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Perception of the Educational Environment and Its Impact on the Academic Performance of Medical School Students: a Cross-Sectional Study

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ABSTRACT

Objective: *To assess the perception of medical school students on their learning environment and to evaluate the association between their academic performance and perception.*

Material and methods: *This was a cross-sectional study conducted in one public and one private medical school in Delhi and Tamil Nadu states of India, respectively, among 415 medical students using systematic random sampling. Dundee Ready Educational Environment Measure (DREEM) questionnaire was used to assess the perception of the educational environment. Academic performance was analysed using the average percentage of marks scored from the recently passed final university examination scores.*

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Results: *The mean (SD) age of study participants was 21.9 (1.4) years. The mean (SD) overall score for public and private institutes was 134.5 (20.23) and 98.4 (25.14), respectively. There was no significant difference in the mean overall score between the academic year; however, there was a significant difference in students' perception of learning (SPoL), with higher scores being found among the fourth year and interns (p-value <0.001).*

Conclusion: *The public institute had significantly higher total and subtotal scores when compared to private institutions. Evaluation of the ongoing educational program using the DREEM tool helps to identify the students' perception of the academic environment.*

Keywords: education, medical, undergraduate, educational environment, DREEM, academic performance.

INTRODUCTION

Students' perception of their educational environment has been studied at all levels of the education system starting from primary through post-secondary and college education (1). A learning environment (LE) is defined as the social, psychological and pedagogical contexts in which learning occurs. The LE is an important factor in enriching students' learning because it plays a central role in learning and contributes positively to students' achievement, satisfaction and success (2-4).

The LE in an educational institution is the way students perceive the climate of an institution, which includes, among others, their perception regarding the campus infrastructure, learning opportunities, teachers' skills and attitudes, their interaction with peers (5). The environment in which students are being trained has a significant impact on their learning and interest in it. An excellent environment is reflective of a quality curriculum in various aspects, which holds good for medical teaching institutions as well. Despite the influence of the learning environment on the academic achievements of an institution, it is a factor that is difficult to measure, and its true status in the educational cycle remains undetermined (6).

Several factors were identified, including the existence of gender issues, overestimation of medical knowledge and skills and underestimation of attitudes, low priority of education in clinical settings and prevalence of positive and negative role models (7). Monitoring and evaluating the educational environment at both the academic and clinical sites is critical for maintaining the quality of the educational curriculum (8, 9). Studies have explored the impact of environment perception on students' learning. There has been a positive correlation between meaningful learning and scales of the educational environment (10). Being a perception of students, the learning environment can only be explored subjectively and is therefore difficult to quantify. As teaching and learning are becoming more and more student-centred among health professions, medical students' perception of the educational environment has to be assessed so that learning should be tailored to meet students' needs (1).

The present study explored the various aspects of academic environment perception and the relationship with academic performance. The objectives of the study were to assess the perception of public and private medical school students on the learning environment and to determine the association of their academic performance with perception of the learning environment. ❑

MATERIAL AND METHODS

The present cross-sectional prospective study was conducted in public and private medical schools in Delhi and Tamil Nadu states of India, respectively. The study population comprised undergraduate medical students – Bachelor of Medicine and Bachelor of Surgery (MBBS) of medical institutes. All participants were undergraduate medical college students of all academic years (second year MBBS to fourth year MBBS, including interns). Using the sample size calculation formula for cross-sectional studies

($4*p*q/L^2$), a perception score of 61.5% (13) from a previous study, a 5% error, and a 10% non-response rate, the calculated sample size was 415, which was included in the two selected academic institutions. Systematic random sampling was done to include 104 students from every academic year of MBBS and interns, who were further selected randomly from their course enrolment numbers. The selected students were invited via email to participate in the study by filling up a questionnaire. The duration of the study was between June 2020 and September 2020. Although data were collected during the initial period of the first wave of the COVID-19 pandemic, subjects' perception of the academic environment as well as their academic performances were related to the pre-COVID period. Thus, both their perceptions and performances were unlikely to be influenced by the COVID-19 situation. The study tool comprised baseline characteristics of the study participants, including age, sex, residence (hosteller or day scholar), academic year, parents' education and occupation, type of family, total family income, permanent residence (rural or urban) and religion.

