Impact of Learning Environment on Development of Professional Identity: A Perception of Undergraduate Medical Students

[1]Dr Rahim Ud Din, [2]Dr Fatima Abid, [3]Aihtisham Parvez, [4]Dr Anas Raza Memon, [5]Dr Sana Iqbal, [6]Dr Arsalan Ahmed Uqaili

[1]Designation. Assistant professor. Department. Medical Education Institution name. Jhalawan Medical College Khuzdar. MHPE Scholar AKU Karachi

Email. drrahim51@gmail.com

[2]MBBS, M.Phil,MBA(HHCM),CMed, Ph.D physiology Associate Professor Department of Physiology Sindh Medical college, JSMU

fatima.abid@jsmu.edu.pk

[3]MHPE Scholar AKU Karachi Lecturer Indus College of Nursing and Midwifery Indus University of Health Sciences

aihtishamparvez@hotmail.com

[4]Lecturer Department of Anatomy LUMHS Jamshoro MHPE Scholar AKU Karachi

anasraza@gmail.com

[5]Manager Research Operations and Development, ORIC, Ziauddin University

sana.iqbal@zu.edu.pk

s_taurian@hotmail.com

[6]MBBS, M.Phil, Ph.D physiology Associate Professor Department of Physiology Sindh Medical college, JSMU (Corresponding Author)

arslan.uqaili@jsmu.edu.pk

arsalanuqaili@gmail.com

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ABSTRACT:

Background:

The learning environment plays a pivotal role in shaping student experiences, academic performance, and professional identity formation in health professions education. While international evidence links supportive educational climates with stronger professional identity, limited data are available from institutions in Pakistan.

Objective:

To assess undergraduate medical students' perceptions of the learning environment and determine its association with professional identity formation in selected public-sector medical colleges in Pakistan.

Methods:

An explanatory sequential mixed-methods design was employed. Quantitative data were collected using the Dundee Ready Educational Environment Measure (DREEM) and the Macleod Clark Professional Identity Scale (MCPIS-9), distributed via

institutional email and learning platforms. A total of 210 students (175 MBBS, 35 BDS) responded (47% response rate). Focus group discussions (FGDs) with 6–8 participants per group further explored themes from the survey. Quantitative data were analysed using descriptive and inferential statistics; qualitative transcripts underwent thematic analysis.
Results:
The median DREEM score was 128 (IQR 112–145), reflecting an overall "more positive than negative" perception of the learning environment. Social self-perception scored lowest, highlighting challenges in peer support and institutional climate. The median MCPIS-9 score was 24 (IQR 22–27), with 82% of students expressing strong professional identity. A moderate positive correlation was observed between DREEM and MCPIS-9 scores ($r = 0.51$, $p < 0.001$). Qualitative findings emphasised the importance of constructive faculty feedback, mentorship, and mental health support, but also noted inconsistencies across faculty.
Conclusion:
Students perceive their environment positively overall, yet challenges in social support, stress, and variability in faculty engagement remain. Strengthening mentoring, mental health services, and curricular innovations may enhance both learning and professional identity formation.

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Introduction

The learning environment is a fundamental component of health professions education (HPE), influencing students' academic experiences, professional development, and overall educational outcomes. A supportive and learner-centred environment promotes active engagement, facilitates knowledge acquisition, and fosters the development of clinical competence, ethical values, and professional behaviours. Such environments have consistently been associated with improved academic performance, learner satisfaction, confidence, and preparedness for professional practice. (1,2) Consequently, the educational environment has gained increasing recognition as a critical determinant of both educational quality and the development of competent healthcare professionals. (3)

Despite growing international evidence, research exploring students' perceptions of the learning environment and its relationship with professional identity formation remains limited in low- and middle-income countries, including Pakistan. (4,5) Professional identity formation is a gradual developmental process through which students internalize the values, responsibilities, ethical standards, and behaviours expected of healthcare professionals. This process is shaped by formal curricula, clinical experiences, faculty role modelling, peer interactions, institutional culture, and opportunities for reflection and constructive feedback, enabling students to transition from learners to competent professionals. (6,7).

