ORIGINAL RESEARCH

Factors influencing to study medicine: a survey of first-year medical students from India

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Purpose: Students joining medical studies may be motivated by many factors. However, there may also be some factors which may concern them. Although, it can be assumed that those joining medical studies would have largely been influenced positively, how the factors interact in different groups of students has not been studied adequately.

Methods: We conducted a questionnaire-based survey in first-year medical students. Besides the demographics and intentions about their future career plans, students rated a list of positively influencing items and a list of negatively affecting items relevant to our context that influenced their decision. We performed factor analysis followed by clustering of study participants.

Results: Ninety-seven students participated in the survey which comprised of 59% females with mean age of 18.6 years. The factors extracted were named as 'personal growth factor,' 'professional calling factor,' 'personal concerns factor,' and 'professional concerns factor.' Four distinct clusters of participants differing in their average ratings to each of the above factors were identified.

Conclusion: This study provides information on the factors that influence students to join medical studies from an Indian context. The motivational patterns were varied in different sub-groups of students. The data obtained from this study may provide pointers to educators to plan training of students, changes in curricular structure that takes into account the expansion of medical education into specialties and beyond.

Key Words: Career choice, Medical students, Medicine, Motivation

Introduction

Medical practice is regarded as a noble profession since it provides an opportunity to serve the people in need [1]. It may also offer a means towards a stable and financially rewarding career. Considering that medical studies can be a long and arduous journey, and the profession itself is demanding, it is desirable that highly motivated students join [2]. Motivation is a phenomenon which explains the why of one's actions [3]. Motivation is dynamic [4], and in the context of medical education, it may play a significant role in influencing the academic performance of learners [5] and the learning environment [6]. The theories of motivation have been recently reviewed [7] which include expectancy-value theory, attribution theory, social-cognitive, goal orientation, and self-determination theory. Of the several theories that explain motivation, medical educationists commonly use self-determination theory [8]. Studies analyzing the factors influencing or motivating a student's decision to join medicine are limited. Among the studies which

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analyse motivation, there has been no attempt to separately characterize the possible demotivational factors that may be involved. This is important since identification of such factors would help in assessing the improvements that may need to be done for the betterment of medical education. A common assumption concerning motivation is that a student joining to study medicine is naturally motivated albeit for different reasons but there cannot be any reasons that may concern them. However, according to Herzberg's motivator-hygiene theory [9], which was originally done to assess job enrichment and job satisfaction, the factors that concern may be completely different from those which motivate them. Hence, it is crucial to study the demotivation factors also along with factors that may motivate to study medicine. There are reports in the field of education in general where the aspect of demotivation have been dealt along with motivational factors [10-12].

Existing literature suggests that several factors influence students' decision to study medicine [5,6,8]. These include factors on the improvement of one's social and financial status (such as money, fame, and status) or those related to their interest or calling of the profession (such as interest in the subject, to serve people). These may positively influence ('motivate') the students to study medicine. One may also consider possible hardships that are part of the medical profession. Such factors may include the demanding work schedules that may affect their quality of personal life. These factors may have a negative influence ('demotivate') on a student's decision to study medicine. Advances in medical sciences have led to diverse career options, and hence the decision to join medicine may be influenced by plans of students [13-15]. The presence of future career opportunities may thus 'motivate' whereas the absence of the same may 'demotivate' the students.

The decision to study medicine may be associated with several other aspects such as the number of attempts taken, whether the student considered choices other than medicine and so on, There can also be contextual variability in factors that affect career decisions. For instance, cultural backgrounds and beliefs of the society are factors that can potentially influence the career decision of students. In a close-knit community such as India, parents and family members play an influential role in deciding the career of students [16,17]. In some countries, students join medicine after completion of an undergraduate degree whereas in India and other developing countries they join soon after completing school education [13,15-17]. This latter group of students may have specific characteristics, owing to their entry into medical school at a relatively younger age. The maturity to take career decisions in these students and their aspirations towards a future career in the medical field at the time of joining is not known. All these and other aspects related to joining medicine were used as grouping variables since the aspects delineated above may inform about the determination of the students to join medicine but may not as such motivate or demotivate them to study medicine.

There is limited information available on the motivational pattern of students joining medicine in the Indian context. In this study, we conducted a questionnaire-based survey to explore and analyse the motivational and demotivational factors that first-year medical students consider to study medicine and compare them between sub-groups of students divided based on their demographic characteristics and other aspects related to joining medicine. In addition to our main objective, we explored the existence of student clusters based on the pattern of the motivational and demotivational factors. We hoped that the study of demotivational factors together with motivational factors may help in iden-

tifying the means to improve medical education [18].