Dundee Ready Education Environment Measure (14)

Though there are various scales (11) for assessing the learning environment, the Dundee Ready Education Environment Measure (DREEM) is a valid and reliable test instrument specifically meant to evaluate education institutions of the health profession. The DREEM questionnaire has a worldwide face validity (12), could be used to assess the learning environment as perceived by students. It comprises 50 items, each scoring 0-4 on a five-point scale. It has a maximum score of 200 indicating the ideal educational environment. Items are scored as follows: 4 for strongly agree, 3 for agree, 2 for uncertain, 1 for disagree and 0 for strongly disagree. However, there are nine negative items (items 4, 8, 9, 17, 25, 35, 39, 48 and 50) that are scored in a reverse manner, with high scores on these items indicating disagreement. The DREEM items are grouped into five subscales covering different aspects of the educational environment: 1) students' perception of learning (SPoL), with a maximum score of 48 classifying the learning as very poor, negative, and a more positive approach; 2) students' perception of teaching (SPoT), with a maximum score of 44 classifying the perception of teachers into abysmal, in need of some retraining, moving in the right direction, and model teachers; 3) students' academic self-perception (SASP), with a maximum score of 32 classifying the perception as a feeling of total failure, many negative aspects, feeling more on the positive side, and confidence; 4) students' perception of the atmosphere (SPoA), classifying it into a terrible environment, many issues that need to change, a more positive atmosphere, and a good feeling overall with a maximum score of 48; and 5) students' social self-perception (SSSP), classifying it as miserable, not a nice place, not too bad, and very good socially with a maximum score of 28. Total DREEM scores were interpreted as "very poor" (range 0-50), "poor" (range 51-100), "better" (range 101-150) and "excellent" (range 151-200).

Academic performance

Academic performance is the percentage of marks scored from the recently passed final university examination scores. The universities across India follow a uniform assessment method for final examination as regulated by the Medical Council of India: it is the percentage obtained from the sum of all marks scored in all subjects of a particular year. For instance, a third-year MBBS student is supposed to add up all the marks obtained from Pathology, Microbiology, Pharmacology and Forensic Medicine, which are all second-year MBBS subjects. The study participants will be classified into two grades, including high achievers (≥60%) and low achievers (<60%).

Study outcomes

The study outcomes were scores of academic environment perception and grades of academic performance.

Data collection procedure

After obtaining the written informed consent of each study participant, the content of the questionnaire was explained to all subjects. A self-administered questionnaire was given to the study participants and data was collected. Students' names and any other identification data were not collected in order to avoid bias. Participants' confidentiality was maintained in all study phases. Institutional Ethical Committee clea-

rance was obtained (Institutional Ethics Committee Number: 135/IHEC/Dec 2019).

Statistical analysis

Data were entered and analysed using Statistical Package for Social Sciences (SPSS-IBM) software version 21. For categorical variable proportions and continuous variables, mean, median, range and standard deviation (SD) were calculated. The mean and SD of scores of the individual five subscales was calculated. Also, the mean SD of academic performance in terms of final exam scores and bivariate analysis was determined to explore the association between performance and perception. An independent t-test was used to compare the mean scores among grades of performers and public-private institutions. ANOVA test was applied to compare mean scores among academic years. A p-value of <0.05 was considered significant.

Patient and public involvement statement

There was no patient or public involvement in the conduction of the present study. Also, participants were not involved in the study design. ❑

RESULTS

Study participants had a mean age of 21.9±1.42 years. The majority of students in the public institution were males and most of those learning in the private medical school were females (Table 1).