Within Pakistan's public-sector medical colleges, the learning environment comprises physical infrastructure, institutional culture, teaching practices, social interactions, clinical exposure, and increasingly, digital learning platforms. Although these institutions follow similar curricular frameworks, considerable variation exists in faculty development, educational resources, student support systems, and learning opportunities. Such differences

may substantially influence students' perceptions of their educational environment and subsequently affect their professional identity formation. Understanding these perceptions is therefore essential for identifying institutional strengths, addressing educational challenges, and guiding improvements in undergraduate medical education.

Instruments such as the Dundee Ready Educational Environment Measure (DREEM) have become standard tools for assessing educational climate in health professions settings globally. DREEM probes student perceptions across domains such as learning, teachers, academic self-perception, atmosphere, and social self-perception (8). The **Macleod Clark Professional Identity Scale-9 (MCPIS-9)** provides a complementary assessment of how students see themselves in relation to their profession, measuring dimensions of competence, commitment, values, and the social aspects of professional life (9). Together, these instruments enable researchers to quantify how learning environment perceptions correlate with professional identity development.

Across diverse international contexts there is mounting evidence that positive learning environments are associated with stronger professional identity among students. For instance, a recent mixed-methods study at Qatar University's health sciences programmes found that more favourable DREEM scores were significantly correlated with higher MCPIS-9 professional identity scores, and that students emphasized mentorship, clear curriculum expectations, and supportive faculty as key enabling factors (5). In Pakistan too, several studies using DREEM have revealed varying strengths and weaknesses in educational environments: differences by year of study, by institution, and in particular domains such as teaching quality, atmosphere, and student social support (10,11). These findings suggest that while many institutions provide an environment that is "more positive than negative," there remain gaps that could impede the internalisation of professional attitudes and identity formation.

However, multicenter evidence examining the association between learning environment and professional identity formation among undergraduate medical students in Pakistan remains scarce. Institutional differences in faculty development, educational resources, clinical learning opportunities, class size, student support services, and sociocultural context may substantially influence students' educational experiences, yet these factors have not been comprehensively investigated across multiple public-sector institutions. Furthermore, because professional identity formation is dynamic and context-dependent, findings from individual institutions cannot be readily generalized to other settings.

The present study was undertaken to address this knowledge gap by examining undergraduate medical students' perceptions of the learning environment across selected public-sector medical colleges in Pakistan and exploring their association with professional identity formation. Using validated quantitative instruments (DREEM and MCPIS-9) together with qualitative focus group discussions, the study aims to identify institutional strengths, explore contextual challenges, and provide evidence to inform educational policy, faculty development, and quality improvement initiatives. Ultimately, strengthening learning environments is essential for preparing competent, compassionate, reflective, and professionally accountable healthcare graduates while contributing multicentre evidence to the growing literature on educational quality and professional identity formation in Pakistan.

Materials and Methods

This explanatory sequential mixed-methods study was conducted across three public-sector medical institutions in Pakistan: Jhalawan Medical College, Khuzdar; Sindh Medical College, Jinnah Sindh Medical University (JSMU), Karachi; and Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro.

A multicentre design was adopted to ensure representation of undergraduate medical students from diverse geographical, educational, and sociocultural settings and to enhance the generalizability of the findings. The study aimed to examine students' perceptions of the educational environment and explore their association with professional identity formation through the integration of quantitative and qualitative data.

The study was implemented in two sequential phases. The first phase employed a quantitative cross-sectional survey to assess students' perceptions of the learning environment and professional identity using standardized, validated instruments. The second phase consisted of qualitative focus group discussions (FGDs), which were conducted after analysis of the survey results to provide deeper insight into the quantitative findings and to explain patterns identified during statistical analysis. This sequential approach enabled comprehensive exploration of students' educational experiences by integrating numerical findings with personal perspectives.

Data for the quantitative phase were collected through an online survey distributed via institutional email and the college's learning management system. The instrument was divided into three sections: demographic information (age, gender, ethnicity, year of study, and self-reported academic satisfaction rated on a five-point Likert scale), perceptions of the learning environment as measured by the Dundee Ready Educational Environment Measure (DREEM), and perceptions of professional identity measured using the Macleod Clark Professional Identity Scale (MCPIS-9). The DREEM includes 50 items across five domains perceptions of learning, perceptions of teachers, academic self-perception, perceptions of atmosphere, and social self-perception [14] while the MCPIS-9 comprises nine items assessing self-perceived competence, professional values, and commitment [15]. The survey remained active for four weeks, with weekly reminders issued to optimise participation.

