# The Dental School Learning Milieu: Students' Perceptions at Five Academic Dental Institutions in Pakistan

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*Abstract:* The significance of the educational environment in health professions academic institutions, increasingly recognized on a global scale, is fundamental to effective student learning. This study was carried out to evaluate students' perceptions of the educational environment in five undergraduate dental institutions in Pakistan. This non-interventional study used a postal questionnaire based on the Dundee Ready Educational Environment Measure (DREEM). The subjects were dental students taking the final professional B.D.S. examination at five dental institutions affiliated with the University of Health Sciences, Lahore, Pakistan. A total of 197 students participated in the study (response rate of 83.82 percent). The overall DREEM score was 115.06 (Cronbach's alpha 0.87). Nine items recorded scores <2 and were flagged for remediation. Significant differences were observed between students' perceptions of learning and of teachers ($p<0.05$). Many issues challenge the quality and delivery of dental education in Pakistan, and dental institutions need to develop robust mechanisms to incorporate contemporary international trends in dental education in order to improve the educational environment.

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*Keywords:* academic environment, dental education, dental students, Pakistan

*Submitted for publication 3/19/11; accepted 7/19/11*

The significance of the educational environment in academic dental institutions is being increasingly evaluated on an international scale.[1,2] Besides identifying the quality of the climate, such evaluations provide an ideal opportunity for students to reflect on their educational experience. Moreover, structured feedback from students can provide input for curriculum planners and can influence approaches to learning and assessment.

The educational environment is fundamental to effective student learning. It has been shown to significantly impact their attitudes and professional progress and is critical for personal and social well-being.[3] Dental educators need to be sensitive and responsive to the concerns of dental students. It is the responsibility of all dental institutions to ensure that future dentists are being nurtured in a supportive and challenging environment that promotes learning in a positive way.[2-4]

A number of factors, ranging from class size, leisure time, teaching methodologies, and assessment procedures to relations with peers and faculty, ethical climate, and extracurricular opportunities, may significantly influence students' perceptions and experiences.[1] Evaluation of the educational environment may be a complex and challenging task as it is made up of a variety of educational settings: lecture rooms, laboratories, hospital wards, outpatient clinics, and general dental practice placements. This multiplicity of settings is matched by a range of socializing agents; fellow students, lecturers, departments, clinicians from many specialties, counselors, tutors, and administrators, for example, have the power to influence the educational setting.[4] Therefore, an

instrument used to evaluate the educational environment must be sensitive to a host of issues that may affect the educational experiences of dental students.

A variety of qualitative and quantitative methodologies have been used to evaluate the educational environment.[3,5,6] One of the most widely used instruments to assess educational environment in academic health professions institutions is the DREEM (Dundee Ready Educational Environment Measure) questionnaire.[7] This instrument was developed by an international Delphi panel specifically for health professionals. A robust mechanism was followed to ensure the reliability and validity of this instrument, which has since been utilized worldwide.[8]

The DREEM is a fifty-statement, closed-question questionnaire that measures perceptions of the learning environment of educational institutions (the questionnaire is available from the corresponding author). Each of the fifty items falls into one of five subscales: students' perceptions of learning (PoL), perceptions of teachers (PoT), academic self-perception (ASP), perceptions of atmosphere (PoA), and social self-perceptions (SSP). Each statement is scored on a five-point Likert scale in which 0=strongly disagree, 1=disagree, 2=uncertain, 3=agree, and 4=strongly agree. Nine items are negative statements and are scored in reverse order. The maximum total DREEM score is 200 (50×4). Overall higher scores indicate a more positive evaluation. DREEM scores can be analyzed in a number of ways, but an approximate guide to interpreting the overall score is 0–50 very poor, 51–100 plenty of problems, 101–150 more positive than negative, and 151–200 excellent. In addition to the total DREEM score, the five subscales can be analyzed as follows: students' perceptions of learning—twelve items, maximum score 48; perceptions of teachers—eleven items, maximum score 44; academic self-perceptions—eight items, maximum score 32; perceptions of atmosphere—twelve items, maximum score 48; and social self-perceptions—seven items, maximum score 28.

A study of students' perceptions of the educational climate in U.S. and Canadian dental schools used the Dental Student Learning Environment Survey (DSLES).[9] That was one of the most comprehensive studies on dental students since it involved 619 participants from eighteen dental schools across North America. Although those researchers used a methodology different from ours and direct comparisons with studies based on the DREEM inventory may not be valid, their study does underscore the importance of gauging students' perceptions and linking the scores on a national scale. The aim of our study was to evaluate students' perceptions of the educational environment in the dental institutions in Punjab affiliated with the University of Health Sciences (UHS), Lahore, Pakistan.