Methods

Students enrolled for Bachelor of Medicine and Bachelor of Surgery (MBBS) course (n=100) in the institution during the academic year 2016-2017 were invited to participate in the study. Students >18 years of age were enrolled after written informed consent. For those <18 years of age, both assents from the students and approval from the parents were obtained. We administered the questionnaire in a classroom setting, and student participation was voluntary. The study was initiated after obtaining approval from the Institutional Review Board (IRB Min. No., 10220 dated 24.08.2016). The survey instrument was a questionnaire designed for this study relevant to the Indian context. Questionnaire development was based on an earlier recommendation [19]. The initial version of the questionnaire was framed after a focused literature search [20-25] and contained 21 closed-ended questions. The questionnaire was screened for content and construct validity by five faculty members from the institution, who were not part of this study (data not shown). Suggestions from this stage were incorporated upon consensus (SSP and MN), and the questionnaire was modified to contain 16 questions. For response process validation, we invited ten first-year paramedical students (five males and five females) of the institution from the same academic year (2016-2017) as participants. Immediately upon completion of the survey, the students were interviewed by one of the investigators using pre-determined verbal probes and subsequently, the questionnaire was further modified (data not shown). The final version of the questionnaire (Supplement 1) consisted of 16 closed-ended questions arbitrarily divided into four segments. The first segment of the questionnaire (questions 1-5) collected demographic details of students (age, gender, and family background). The second segment (questions 6-12) queried about aspects relevant to study medicine (number of attempts involved, time of the decision, alternative career choices, professional counselling, influences of individuals, and self-reported maturity to make a career decision). The third segment consisted of 15 items that may positively influence or motivate (question 13) and 10 items that may negatively affect or demotivate (question 14) their decision to study medicine. Students were asked to rate each of these items on a scale of 1 to 5 (where 1=least and 5=most). The last segment consisted of questions to analyze the career aspirations of students (questions 15-16).

Data from the completed survey was extracted and anonymized for analysis. We explored the data by two different and complementary approaches. To analyze the presence of a theoretical relationship among the items, we used factor analysis. Factor analysis groups the different items based on the values assigned by survey respondents and thereby reduces the dimensionality. While factor analysis demonstrates the relationship between the items, it does not provide any information on whether the respondents could be grouped based on their pattern of ratings for different study variables. To analyze this, we used cluster analysis which is a non-inferential unsupervised classification to obtain information on groupings of respondents distinct from each other for their ratings of variables. The respondents within a group or cluster would be homogenous in their ratings of variables.

Data analysis was done using SPSS ver. 16.0 (SPSS Inc., Chicago, USA). Factor extraction was done by principal component analysis (PCA) of the positive and negative sets of items independently. Sampling adequacy was checked by Kaiser-Meyer-Olkin test. Bartlett's test

of sphericity and the determinant value was assessed before performing PCA. The factors were extracted using varimax rotation in a correlation matrix. A factor loading of 0.5 was set as the criteria for factor extraction. Items with low communalities (<0.3) were excluded, and the analysis was re-run to obtain the factors. Scree plots and Eigenvalues were also examined to identify the number of factors. Cronbach's α was calculated for each of the factors extracted. For each participant, we calculated cumulative scores by adding the ratings given by the students for the items that characterized the individual factors. Since each of the factors had different numbers of items, we calculated mean scores from the cumulative scores for each participant for all the extracted factors. Then the mean scores of each of the factors were analyzed across different sub-groups of students using Student t-test.

We then performed hierarchical cluster analysis to identify different patterns of influencing factors among the study subjects using standardized scores of the extracted factors. Multicollinearity which refers to the interdependence between variables was ruled out before performing cluster analysis. Clustering was done by average group linkage method and the distance between clusters was measured by Pearson's correlation. The uniqueness of the cluster solution obtained was tested by analysis of variance. The clusters obtained were then analyzed by different sub-groups of students using chi-square tests. Missing data were excluded from the analyses. A p-value of <0.05 was considered statistically significant.

Results

Of the 100 eligible participants, 97 completed the survey. Mean±standard deviation age of the participants was 18.6±0.9 years. The demographic data of the study participants are shown (Table 1) and variables related to joining MBBS are summarized (Table 2). About two-thirds of the study participants reported joining MBBS in their first attempt and about half of the study participants had MBBS as their sole choice. Based on the overall mean scores of the ratings, three highest rated motivational items were 'opportunity to serve people' (4.26±0.9), 'to train and be a doctor' (4.13±1.0), and 'study a subject that interests me' (4.06±1.2). The three highest rated demotivational items were 'insufficient time for family' (3.11±1.4), 'insufficient time for hobbies' (2.89±1.4), and 'long period to settle in life' (2.89±1.3).

