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Perception of educational environment as a predictor of academic performance in physiotherapy students

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Abstract:

BACKGROUND: Students' perception of their academic environment has a substantial influence on their actions, academic accomplishments, satisfaction, goal attainment, and behavior. The study was carried out to evaluate the perception of academic environment in physiotherapy students, and to identify the specific domains which could act as predictors of academic performance.

MATERIALS AND METHODS: This descriptive, cross-sectional research was conducted over 12 months using total population sampling. Three hundred and forty-three (139 postgraduate and 204 final year) final year and postgraduate physiotherapy students from five colleges of Mumbai and Navi Mumbai, who conformed to the inclusion benchmarks, participated in the study. Perception of educational environment was evaluated using Dundee Ready Education Environment Measure (DREEM). Academic performance was evaluated using the percentage obtained in the last university examination. Data were entered in MS Excel (©Microsoft, USA) and converted to Stata Version 15.1© StataCorp, College Station, for further analysis. The mean values and standard deviations for perception of educational environment were calculated and linear regression models were used to conduct multivariate analysis for each item in the questionnaire.

RESULTS: The mean total DREEM score of physiotherapy students was 129.97 ± 22.72. Students whose Students' Academic Self-perception scores were in the "Feeling more on the positive side" category showed a 4.17 point increase in percentage scores as compared with those who reported feeling like a total failure/had many negative aspects to their academic self-perception (95% confidence interval [CI]: 2.46, 5.89; $P < 0.001$). Students whose Students' Perception of Learning (SPoL) scores were in the "Teaching highly thought of" category showed a 2.75 point increase in percentage scores as compared with those who viewed teaching poorly/negatively (95% CI: 0.44, 5.06; $P = 0.02$).

CONCLUSION: Physiotherapy students had a "more positive than negative" view of the academic environment; however, a few "problematic areas" need to be remediated. Efforts to improve students' academic self-perception may improve their academic performance since this was the strongest predictor of their academic performance, followed by total DREEM scores and SPoL.

Keywords:

Academic performance, goals, learning, perception, self-concept, students, universities

Introduction

Learning is defined as a transformation in human nature or abilities that endures over time and cannot be attributed only to growth.[1] Learning brings about a change through experience. It is the process of attainment of a reasonably long-lasting change in understanding, knowledge, proficiency, point of view, and aptitude through experience.[2]

The above definitions of learning and many others throughout academic literature seem to agree that an active involvement of the learner, occurring either intentionally or intuitively, is essential to grasp and process sensory

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information, ultimately assimilating it in a meaningful way into memory.[3]

Educational experts have now moved past traditional measures such as intelligence and past performance and have recommended an in-depth analysis of the factors associated with learning.

These elements fall into two major categories: (a) associated with students' attributes and (b) associated with the educational atmosphere, such as teaching and students' contentment with their academic setting.[4] Studying these factors could help in identifying the unique problems faced by students from various fields, and may reveal the potential areas that need to be targeted to enhance their learning and academic performance.

As a significant factor with the potential to impact academic performance, students' opinion of their educational environment has garnered a lot of attention over the years.[5] A few elements that constitute the educational environment are the tangible substructure such as classrooms, seminars, and clinical activities; the atmosphere formed by interactions with colleagues and classmates; and factors promoting and hampering learning and the faculty [teaching and administrative).[6,7] These academic experiences are course specific. For example, physiotherapy courses offer different curricular designs that give an overall framework for studying physiotherapy. Within these designs, students have common academic experiences including lectures, practical demonstrations for therapeutic modalities, manual therapy, evaluation, and rehabilitation.[8]

Harden[9] postulates that assessing the educational environment is a foundation for the identification of practices in an organization, and as the environment can be modified, its evaluation can act as the basis for making the required alterations for better educational routines that support an institution's own objectives.

The environment of medical schools is considered to be derived from, and a manifestation of the curriculum.[10,11] Educational environment impacts the way students learn, the reason they want to learn, and what they learn, all of which are vital for the success of the syllabus. This, in turn, has the potential to impact the quality of education. The student's feedback regarding their educational environment is, therefore, essential to achieve the objective of imparting high-quality education.[12]

Students' perception of their academic environment has been found to have a substantial influence on their actions, academic accomplishments, satisfaction, goal attainment, and behavior.[10-14]

Various methods of evaluation of students' perception of academic environment have been used, out of which the Dundee Ready Education Environment Measure (DREEM)[15] is the most unambiguous and widely used outcome measure.[16]

A few studies have evaluated physiotherapy students' perception of their academic atmosphere.[17-19] However, its correlation with academic performance and the relative association of the various domains of academic environmental perception with academic performance has not been studied in depth. Therefore, the current study was carried out with two main objectives – to evaluate the perception of academic environment in physiotherapy students from multiple institutions and to identify the specific domains which could potentially act as predictors of academic performance in these students.