There was no significant difference in the mean overall score between academic years. It ranged from 73 to 138, 78 to 137, 75 to 141, 75 to 148 among the second, third and fourth years and interns, respectively. Subscale analysis revealed a significant difference only among students' perception of learning (SPoL), with higher scores being found among fourth year students and interns (Table 2).

In both the public and private medical colleges, the subscale scores were significantly higher among high performers. On looking at the overall score, there was a significant difference between the high and low performers in the private institution, with the score ranging from 63 to 121 and 71 to 123 among the low and high performers, respectively. In the public institution, the high performers had a higher overall score than the low performers (statistically insignificant). The score ranged from 101 to 145 and 114 to 159 among the low and high performers, respectively. When comparing with the academic performance, we found significantly higher values for students' academic self-perception (SASP), students' perception of atmosphere

TABLE 1. Distribution of study participants according to their socio-demographic profile (n=594)

Variable		Public institution (n=177)	Private institution (n=417)
		No. (%)	No. (%)
Age group	Mean (±SD)	21.7 (±1.48)	22 (±1.38)
	≤20	32 (18)	66 (16)
	21-23	126 (71)	275 (66)
	≥24	19 (11)	76 (18)
Sex	Male	129 (73)	195 (47)
	Female	48 (27)	222 (53)
Religion	Hindu	157 (89)	276 (66)
	Christian	4 (2)	78 (18)
	Others	16 (9)	63 (15)
Father's occupation	Professional	40 (22)	106 (25)
	Semi-professional	79 (44)	114 (27)
	Others	58 (33)	197 (47)
Father's education	Above graduate	57 (32)	123 (29)
	Graduate	70 (40)	168 (40)
	Diploma or less	50 (28)	126 (30)
Mother's occupation	Professional	15 (8)	68 (16)
	Semi-professional	24 (14)	78 (19)
	Other	138 (78)	271(65)
Mother's education	Above graduate	44 (25)	72 (17)
	Graduate	65 (37)	200 (48)
	Diploma or less	68 (38)	145 (35)
Current residence	Day scholar	91 (51)	173 (41)
	Hosteller	86 (48)	244 (58)
Permanent residence	Urban	164 (93)	263 (63)
	Rural	13 (7)	154 (37)
Academic MBBS year	II	44 (25)	105 (25)
	III	44 (25)	105 (25)
	IV	42 (24)	101 (24)
	Intern	47 (26)	106 (26)

TABLE 2. Association of perception of the learning environment and its subscales with the academic year (n=594)

S. no.	Components	Second year (n=149)	Third year (n=149)	Fourth year (n=143)	Intern (n=153)	F	P-value
1.	Students' perception of learning (SPoL)	21.9 (±8.3)	21.8 (±7.8)	23.9 (±9.2)	25.4 (±9.9)	5.87	0.001
2.	Students' perception of teachers (SPoT)	24.1 (±5.8)	25.3 (±5.7)	25.3 (±5.6)	24.3 (±6.4)	1.78	0.148
3.	Students' academic self-perception (SASP)	15.5 (±5.8)	16.6 (±5.1)	16.7 (±6.8)	17 (±6.2)	1.86	0.135
4.	Students' perception of atmosphere (SPoA)	26.5 (±7.5)	27.5 (±7.2)	27.7 (±8.1)	28.1 (±8.6)	1.11	0.342
5.	Students' social self-perception (SSSP)	17.6 (±4.1)	17.3 (±4.3)	16.8 (±4.6)	17.4 (±5.3)	0.704	0.550
6.	Overall perception of the learning environment	105.5 (±27.)	108.5 (±25.9)	110.3 (±29.6)	112.2 (±32.5)	1.37	0.22

ANOVA test, p-value <0.05 is significant

TABLE 3. Association between domains of perception of the learning environment with academic performance among government and private medical colleges (n=594)