# Materials and Methods

This non-interventional study used a postal questionnaire (available from the corresponding author) based on the DREEM. The subjects consisted of all the dental students taking the final professional B.D.S. examination from five dental institutions affiliated with the UHS in 2009. These institutions were the de Montmorency College of Dentistry (DMCD), Lahore Medical and Dental College (LMDC), Fatima Memorial College of Medicine and Dentistry (FMH), Nishter Institute of Dentistry (NID), and Margalla Institute of Health Sciences (MIHS). Students were given an information sheet, and informed consent was obtained. The data obtained were anonymous, and all the ethical principles pertaining to data protection were strictly followed. The study was conducted as part of a Master's in Medical Education, University of Dundee and was approved by the Institutional Research Ethics Committee.

The data were analyzed using SPSS version 17.0. Prior to data analysis, normality of distribution was confirmed. A Cronbach's alpha value was obtained as a measure of the reliability of the DREEM data. Scores on the fifty-item DREEM inventory, the subscales, and each item were expressed as mean±standard deviation (SD). Univariate and multivariate analyses of variance (ANOVA and MANOVAs) were used to identify significant differences among the total and subscale scores in relation to gender and dental institution. Post hoc comparisons using Tukey's Honestly Significant Difference (HSD) test were also carried out to further investigate the differences.

# Results

The postal questionnaire was mailed to 235 students, and 127 returned the completed questionnaire for an overall response rate of 83.8 percent. The difference in response rates between males and females was statistically insignificant ($p>0.05$). The age range of the participants was quite narrow (twenty-three to

twenty-five years) and was not a confounding factor. A Shapiro Wilk test confirmed normal distribution of the data (W=0.99; p=0.67). The reliability of the DREEM data as a whole was strong (α=0.87) as was the reliability of data obtained from individual institutions (α=0.85 to 0.91). Overall, the mean score on individual items was 2.30 (SD 0.34). Nine items had scores below 2 and were identified as areas of concern requiring remedial actions (Table 1). The mean total scores (with standard deviation) on the five subscales were determined for individual dental institutions (Table 2).

A univariate ANOVA and post hoc comparisons using the Tukey's HSD test were carried out to investigate the impact of gender and dental institution on DREEM scores (Table 3). A Levene's test was used to ensure the assumption of homogeneity of variance had not been violated (p=0.198). The ANOVA results showed a significant main effect of institution (F=3.97; p=0.004). Tukey post hoc comparisons showed the main difference was between the MIHS and NID (M=13.07, 95 percent CI 0.03–26.15; p<0.05). Although there was no significant main effect of gender (F=0.53; p=0.467), there was a significant interaction effect of institution and gender (F=2.76; p=0.029) (Table 4).

MANOVA and post hoc comparisons using the Tukey's HSD test were carried out to evaluate differences in the scores on the five DREEM subscales amongst the five institutions. A Box's M test of equality of covariance matrices was carried out, indicating an acceptable level of homogeneity (p=0.011). The MANOVA results showed a significant difference in the perceptions of learning amongst the participants (F=2.93; p=0.022). Tukey post hoc comparisons showed participants from MIHS had more positive perceptions of learning (M=29.54, 95 percent CI 27.05–32.04) when compared to those from NID (M=23.90, 95 percent CI 21.59–26.21; p<0.01). Similarly, significant differences were observed in students' perceptions of teachers (F=5.1; p=0.001). Tukey post hoc comparisons showed perceptions of teachers were more positive amongst participants from MIHS (M=26.89, 95 percent CI 25.13–28.64) compared to those from both DMCD (M=23.26, 95 percent CI 21.79–24.73; p=0.02) and NID (M=22.44, 95 percent CI 20.82–24.06; p=0.001). Participants from LMDC also had significantly higher perceptions

**Table 1. DREEM items with low scores**

| Item | Mean Score | Standard Deviation |
|---|---|---|
| 8. The teaching overemphasizes factual learning. | 1.78 | 1.04 |
| 12. The teaching is too teacher-centered. | 1.77 | 1.20 |
| 15. The teachers ridicule the students. | 1.89 | 1.20 |
| 16. The teachers are authoritarian. | 1.51 | 1.18 |
| 21. The teachers get angry in class. | 1.60 | 1.60 |
| 32. The atmosphere is relaxed during the ward teaching. | 1.88 | 1.88 |
| 34. Cheating is a problem in this school. | 1.90 | 1.90 |
| 44. I am rarely bored in this course. | 1.33 | 1.33 |
| 46. My social life is good. | 1.95 | 1.95 |