To complement the survey findings, the second phase of the study consisted of focus group discussions (FGDs). A convenience sample of students from both MBBS and BDS programmes was recruited, ensuring representation across disciplines. Four FGDs were conducted, two with MBBS students and two with BDS students, each group comprising six to eight participants. A semi-structured interview guide, developed from the survey data and existing literature, was used to stimulate discussion on the learning environment, faculty–student interactions, peer relationships, and the ways in which these experiences shaped students' sense of professional identity.

Quantitative data were analysed using SPSS version 26 (IBM Corp., Armonk, NY). Descriptive statistics were calculated for all demographic and survey variables, and inferential analyses were undertaken to examine potential differences by demographic and academic characteristics. The relationship between learning environment perceptions (DREEM scores) and professional identity (MCPIS-9 scores) was tested using Spearman's rank correlation coefficient, while internal consistency reliability of the instruments was assessed using Cronbach's alpha [16].

The qualitative data from the FGDs were audio-recorded, transcribed verbatim, and analysed thematically. Deductive coding was used, guided by categories derived from both the survey results and established conceptual frameworks [17]. Comparisons were made across the MBBS and BDS groups to highlight both shared and distinctive elements of their experiences.

To strengthen the overall interpretation, quantitative and qualitative findings were integrated through methodological triangulation. This process enabled validation of findings across data sources, provided contextual understanding of students' experiences, and facilitated identification of institutional strengths, common challenges, and areas for educational improvement aimed at enhancing learning environments and fostering professional identity formation among undergraduate medical students.

Results

A total of 210 students participated in the study, corresponding to a response rate of approximately 47% of the targeted population. Among them, 175 (83.3%) were MBBS students and 35 (16.7%) were BDS students. Female students constituted the majority (60%), while 40% were male. The age distribution revealed that most participants (57.1%) were between 21–23 years, followed by 23.8% aged 18–20 years and 19% aged 24–26 years. Regarding study year, 55% were in their third year and 35% in the fourth year. Self-study hours varied, with the largest group reporting 6–10 hours per week (38.1%), while 23.8% studied fewer than 5 hours, 28.6% reported 11–15 hours, and only 9.5% studied more than 16 hours per week. These findings are summarised in **Table 1**.

Table 1. Baseline characteristics of study participants (n = 210)

Characteristic	**Frequency (%)**
Gender	
Male	84 (40.0)
Female	126 (60.0)
Program	
MBBS	175 (83.3)
BDS	35 (16.7)
Year of Study	
3rd Year	115 (55.0)
4th Year	74 (35.0)
Age Group (years)	
18–20	50 (23.8)
21–23	120 (57.1)
24–26	40 (19.0)
Self-study Hours/week	
0–5	50 (23.8)
6–10	80 (38.1)
11–15	60 (28.6)
>16	20 (9.5)

Perceptions of the Learning Environment

The Dundee Ready Educational Environment Measure (DREEM) revealed an overall median score of 128 (IQR 112–145), suggesting that students viewed the learning environment as "more positive than negative." Domain-specific scores demonstrated that perceptions of learning and teachers, as well as atmosphere, were rated relatively higher, whereas social self-perception remained the lowest, highlighting gaps in peer and institutional support. Full domain scores are presented in **Table 2**.