Institution	Components	Low performer Mean (SD)	High performer Mean (SD)	t value	P-value
Govt. medical college (n=177)	Total score	123.8 (±20.17)	135.9 (±20.47)	-3.14	0.001
	Students' perception of learning (SPoL)	27.2 (±7.31)	31.2 (±6.44)	-3.20	0.001
	Students' perception of teachers (SPoT)	23.6 (±4.77)	28.7 (±4.48)	-5.95	<0.001
	Students' academic self-perception (SASP)	18.2 (±5.28)	20.7 (±5.12)	-2.57	0.010
	Students' perception of atmosphere (SPoA)	31.1 (±6.52)	34 (±6.37)	-2.40	0.017
	Students' social self-perception (SSSP)	17.8 (±3.97)	21.2 (±3.9)	-4.60	<0.001
Private medical college (n=417)	Total score	91.8 (±25.73)	95.3 (±21.59)	-1.33	0.18
	Students' perception of learning (SPoL)	14.2 (±7.69)	17.5 (±6.11)	-4.37	<0.001
	Students' perception of teachers (SPoT)	20.2 (±5.62)	22.2 (±5.45)	-3.14	0.001
	Students' academic self-perception (SASP)	12.5 (±5.49)	14.8 (±4.24)	-4.35	<0.001
	Students' perception of atmosphere (SPoA)	22.9 (±7.21)	24.9 (±6.47)	-2.59	0.009
	Students' social self-perception (SSSP)	12.1 (±4.41)	15.8 (±3.75)	-8.15	<0.001
Combined (n=594)	Students' perception of learning (SPoL)	22.9 (±8.97)	24.8 (±9.30)	-2.08	0.03
	Students' perception of teachers (SPoT)	24.6 (±5.92)	25.7 (±5.93)	-1.88	0.060
	Students' academic self-perception (SASP)	16.2 (±6.16)	26.9 (±7.87)	-14.40	<0.001
	Students' perception of atmosphere (SPoA)	26.9 (±7.87)	29.7 (±7.85)	-3.61	<0.001
	Students' social self-perception (SSSP)	17 (±4.58)	18.7 (±4.66)	-3.71	<0.001
	Total score	107.7 (±28.76)	116.9 (±29.19)	-3.20	0.001

Independent t-test, p value <0.05 is significant

(SPoA) and students' social self-perception (SSSP) and overall mean score among high performers, while SPoL and SPoT were also higher among them but not statistically significant (Table 3).

TABLE 4. Association between perception of the learning environment and types of medical colleges (n=594)

Components	Public institution (n=177) Mean (SD)	Private institution (n=417) Mean (SD)	t statistic	P-value
Total score	134.5 (±20.23)	98.4 (±25.14)	-398.1	0.00
Students' perception of learning (SPoL)	31.2 (±7.03)	19.9 (±7.54)	-17.1	0.00
Students' perception of teachers (SPoT)	28.7 (±4.67)	23 (±5.59)	-11.9	0.00
Students' academic self-perception (SASP)	21 (±5.22)	14.5 (±5.3)	-13.7	0.00
Students' perception of atmosphere (SPoA)	33.4 (±6.47)	24.9 (±7.08)	13.7	0.00
Students' social self-perception (SSSP)	20.2 (±3.99)	16.1 (±4.32)	10.8	0.00

Independent t-test, p-value <0.05 is significant

On assessing the total and subscale scores, the public institution had significantly higher scores that the private one (Table 4). ❑

DISCUSSION

An effective learning environment is not just limited to educators' good communication skills, credibility, knowledge and preparedness contributing toward teaching excellence. An ideal academic environment is considered to be the one that prepares students for their future endeavours, development and social well-being (15). A competitive, stressful, threatening or authoritative environment can de-motivate the students, whereas collegial, collaborative and supportive environment is a motivational contributor (16). The major domains in the education environment include self-perception of teachers, learning, atmosphere; academic self-perception and social self-perception (17).

Understanding the institution's atmosphere and its prime determinants can help in many aspects of improvement. Systemic feedback and assessment is useful for improving the lacunae of an educational institute. The DREEM questionnaire has been used by many institutes globally to identify the strengths and weaknesses of the teaching style, educational atmosphere, and limitations of the curriculum.