**Table 2. Mean DREEM score on five subscales**

| Institution | N | PoL (Max. 48) Mean±SD | PoT (Max. 44) Mean±SD | ASP (Max. 32) Mean±SD | PoA (Max. 48) Mean±SD | SSP (Max. 28) Mean±SD | Total Score (Max. 200) Mean±SD |
|---|---|---|---|---|---|---|---|
| DMCD | 50 | 26.86±7.74 | 23.26±4.56 | 19.98±5.88 | 25.70±5.86 | 16.06±3.41 | 111.86±20.77 |
| LMDC | 53 | 28.05±6.99 | 26.05±5.26 | 20.39±7.33 | 28.16±6.99 | 16.88±4.20 | 119.56±20.71 |
| FMH | 18 | 27.66±6.99 | 25.16±4.40 | 19.77±5.61 | 26.94±7.51 | 15.05±4.23 | 114.61±22.66 |
| NID | 41 | 23.90±8.17 | 22.43±6.56 | 20.41±5.07 | 25.60±7.03 | 15.75±2.92 | 108.12±20.99 |
| MIHS | 35 | 29.54±7.25 | 26.88±4.88 | 21.08±5.55 | 27.51±6.43 | 16.17±5.23 | 121.20±21.73 |
| Total | 197 | 27.11±7.64 | 24.65±5.49 | 20.36±6.03 | 26.78±6.70 | 16.14±3.99 | 115.06±21.52 |

PoL=perceptions of learning; PoT=perceptions of teaching; ASP=academic self-perceptions; PoA=perceptions of assessment; SSP=social self-perceptions

of teachers (M=28.06, 95 percent CI 24.63–27.48; p=0.01) than participants from NID. However, differences in the scores on the remaining three subscales (academic self-perceptions, perceptions of atmosphere, and social self-perceptions) were not significant across the five institutions (Table 5).

In addition, the impact of gender on the five subscales scores was examined. Significant differences were observed in perception of atmosphere in relation to gender (F=4.24; p=0.04) with females showing more positive perceptions of the atmosphere (M=27.61, 95 percent CI 26.48–28.74) than males (M=24.97, 95 percent CI 22.71–27.23). Lastly, the impact of institution and gender interaction on the subscale scores was investigated. There was a significant effect for perception of learning (F=3.14; p=0.02), with male and female students in the five institutions receiving different scores on this subscale (Figure 1). There was also a significant effect for social self-perception (F=2.81; p=0.03), with male and female students in the five institutions receiving different scores (Figure 2).

**Table 3. Mean DREEM scores at dental institutions in study, by gender**

| Institution | Gender | N | Mean Score | Std. Deviation |
|---|---|---|---|---|
| DMCD | Male | 12 | 101.58 | 22.24 |
| | Female | 38 | 115.10 | 19.47 |
| | Total | 50 | 111.86 | 20.77 |
| LMDC | Male | 23 | 112.39 | 19.25 |
| | Female | 30 | 125.06 | 20.39 |
| | Total | 53 | 119.56 | 20.71 |
| FMH | Male | 4 | 103.75 | 2.98 |
| | Female | 14 | 117.71 | 24.96 |
| | Total | 18 | 114.61 | 22.66 |
| NID | Male | 7 | 109.71 | 11.96 |
| | Female | 34 | 107.79 | 22.52 |
| | Total | 41 | 108.12 | 20.99 |
| MIHS | Male | 4 | 142.00 | 25.39 |
| | Female | 31 | 118.51 | 20.14 |
| | Total | 35 | 121.20 | 21.73 |
| Total | Male | 50 | 111.10 | 20.99 |
| | Female | 147 | 116.41 | 21.60 |
| | Total | 197 | 115.06 | 21.52 |

# Discussion

According to our research, this is the first study of students' perceptions of the dental education environment in Pakistan and provides new insights into cross-cultural issues. This study may be especially relevant for dental educators in North America who administer programs for dentists trained in other countries (including Pakistan and other South Asian countries) seeking to practice in the United States and Canada.

