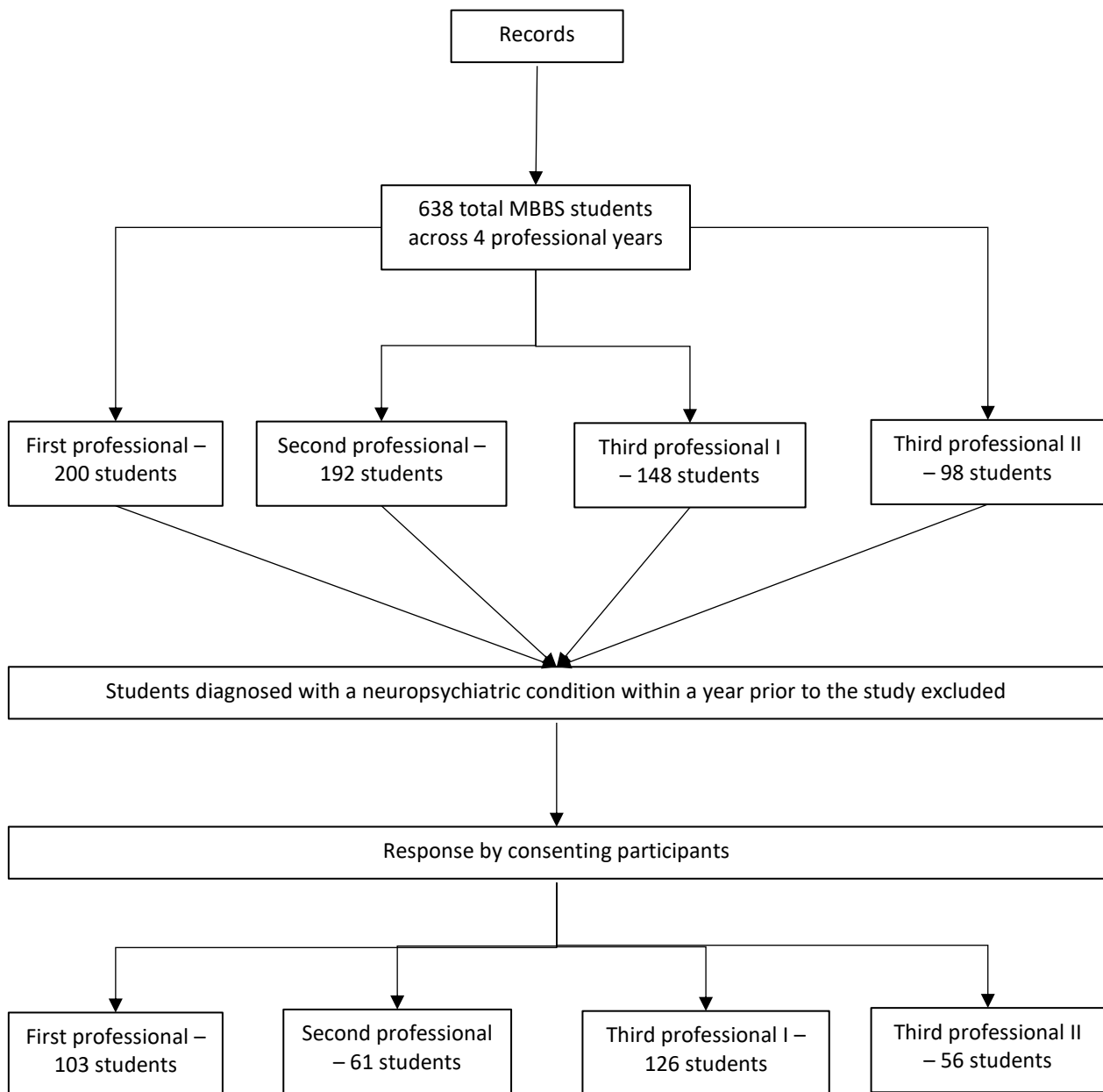
| Subscale Score | Academic Year (n) | | | | | $\tau b^a$ | p-value |
|---|---|---|---|---|---|---|---|
| | Total | 1st Professional | 2nd Professional | 3rd Professional Part I | 3rd Professional Part II | | |
| | (346) | (103) | (61) | (126) | (56) | | |
| **Extraversion** | | | | | | | |
| *Mean* | 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 | | |

[a]Kendall's tau-b correlation coefficient

*statistically significant

1 **Figure 1. Data collection protocol for the study**



2
3