Materials and Methods

Study design and setting

Seven physiotherapy colleges were approached to seek permission for data collection, out of which five institutions gave their consent. Four of these colleges were affiliated to a public university, while one was affiliated to a private university.

Study participants and sampling

This descriptive, cross-sectional study was conducted over 12 months. The researchers used a total population sampling method – 343 (139 postgraduate and 204 final year) final year and postgraduate physiotherapy students from five colleges who conformed to the inclusion benchmarks were allowed to participate in the study.

Inclusion criteria

Final year and postgraduate physiotherapy students from five public and private university institutions who were prepared to take part in the research were incorporated in the study.

Exclusion criteria

Students who were disinclined to take part in the research or those who had psychological, neurological, learning, or any other ailments which could hinder their educational achievements and learning were ruled out.

Data collection tool and technique

Student's perception of the educational environment was evaluated using the DREEM.

The DREEM is a 50-item questionnaire designed by Roff *et al*.[15] to evaluate the student's academic environment in professional health-care courses. The questionnaire was developed using a Delphi method encompassing

an assortment of educators from diverse health-care vocations, geographical locations, and professional backgrounds. Hence, the DREEM is reported to be suitable for use in any professional health-care course, and is not exclusively designed for a particular culture or setting.[20-22]

The 50 items are segregated into five subscales created primarily on the basis of psychometric evaluation conducted by Roff *et al*.[15] The five subscales are Students' Perception of Teachers (SPoT), Students' Perception of Learning (SPoL), Students' Perception of Atmosphere, (SASP), and Students' Social Self-perception (SSSP).

Each item is quantified using a 5-point Likert scale: 0 denotes strongly disagree, 1 denotes disagree, 2 denotes neither agree or disagree, 3 denotes agree, and 4 denotes strongly agree. Participants are required to select a response to each of the 50 statements in the questionnaire using the above Likert scale. Negatively worded items need to be recoded before determining the total and subscale scores. The overall DREEM scores, subscale scores, and item scores are interpreted according to the criteria given by Roff *et al*.[7,23]

Academic performance was evaluated using the percentage obtained in the last University examination undertaken by the students. These scores were considered to be a reliable measure of the students' academic performance since they included some marks for internal assessment (considering their performance throughout the year) and were also the benchmark used to decide whether to promote students to the next academic year.

Ethical consideration

The study was sanctioned by the Institutional Review Board as well as the Institutional Ethics Committee of our institution. The participants gave written informed consent before being included in the study, and care was taken to safeguard their privacy.

Statistical analysis

Data were entered in MS Excel (©Microsoft, USA) and converted to Stata Version 15.1 © StataCorp, College Station, Texas, USA, for further analysis. We tested the normality of continuous data using the Shapiro–Wilk Test. We estimated the means and standard deviations for perception of educational environment. We estimated the Pearson correlation co-efficient *r* between academic performance and perception of educational environment. We used linear regression models to conduct multivariate analysis for each item in the questionnaire. Initially, we build univariate models. After these, we build multivariate models. The additional variables in the multivariate models were age, gender, type of course (Bachelor of Physiotherapy/Master in Physiotherapy), and type of university (public vs private). $P < 0.05$ was considered statistically significant.

Results

Three hundred and forty-three students from five institutions across Mumbai and Navi Mumbai participated in the study. Among the participants, 6% were male and 94% were female. Age of the respondents ranged between 21 years and 26 years. 56.9% students were from public universities, while 43.1% were from private universities. About 59.5% of students were undergraduates (final year BPT), while 40.5% were postgraduates. The mean total DREEM score of physiotherapy students was 129.97 ± 22.72. Thus, physiotherapy students rated their overall educational environment as "more positive than negative."

Overall mean scores of Dundee Ready Education Environment Measure subscales

Interpretation

As seen in Graph 1, physiotherapy students showed a positive perception of their educational environment across the various domains of the DREEM.

The SPoL scores indicated "a more positive approach."