The gender distribution of subjects in this study revealed a striking female majority. Until 1990, female students could seek admission to medical and dental colleges in Pakistan on reserved seats only. However, after the "open merit" policy was introduced by the government in 1990, there has been a sharp rise in the number of female graduates from medical and dental institutions. It is noteworthy that the percentage of female dental students in this study was higher than those reported from Europe.[10] These differences may be attributed to local cultural and social trends since Pakistani society is passing through a major transition in which women are increasingly allowed and expected to contribute to society. Although current dental school admissions policies are based on equal rights for

**Table 4. Output of ANOVA in tests of between-subjects effects (dependent variable: mean DREEM score)**

| Source | Type III Sum of Squares | Df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Corrected model | 11225.965 | 9 | 1247.329 | 2.932 | .003 |
| Intercept | 1382847.171 | 1 | 1382847.171 | 3250.928 | .000 |
| Institution | 6765.094 | 4 | 1691.274 | 3.976 | .004 |
| Gender | 226.290 | 1 | 226.290 | .532 | .467 |
| Institution and gender | 4711.649 | 4 | 1177.912 | 2.769 | .029 |
| Error | 79544.177 | 187 | 425.370 | | |
| Total | 2699086.000 | 197 | | | |
| Corrected Total | 90770.142 | 196 | | | |

**Table 5. Output of MANOVA in tests of between-subjects effects**

| Source | Dependent Variable | Type III Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| Corrected model | Perception of learning | 1430.453 | 9 | 158.939 | 2.962 | .003 |
| | Perception of teachers | 803.288 | 9 | 89.254 | 3.269 | .001 |
| | Academic self-perception | 304.234 | 9 | 33.804 | .925 | .505 |
| | Perception of atmosphere | 839.113 | 9 | 93.235 | 2.185 | .025 |
| | Social self-perception | 253.139 | 9 | 28.127 | 1.829 | .065 |
| Intercept | Perception of learning | 79083.533 | 1 | 79083.533 | 1473.871 | .000 |
| | Perception of teachers | 64245.822 | 1 | 64245.822 | 2353.407 | .000 |
| | Academic self-perception | 43093.438 | 1 | 43093.438 | 1178.626 | .000 |
| | Perception of atmosphere | 71814.195 | 1 | 71814.195 | 1683.180 | .000 |
| | Social self-perception | 27452.641 | 1 | 27452.641 | 1785.248 | .000 |
| Institution | Perception of learning | 628.327 | 4 | 157.082 | 2.928 | .022 |
| | Perception of teachers | 556.998 | 4 | 139.249 | 5.101 | .001 |
| | Academic self-perception | 192.336 | 4 | 48.084 | 1.315 | .266 |
| | Perception of atmosphere | 363.374 | 4 | 90.844 | 2.129 | .079 |
| | Social self-perception | 57.546 | 4 | 14.386 | .936 | .445 |
| Gender | Perception of learning | .043 | 1 | .043 | .001 | .977 |
| | Perception of teachers | 4.115 | 1 | 4.115 | .151 | .698 |
| | Academic self-perception | .287 | 1 | .287 | .008 | .929 |
| | Perception of atmosphere | 180.644 | 1 | 180.644 | 4.234 | .041 |
| | Social self-perception | .570 | 1 | .570 | .037 | .848 |
| Institution and gender | Perception of learning | 673.668 | 4 | 168.417 | 3.139 | .016 |
| | Perception of teachers | 188.831 | 4 | 47.208 | 1.729 | .145 |
| | Academic self-perception | 272.286 | 4 | 68.071 | 1.862 | .119 |
| | Perception of atmosphere | 148.335 | 4 | 37.084 | .869 | .484 |
| | Social self-perception | 172.849 | 4 | 43.212 | 2.810 | .027 |
| Error | Perception of learning | 10033.862 | 187 | 53.657 | | |
| | Perception of teachers | 5104.926 | 187 | 27.299 | | |
| | Academic self-perception | 6837.177 | 187 | 36.562 | | |
| | Perception of atmosphere | 7978.502 | 187 | 42.666 | | |
| | Social self-perception | 2875.592 | 187 | 15.377 | | |
| Total | Perception of learning | 156322.000 | 197 | | | |
| | Perception of teachers | 125706.000 | 197 | | | |
| | Academic self-perception | 88807.000 | 197 | | | |
| | Perception of atmosphere | 150118.000 | 197 | | | |
| | Social self-perception | 54493.000 | 197 | | | |
| Corrected total | Perception of learning | 11464.315 | 196 | | | |
| | Perception of teachers | 5908.213 | 196 | | | |
| | Academic self-perception | 7141.411 | 196 | | | |
| | Perception of atmosphere | 8817.614 | 196 | | | |
| | Social self-perception | 3128.731 | 196 | | | |

females and are meant to safeguard against gender discrimination, other issues still need to be addressed to provide support to female students. In our study, thirty-five females (23.8 percent) reported gender discrimination in their educational institution. Gender discrimination is a universal phenomenon witnessed in Western countries in a variety of forms,[11,12] but, in a less open society like Pakistan, it seems to be largely underreported due to various social taboos.