Kaiser-Meyer-Olkin test indicated sampling adequacy for both the PCA analyses (0.733 for motivational items and 0.714 for demotivational items). The ceiling effect was ruled out in both studies by examination of the correlation matrix. Bartlett's test of sphericity was significant (degrees of freedom [df]=55, p<0.001 for

Table 1. Demographic Data of Study Participants

Characteristic	Frequency (%)
Age (completed yr)	
17	5 (5)
18	47 (49)
19	28 (29)
20	15 (16)
21	2 (2)
Gender	
Male	40 (41)
Female	57 (59)
Place of permanent residence	
Village (rural)	8 (8)
Town or city (urban)	87 (90)
Abroad	2 (2)
Family members as doctors	
Yes	59 (61)
No	38 (39)
Those who had family members as doctors (n=59)	
At least one first degree relative as doctor	30 (51)
Other than first degree relative as doctor	29 (49)

Table 2. Parameters Related to Joining MBBS

Variable	Frequency (%)
No. of attempts to join MBBS	
One	64 (66)
More than one	33 (34)
Timing of decision to study medicine	
Never or not sure	18 (19)
Before class X	46 (47)
After class X	33 (34)
Career counselling	
Yes	26 (27)
No	70 (73)
Career options—only MBBS or others	
Only MBBS	53 (55)
Others	44 (45)
Alternative choice if unsuccessful this time	
Other options	39 (41)
Wait for another year to join MBBS	55 (59)
Most influential person to decide to join MBBS	
Self	32 (33)
Other than self	64 (67)
Self-declared maturity to take career decisions after school education	
Not mature (strongly disagree, disagree, neither agree nor disagree)	29 (30)
Mature (agree, strongly agree)	68 (70)

MBBS: Bachelor of Medicine and Bachelor of Surgery.

motivational items and df=45, $p<0.001$ for demotivational items) for both the analyses and collinearity among the items was ruled out by examining the determinant value (0.026 for motivational items and 0.027 for demotivational items).

The results of factor extraction by PCA are provided (Table 3). Two factors were extracted from motivational items that explained 51% (30% by the first component and 21% by the second component) of the total variance in the study population. The first factor consisted of six items on enhancing one's personal status and hence this was termed as 'personal growth factor.' The second factor consisted of five items that reflected the professional calling of a medical doctor and hence this was termed as 'professional calling factor.' One of the items 'opportunity to serve people' was loaded into both the factors. Since this item's loading was much higher in the second factor, it was considered in the latter.

Similarly, two factors were obtained by PCA of demotivational items which explained 56% (29% by the first component, 27% by the second component) of the total variance in the study population. The first factor consisted of three items that reflected the compromising of personal and family time and it was termed as 'personal concerns factor.' The second factor consisted of six items related to profession-related concerns and was termed as 'professional concerns factor.' Scree plots of both the PCA analyses revealed that the two factors in each of the analyses had Eigenvalues more than 1. Assessment of Cronbach's α was found to be satisfactory for each of the extracted factors (Table 3).

Mean scores calculated for each of the factors extracted are provided (Supplement 2). We analyzed the mean scores of each of the four factors across different sub-groups and found that males rated higher ($p=0.02$) for 'personal growth factor' as compared to females.

Table 3. Factor Extraction from Items That Influence Students to Join Medicine

Factors	Items	Communalities	Factor loading	Cronbach's α
Personal growth factor	Opportunity to achieve financial stability	0.610	0.725	0.791
	Opportunity to settle in urban areas	0.512	0.709	
	Wide career options after MBBS	0.474	0.687	
	Prestige and respect in society	0.693	0.685	
	Opportunity to travel abroad for higher studies/work	0.387	0.621	
	Self-employment is possible	0.380	0.616	
Professional calling factor	To train and be a 'doctor'	0.518	0.717	0.661
	Doctors as role models	0.452	0.671	
	One of the noble professions	0.541	0.648	
	Opportunity to serve people	0.642	0.619	
	Opportunity to work in rural/remote locations	0.484	0.521	
Personal concerns factor	Insufficient time for family	0.787	0.887	0.799
	Insufficient time for hobbies	0.772	0.870	
	Less opportunities in India for higher studies	0.437	0.629	
Professional concerns factor	Bond after MBBS	0.590	0.758	0.766
	Not enough scope for MBBS graduates to practice medicine	0.541	0.733	
	Long period to settle in life	0.583	0.625	
	Necessity to do at least a postgraduate degree after MBBS	0.414	0.559	
	Need to work for long hours with comparatively less salaries	0.453	0.533	
	Long duration of study period	0.482	0.528	