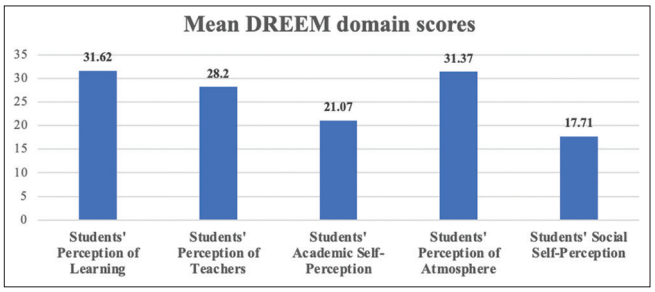
The SPoT scores were found to be "moving in the right direction."

The SASP scores indicated that they were "feeling more on the positive side."

The SPoA scores indicated "a more positive atmosphere."

On analyzing individual item mean scores for all physiotherapy students, four items had mean scores less 2 (Item number 9, 25, 27, 39), indicating that these were "problematic areas." In addition, 41 items had mean scores between 2 and 3, indicating that these areas "could be enhanced or improved."

The mean total DREEM score of undergraduate (final year) students was 127.22 ± 20.59, and the mean



Graph 1: Overall mean scores of DREEM subscales

total DREEM score of postgraduate students was 134.01 ± 25.07.

Thus, postgraduate students had a statistically significantly higher mean overall DREEM score ($P = 0.006$) as compared to undergraduate (final year) students.

Comparison of mean domain scores of Dundee Ready Education Environment Measure between bachelor of physiotherapy and master in physiotherapy students

Interpretation

As seen in Graph 2, postgraduate students had a statistically significantly higher mean scores in SPoL ($P = 0.01$), SPoT ($P = 0.0005$), SPoA ($P = 0.0004$, SSSP ($P = 0.0002$), and lower mean scores in SASP ($P = 0.02$) as compared to undergraduate (final year) students.

Correlation between perception of environment and academic performance

Interpretation

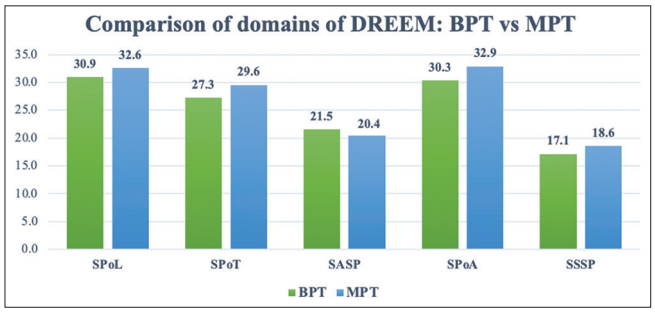
As seen in table 1, percentage scores had a positive and statistically significant correlation with overall DREEM score ($P < 0.01$), SPoL ($P < 0.05$), SPoT ($P < 0.05$), and SASP ($P < 0.001$).

A multivariate regression analysis was used to determine the relative association of perception of the academic environment with academic performance.

Multivariate regression model: Percentage score and Students' Perception of Learning category scores

Interpretation

As seen in table 2, after adjusting for age, gender, type of university, and type of student, it was found that students whose SPoL scores were in the "Teaching highly thought of" category showed a 2.75 point increase in percentage scores as compared with those who viewed teaching poorly/negatively (95% confidence interval [CI]: 0.44, 5.06; $P = 0.02$). This association (increase) was statistically significant.



Graph 2: Comparison of mean domain scores of DREEM between BPT and MPT students

Multivariate regression model: Percentage score and Students' Academic Self-perception category scores

Interpretation

As seen in table 3, after adjusting for age, gender, type of university, and type of student, it was found that students whose SASP scores were in the "Feeling more on the positive side" category showed a 4.17 point increase in percentage scores as compared with those who reported feeling like a total failure/had many negative aspects to their academic self-perception (95% CI: 2.46, 5.89; $P < 0.001$). This association (increase) was statistically significant. In addition, students whose SASP scores were in the "Confident" category showed an 8 point increase in percentage scores as compared with those who reported feeling like a total failure/had many negative aspects to their academic self-perception (95% CI: 5.91,10.09; $P < 0.001$). This association (increase) was statistically significant.

Multivariate regression model: Percentage score and overall Dundee Ready Education Environment Measure category scores

Interpretation

As seen in table 4, after adjusting for age, gender, type of university, and type of student, it was found that students with overall DREEM scores in the 'Excellent' category showed a 3.18 point increase in percentage scores as compared to those who reported a very poor environment or plenty of problems in the environment (95% CI: 2.46, 5.89; $P = 0.011$). This association (increase) was statistically significant.