At 115, the mean DREEM score of the students in our study was slightly lower than the score reported in a study of 143 dental students in the United Kingdom in which a mean score of 122 was recorded.[13] A study of 126 undergraduate dental students in India also reported a mean score of 115.[14] Interestingly, the mean total score for the final-year dental students in the Indian study was 114, which is probably more applicable to our study as it was done on a similar cohort (final-year students). A range of DREEM scores have been reported from studies on undergraduate medical students. Some recent studies on these students have reported mean DREEM scores of 99 in Yemen,[15] 107

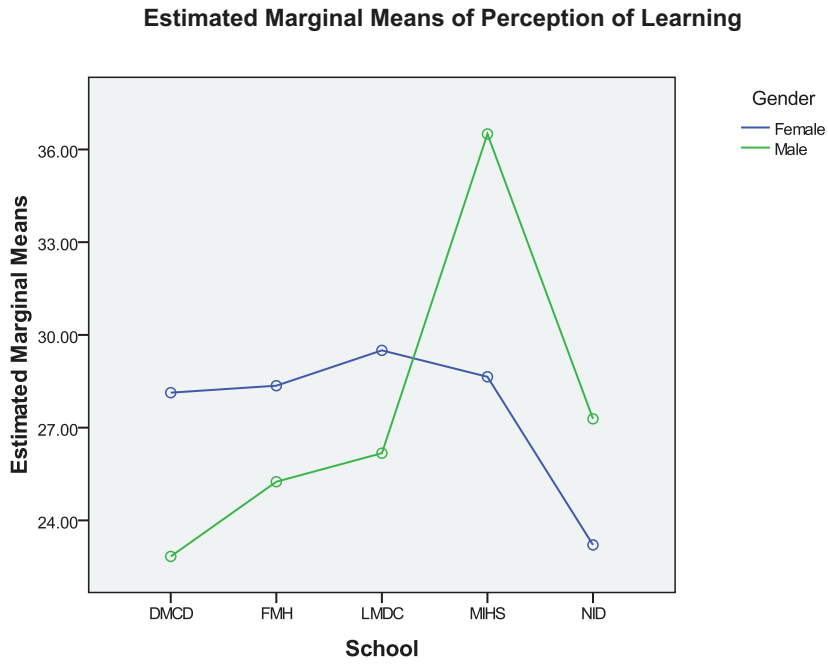


**Figure 1. Gender and institution interaction: students' perception of learning**

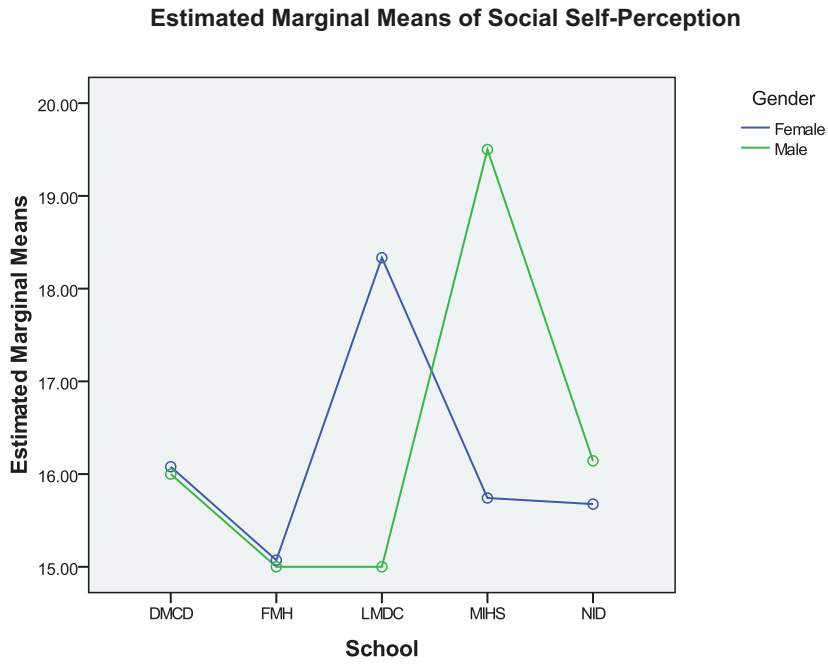


**Figure 2. Gender and institution interaction: students' social self-perception**

in Saudi Arabia,[16] 110 in Trinidad,[2] 117.63 in Ankara, Turkey,[17] 118 in Nigeria,[15] 130 in Nepal,[15] 139 in Scotland,[16] 141.23 in Norwich, United Kingdom,[18] 141.40 in York, United Kingdom,[19] 143 in Australia,[20] and 145.20 in Hull, United Kingdom.[19]