The present study has shown that the overall score for the public and private institutions was 134.5±20.23 and 98.4±25.14, respectively, which revealed that students had a more positive perception of the public *versus* private educational environment. In our study, the overall score for the public institution was higher than the overall mean DREEM score of 120.21±22.4 which was found by Sunkad MA *et al* (18). Previous research in Indian, Saudi Arabian and Greek universities reported overall DREEM scores of 126.5, 101.4 and 124.3, respectively, which were lower than those found in our study, while studies in the United Kingdom and New Zealand reported a higher mean score of 143.58 and 141.4, respectively, which was higher than ours (19-23). A similar study conducted in a Spanish school of podiatry found a higher score of 129/200 (24). Thus, it can be speculated that health educational institutes in the Western world are equitably innovative to deliver an innovative student-friendly approach to education when compared with Asian and Middle Eastern health educational institutions (25)

The present study has seen no significant difference in the overall score of students' perception between academic years. However, SPoL was significantly different among academic years, with final year students and interns having higher scores. An explanation could due to the fact that final year students and interns are encouraged towards self-directed learning, which might develop their confidence to independently work. Also, the stress related to examination and work completion may have been attributed to the lower score in other academic years. The in-

crease in the mean subscale score with students' transition from one academic year to another one is not in agreement with previously published reports, which found that self-perceptions of learning were higher in the initial years (25, 26). These results are comparable with those provided by studies done in Malaysia and Iran, which found decreased overall mean scores among senior year students (27, 28), probably because initial year students were more enthusiastic after their successful admittance to a medical college.

Similarly, on assessing subscales among low and high performers, the overall and subscale scores were significantly higher among the high performers than the low ones in both the private and public institutions, and the mean subscale score was significantly higher among the high performers. These results are in agreement with those reported by Park KH *et al* (29) and Kim H *et al* (30), who showed that participants with higher achievement had higher scores in their learning environment. Students' perception of their learning environment has an impact on the choice of learning tactics and approaches, which influences their performances. However, a study done by Al-Qahtani MF (31) found no relationship between academic performance and students' perceptions of the learning environment. This variation could be due to other inherent factors such as study habits, learning motivation and examination performance.

Though the medical curriculum is regulated by the Medical Council of India, universities running the medical programs have different environments that could influence the outcome of students' performance. The difference in the performance of students attending public and private medical schools could be addressed by adopting the prescribed guidelines of components of the academic environment. In addition, the higher mean scores of all domains of public school could be attributed to several factors, including availability of clinical material, clinical training, years of experience of teachers and peer motivation.

Strengths and limitation of the study

The present study was conducted in both public and private medical schools including all academic year students for better generalisability and external validity. We used a comprehensive research tool to assess the perceptions of learning, teaching, self-perception, social status and atmosphere. Our study has a limitation: students' performance during the previous academic year may not represent that of the present year. ❑

CONCLUSION

The public institution had significantly higher total and subtotal scores than the private medical school. The DREEM questionnaire could be used as an effective tool for identifying the curriculum strengths and weaknesses. To achieve a better outcome for students' performance, there is a need for a support system for students that should address all five DREEM domains for a high-quality educational environment. Moreover, cross country cultural differences in medical education may have an effect on how medical students perceive their learning environment and progress. National medical education regulatory bodies must acknowledge and address these differences by adding cultural competency training and supporting diversity and inclusion programmes in order to create a more welcoming and productive learning environment. ❑

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Authors' contribution: VGC, JM and JJ conceived the idea and planned the study. VGC, BK and JM did the review of the literature. VGC, BK, SG and FL performed data extraction and tabulation. VGC, BK, JM and JJ prepared the manuscript. FL, JM, SG and JJ provided technical suggestions and supervised the study. All the authors read and approved the final manuscript.

Data sharing statement: Data are available from the corresponding author, upon reasonable request.

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