Discussion

The mean total DREEM scores, as well as subscale scores of physiotherapy students, indicated a more positive than negative view of the environment. These results coincide with the conclusions of three other studies in physiotherapy students, which reported similar findings.[17-19]

Based on individual item scores, we identified four "problematic areas" in the educational environment as per the students-authoritarian teachers, overemphasis on factual learning, the inability to memorize content effectively, and teachers getting angry in class. Students perception that "teachers are authoritarian" and "there is over-emphasis on factual learning" were also reported by two other studies conducted in physiotherapy students.[17,18]

The fact that teachers are perceived as authoritarian may indicate that teachers may be inclined to undertake conventional approaches of teaching, and their methods and outlook could therefore be teacher-centered.[17] To remediate this, it is vital that teachers always respect

Table 1: Correlation between perception of environment and academic performance

? Domain	Percentage score	Total DREEM	SPoL	SPoT	SASP	SPoA	SSSP
Percentage score	1.000						
Total DREEM	0.156**	1.000					
SPoL	0.107*	0.924***	1.000				
SPoT	0.115*	0.865***	0.765***	1.000			
SASP	0.347***	0.771***	0.699***	0.527***	1.000		
SPoA	0.078	0.929***	0.812***	0.753***	0.642***	1.000	
SSSP	0.074	0.746***	0.601***	0.533***	0.492***	0.691***	1.000

*P<0.05, **P<0.01, ***P<0.001. DREEM=Dundee Ready Education Environment Measure, SPoL=Students' Perception of Learning, SPoT=Students' Perception of Teachers, SASP=Students' Academic Self-perceptions, SPoA=Students' Perception of Atmosphere, SSSP=Students' Social Self-perceptions

Table 2: Multivariate regression model: Percentage score and Students' Perception of Learning category scores

Percentage score	Coefficient	95% CI	*t*	*P>t*
SPoL category				
Very poor/teaching viewed negatively	Reference			
A more positive approach	1.19	−0.73-3.12	1.22	0.223
Teaching highly thought of	2.75	0.44-5.06	2.34	0.020
Age	−0.83	−1.41-−0.24	−2.79	0.006
Gender				
Female	Reference			
Male	0.02	−2.52-2.56	0.01	0.988
University				
Private	Reference			
Public	2.41	1.19-3.64	3.87	<0.001
Type of student				
BPT	Reference			
MPT	1.66	−0.26-3.59	1.70	0.090
Constant	80.06	67.08-93.04	12.13	<0.001

CI=Confidence interval, SPoL=Students' Perception of Learning, BPT=Bachelor's in physiotherapy, MPT=Master's in physiotherapy

physiotherapy students as adult learners.[11] Feedback, whenever required, should always be given one-on-one, and in a constructive manner without insulting the student. This will also address the issue of "teachers getting angry in class," which was another problematic area identified in our study. In addition, taking student's opinion regarding how they would like to be taught a particular concept into consideration could turn the learning process into a collaboration. The students, along with gaining the feeling of self-autonomy, could then start seeing teachers as less authoritarian and more as facilitators for acquiring knowledge.

Another concern that students reported was the "over-emphasis on factual learning." The comprehensive and cumulative assessment methods employed in the current curriculum necessitate that students consistently score well in their examinations, which may shift the focus to memorization of facts, rather than concept-based learning and long-term retention.[4,17] Promoting innovative teaching methods and techniques that encourage active participation of students and better student engagement is seen as an important step toward achieving this goal.[24] Using examples of patients that students come across routinely to teach may help in establishing context so that the practical implications of learning facts can become clearer, thus removing the emphasis on factual learning.[25-27]

A positive and statistically significant correlation was seen between academic performance and overall DREEM score, academic performance and SPoL, academic performance and SPoT, and academic performance and SASP. As per our knowledge and review of literature, ours is the first study to study the correlation between perception of educational environment and academic performance in a multicentric sample of final year and postgraduate physiotherapy students. One other study has evaluated this relationship in 1st year female applied health sciences students,[28] and has only found a significant relationship between academic performance and SASP. Differences in the study sample such as gender, type of courses studied by the participants, as well as the year of study could account for the variations in the results between the two studies.

A regression analysis revealed that SASP domain scores were the strongest predictors of academic performance, followed by total DREEM scores and SPoL domain scores. This is the first study to identify specific domains of physiotherapy students' perception of their educational environment as predictors of their academic performance.