Factor extraction was done using principal component analysis to categorize 15 items that might have positively influenced and 10 items that might have negatively affected students in joining medicine into two factors each. A factor loading of more than 0.5 and communalities >0.3 was set as the criteria for factor extraction. Those items (4 in first set that included 'study a subject that interests me,' 'past experience in hospital environment,' 'illness in self or family,' and 'opportunity to become first doctor in the family/village' and 1 in the second set that included 'highly competitive field') failing to meet these criteria were excluded.
MBBS: Bachelor of Medicine and Bachelor of Surgery.

Females (p=0.03), those who attempted more than one time to get into MBBS course (p=0.02), those who decided early (before class X) to join medicine (p=0.03), those who had MBBS as their sole career choice (p=0.03) and those who would have waited for one more year to join medicine in the event of not getting admitted that year (p=0.007), rated higher for 'professional calling factor' as compared to their respective counterparts. Students from urban background rated higher (p=0.02) for 'personal concerns factor.' Students who have doctors in their family (p=0.02) and early deciders (p=0.03) rated higher for 'professional concerns factor' than their counterparts.

The factors identified by PCA were used as variables for cluster analysis. Variance inflation factor values were between 1 and 2 for all the four variables used to cluster study participants which suggested the absence of multicollinearity between the variables. Hierarchical cluster analysis suggested the presence of four distinct clusters of students (Table 4, Supplement 3). Each of the clusters was named based on the factor(s) that were rated significantly different from other clusters. Cluster 1 was termed as 'service-oriented' since the rating was significantly higher for 'professional calling factor.' Similarly, cluster 2 was termed as 'concerned with family time' since the rating was significantly higher for 'personal concerns factor.' Cluster 3 was termed as 'concerned with personal gain and career prospects' due to significantly higher ratings for 'personal growth factor' and 'professional concerns factor.' Cluster 4 was termed as 'concerned with family time and career prospects' due to significantly higher ratings for 'personal concerns

Table 4. Clusters of Study Participants Based on Factors Influencing Them to Join Medicine

Factors	Clusters of study participants (n=95)				p-value[a)]
	Cluster 1 (n=33)	Cluster 2 (n=12)	Cluster 3 (n=20)	Cluster 4 (n=30)	
Personal growth factor	$2.8^{a}\pm0.9$	$2.5^{a}\pm0.6$	$3.7^{b}\pm0.8$	$3.1^{ab}\pm0.8$	<0.001
Professional calling factor	$4.3^{a}\pm0.4$	$3.9^{ab}\pm0.4$	$3.8^{b}\pm0.6$	$3.1^{c}\pm0.7$	<0.001
Personal concerns factor	$2.2^{a}\pm0.9$	$3.7^{b}\pm0.5$	$1.9^{a}\pm0.8$	$3.6^{b}\pm0.9$	<0.001
Professional concerns factor	$1.7^{a}\pm0.6$	$2.2^{a}\pm0.5$	$2.9^{b}\pm0.6$	$2.9^{b}\pm0.7$	<0.001

Data are presented as mean±standard deviation. Four clusters of participants were identified. Different letters (a, b, c) in each row indicate that the mean scores are significantly different ($p<0.05$) from one another by post-hoc tests.
[a)]By analysis of variance test.

Table 5. Distribution of Study Participants in Different Clusters by Sub-Groups

Parameter	Sub-groups	No. of participants	No. of clusters				Chi-square test		
			1	2	3	4	χ^2	Degrees of freedom	p-value
Gender	Male	39	9	4	13	13	7.69	3	0.05
	Female	56	24	8	7	17			
Background	Rural	8	4	1	3	0	4.50	3	0.21
	Urban	85	29	11	16	29			
Doctors in family	Yes	56	16	9	13	18	3.91	3	0.27
	No	37	17	3	6	11			
Attempts	One	60	15	8	14	23	7.74	3	0.05
	>One	30	15	3	6	6			
When decided	Never	18	1	3	6	8	10.92	6	0.09
	Early	42	19	5	8	10			
	Late	30	10	3	6	11			
Career counselling	Yes	24	7	1	8	8	3.93	3	0.27
	No	66	23	10	12	21			
Career choice	Only MBBS	48	19	7	10	12	3.71	3	0.29
	Others	42	11	4	10	17			
Alternate career choice	Other than wait	35	8	4	6	17	6.95	3	0.07
	Wait next year	55	22	7	14	12			
Influenced by	Self	32	14	4	4	10	2.79	3	0.42
	Non-self	58	16	7	16	19			
Self-declared maturity	Not mature	28	6	3	9	10	3.61	3	0.31
	Mature	62	24	8	11	19			