The mean scores on all five subscales from the dental institutions in Punjab in our study are quite low compared to those reported in 2009 from Europe and Australia.[18-20] These differences in subscale scores are also reflected in the total mean scores and can be attributed to the fact that the Western institutions are increasingly cognizant of the importance of educational environment, particularly in professional institutions. Most Western institutions have developed means to obtain regular and structured feedback from their students, e.g., the national student survey in the United Kingdom.[21] Regular monitoring and evaluation provide impetus to boost the educational environment, which translates into improved student perceptions of the educational experience. It has been suggested that medical and dental schools offering traditional curricula generally tend to report lower mean total DREEM scores and the DREEM score may be used to detect the type of curriculum.[6] Even though this suggestion has not been validated, the results of our study support this idea.

It is noteworthy that the DMCD and NID, the two public sector dental institutions, recorded the lowest total mean DREEM scores in our study. On the other hand, the three private sector dental institutions (the LMDC, FMH, and MIHS), despite being established more recently, had better overall scores. Interestingly, the pass percentage of students from DMCD in the final professional B.D.S. examination was 60.0 percent, which was the lowest amongst all the institutions. At the other extreme, the MIHS, which had the highest mean total DREEM score of 121.20 (SD 21.73), also recorded the highest pass percentage in the university examination. The university examinations are based on norm-referenced assessment. The students are awarded numerical marks and can be ranked based on their total marks. The first three positions amongst the subjects in this study were also secured by students from private sector institutions. It may be appropriate to state that the DREEM scores in our study show a direct correlation with the overall performance of the institutions in the university examinations. Given this observation, it may be possible to use DREEM scores to predict performance, i.e., higher DREEM scores may be predictive of better performance on examinations. However, research is required to gather further evidence before any such conclusions can be drawn.

These results of our study could be explained in a number of ways. First, the private institutions enjoy complete administrative and financial autonomy and are free from bureaucratic requirements usually seen in public sector institutions. Second, the private institutions charge a high tuition fee and are thus obliged to address students' concerns more promptly. Moreover, the private institutions offer lucrative salary packages to faculty members, and financial incentives have attracted qualified and experienced teachers to move to private institutions from the public sector. Thus, the private institutions seem to have stronger faculties than those in public sector institutions. It is evident that, to compete with the private sector, the government-supported dental schools need major reforms, including administrative and financial autonomy along with better financial incentives for faculty members.

Several DREEM items were identified as areas of concern based on average mean scores for individual items from across the five institutions. Of these, items 8, 12, 15, 16, 21, and 32 represent a continuum of issues related to teaching methodology and attitudes of teachers. Similar concerns have been identified in studies conducted in institutions with traditional curricula.[14,16] Clearly, the dental institutions affiliated with the UHS need to initiate fundamental changes in their teaching methodologies to align them with contemporary trends. While introduction of an enquiry-based pedagogy, special study units, small-group teaching, and improved formative feedback seem to be obvious measures, it is also imperative to train the faculties to support these vital changes.

Another area highlighted by DREEM analysis was the issue of cheating. Cheating by students in higher education is universally recognized.[22] However, further exploration of this aspect of the educational environment merits a separate study as it is not possible to ascertain precisely the nature, incidence, causes, and seriousness of cheating from the DREEM data alone. Lastly, two items of concern were identified in the subscale of social self-perceptions. The DREEM scores in our study found boredom and dissatisfaction with social life amongst the students. In this regard, the institutions need to support the students and create an environment that promotes healthy social interaction and extracurricular/leisure activities.

# Conclusions

Assessing students' perceptions of the academic dental environment may provide useful insights that can help administrators and faculty members identify areas that require change. This study has shown that the DREEM instrument can serve as a useful means to evaluate students' perceptions about the educational environment. A myriad of issues challenge the quality of dental education in Pakistan, and its dental schools need to develop robust mechanisms to incorporate contemporary international trends in dental education in order to improve the educational environment.

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