The SASP domain mainly consists of questions pertaining to students' self-efficacy, i.e., their belief in their ability to succeed in specific situations or accomplish a task. It is therefore not surprising that this domain is the strongest predictor of academic performance since previous studies have found academic self-efficacy[29,30] and student's ability self-concept[31] to be the best predictors of academic performance, as measured by the grade point average.

Postgraduate students had statistically significantly higher mean scores for overall DREEM scale as well as domain scores of SPoL, SPoT, SPoA, SSSP, and lower

Table 3: Multivariate regression model: Percentage score and Student's Academic Self-perception category scores

Percentage score	Coefficient	95% CI	*t*	*P* > *t*
SASP category				
Feeling of total failure/ many negative aspects	Reference			
Feeling more on the positive side	4.17	2.46-5.89	4.79	<0.001
Confident	8.00	5.91-10.09	7.53	<0.001
Age	−0.72	−1.26-−0.17	−2.59	0.010
Gender				
Female	Reference			
Male	−1.08	−3.48-1.32	−0.89	0.376
University				
Private	Reference			
Public	2.36	1.22-3.50	4.08	<0.001
Type of student				
BPT	Ref			
MPT	2.05	0.27-3.82	2.27	0.024
Constant	74.50	62.32-86.68	12.03	<0.001

CI=Confidence interval, BPT=Bachelor's in physiotherapy, MPT=Master's in physiotherapy, SASP=Students' Academic Self-perceptions

Table 4: Multivariate regression model: Percentage score and overall Dundee Ready Education Environment Measure category scores

Percentage score	Coefficient	95% CI	*t*	*P*>*t*
DREEM category				
Very poor/plenty of problems	Reference			
More positive than negative	1.05	−0.97-3.08	1.02	0.307
Excellent	3.18	0.75-5.61	2.57	0.011
Age	−0.79	−1.37-−0.21	−2.66	0.008
Gender				
Female	Reference			
Male	−0.19	−2.74-2.35	−0.15	0.883
University				
Private	Reference			
Public	2.29	1.08-3.51	3.71	<0.001
Type of student				
BPT	Reference			
MPT	1.58	−0.34-3.50	1.62	0.107
Constant	79.33	66.35-92.31	12.02	<0.001

CI=Confidence interval, BPT=Bachelor's in physiotherapy, MPT=Master's in physiotherapy, DREEM=Dundee Ready Education Environment Measure

mean scores of SASP as compared to final year students. However, the scores of both the groups were in the same category, i.e., more positive than negative. Our study is the first of its kind to compare the perception of academic environment between undergraduate and postgraduate physiotherapy students. The comparatively lower perception of academic environment in undergraduates may indicate the need to specifically address the needs of this group with respect to their educational environment.

The study makes a significant contribution to the literature on physiotherapy students' perception of their educational environment. Although this parameter has been studied earlier in physiotherapy students, ours is the first study to evaluate the correlation between perception of educational environment and academic performance in this population. Moreover, our study is also the first one to compare the perception of educational environment between undergraduate and postgraduate physiotherapy students. Finally, this is the first study to assess and identify specific domains of educational environmental perception that are predictors of academic performance, thus highlighting specific areas for remediation and intervention.

Limitations

Students from a particular geographic site were selected for the research. A more widely distributed and large sample could have enhanced the generalizability of the research outcomes. The study contained more undergraduate students as compared to postgraduates. Equal distribution of students would have been ideal.

Recommendations

The DREEM could be used as an effective supplement to formative assessment in physiotherapy students. Regular assessment of the various domains of DREEM, especially the SASP domain, can help in early identification of students with low scores in this area. These students can then be referred for remedial sessions and counseling, which could lead to an improvement in their academic performance.

In future, longitudinal studies can be planned to understand the variability of DREEM scores and academic performance over a period of time. Changes in various domain scores of DREEM and corresponding changes in academic performance over a period of time with a specific intervention can also be studied.

Conclusion

Physiotherapy students had a "more positive than negative" view of the academic environment. However, a few "problematic areas" identified on the basis of individual item scores need to be remediated. Special attention may need to be given to the needs of undergraduate physiotherapy students with respect to their educational environment. Efforts to improve SASP may improve their academic performance since this was the strongest predictor of their academic performance, followed by total DREEM scores and SPoL.

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Conflicts of interest

There are no conflicts of interest.

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