The table shows the frequencies of study participants categorized by demographic characteristics and other parameters related to joining medicine in the identified clusters.
MBBS: Bachelor of Medicine and Bachelor of Surgery.

factor' and 'professional concerns factor.' The frequencies of the study participants in the clusters by different sub-groups are shown (Table 5). Sub-groups based on gender (7.689, df=3, p=0.05) and number of attempts (7.739, df=3, p=0.05) approached statistical significance; however, the other sub-group distributions did not.

Discussion

In this study, we used an exploratory approach to study the factors that influence students to study medicine. We identified the motivational and demotivational factors that influence to study medicine in our study participants. The extracted factors differed

in students grouped based on their demographic characteristics and other variables associated with joining medicine. Studies in the past have found several variables such as gender and background that impact the students' decision. For instance, it has been noted that men and those from the urban background are motivated by the opportunity to expand their training by traveling abroad, to move towards urban areas and improve their financial status [16,17,21,23,24]. We found similar results in this study. Besides, other variables such as the number of attempts, the presence of a doctor in the family, whether they had only medicine as a choice and whether they would persist in joining medicine also had differences in the factors that influenced them to join medicine.

Cluster analysis results showed that students could be categorized into four distinct clusters that exhibit differences in their influences in joining medicine. Majority of students were segregated into 2 clusters: 'service-oriented' cluster with an inclination to serve people in needy areas; 'concerned with family time and career prospects' cluster were influenced by their need to compromise on personal time and the concerns over future career prospects (Table 4). This could help in identifying those who may need to be advised or counselled during their training on the aspects that may concern them. The advantage of performing cluster analysis helped us to understand the interaction of multiple factors that influence to study medicine in the study participants. This would provide an understanding of how different groups of individuals perceive various challenges in the medical profession. Ultimately, such analyses would help the educators in guiding students to pursue their choice of career in medicine according to their personal interests and concerns. Cluster analysis thus would help in paving way for implementing the educational interventions in a personalized manner.

These results revealed several aspects of the intentions of students who join medicine. Importantly, our study identified the factors that may cause demotivation in those who study medicine. For instance, lack of adequate opportunities for further training and the long duration of medical studies are crucial aspects that can be concerning for students joining medicine. Students from doctor families who might be aware of the professional realities rated higher for the above items. These may need to be addressed by medical educators and health care administrators to allay the concerns of the students. Students completing the undergraduate medical course (MBBS) can function independently as a medical practitioner [26]. However, we found that most of the study participants preferred to work after either post-graduation or sub-specialization (data not shown). This finding corroborates with several studies that note medical students' preference towards specializations even at the time of joining MBBS (also, unpublished data) [13-17]. The fact that the majority of the students prefer to work after obtaining higher degrees emphasizes the need to realign our goals and purpose of undergraduate medical education. It is also essential that students are guided and counselled regarding future career options to help them understand the different fields where doctors can work.

To summarize, knowledge on the factors that influence students in their decision to join medical school may provide valuable information about their reasons to pursue a career in the health profession [27]. The results from this study can serve as a guide for the educators in designing the curriculum and cater to the students' expectations. The findings also emphasize the need for having career orientation as a part of the structure of the medical curriculum, as noted by us [28] and others [29,30].

Some of the limitations of this present study are as

follows. This study was conducted in a single institution in India and had a limited number of study participants. Also, it should be noted that the result of the cluster analysis is non-inferential. Additionally, the study represents the factors that influenced students to join medicine during the first year. How the influence of these factors changes with the progression of the course remains to be studied. Although the questionnaire was screened for content and response process validity, pilot testing was not done. In spite of the above limitations, this is perhaps the first study to comprehensively analyze the factors that positively and negatively influenced the student's decision to join medical school in the Indian setting.

The present study provides an insight into the factors that influence students to study medicine in our settings. The information obtained from this study may give pointers to educators to plan specific components that need to be addressed for the training of students as indicated above in the discussion, changes in curricular structure and avenues for future career opportunities which were identified as main concerns that demotivated those who chose to study medicine.

Supplementary Materials

Supplementary files are available from: https://doi.org/10.3946/kjme.2019.119.

Supplement 1. The final version of the questionnaire.

Supplement 2. Mean factor scores of study participants separated by clusters.

Supplement 3. Dendrogram obtained by hierarchical cluster analysis.

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