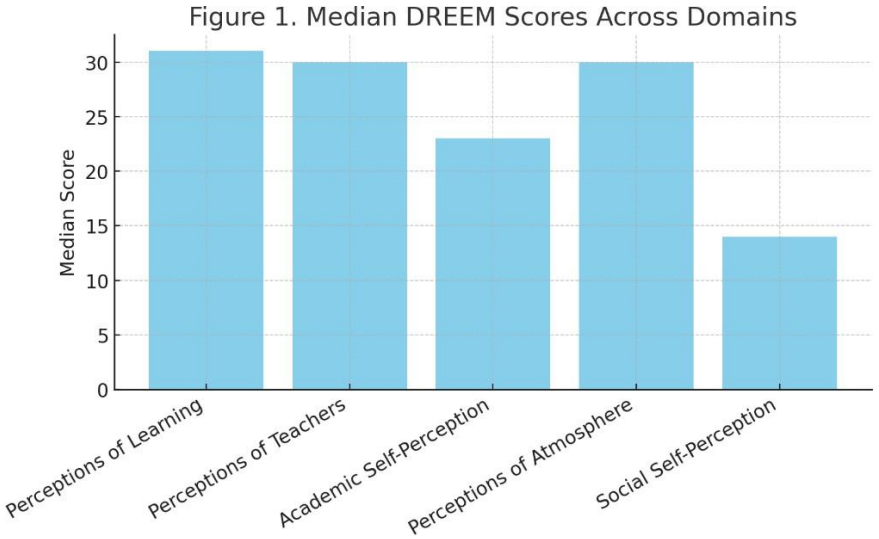
Table 2. Median DREEM scores across domains

Domain	Median (IQR)
Perceptions of Learning (PoL)	31 (25–35)
Perceptions of Teachers (PoT)	30 (26–34)
Academic Self-Perception (ASP)	23 (19–26)
Perceptions of Atmosphere (PoA)	30 (24–35)
Social Self-Perception (SSP)	14 (11–18)
Overall DREEM	128 (112–145)

Figure 1 shows the relative distribution of scores across the five domains, emphasising that while teaching and learning perceptions were stronger, students felt under-supported socially.

Figure 1. Median DREEM scores across domains.

Bar chart depicting domain-wise scores, with lowest ratings observed for social self-perception.



Professional Identity

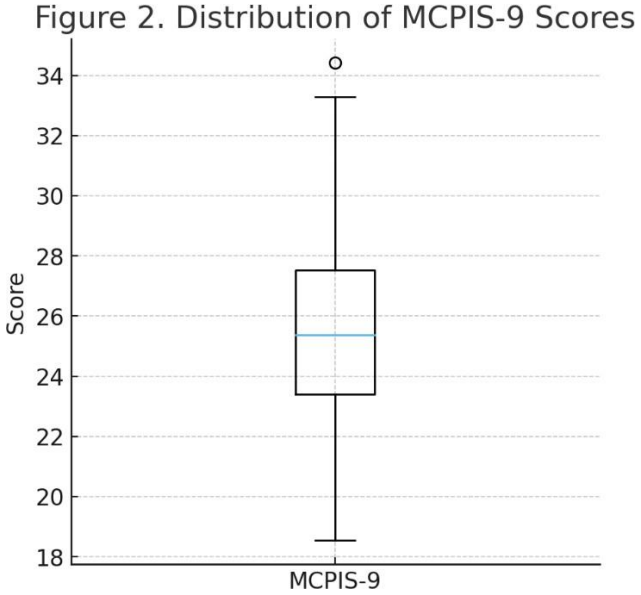
The Macleod Clark Professional Identity Scale (MCPIS-9) yielded a median score of 24 (IQR 22–27), reflecting a generally positive sense of belonging and identification with the profession. The majority of students (82%) expressed strong professional alignment. These results are summarised in **Table 3**.

Table 3. MCPIS-9 professional identity scores Domain	
MCPIS-9	**Median (IQR)**
	Overall 24 (22–27)

Figure 2 illustrates the overall distribution of MCPIS-9 scores, confirming a high level of identification among the majority of respondents.

Figure 2. Distribution of MCPIS-9 scores.

Boxplot showing interquartile spread of MCPIS-9 responses across the sample.



Program-wise Differences

MBBS students had slightly higher DREEM and MCPIS-9 scores compared with BDS students (median DREEM 130 vs 125; MCPIS-9 24 vs 23). Although these differences did not reach statistical significance (p = 0.07), BDS students consistently reported lower scores for social self-perception, suggesting a greater need for support in this subgroup. Results are summarised in **Table 4**.

Table 4. Comparison of DREEM and MCPIS-9 scores by program			
Program	Median DREEM (IQR)	Median MCPIS-9 (IQR)	p-value*
MBBS	130 (115–147)	24 (22–27)	0.07
BDS	125 (110–140)	23 (21–26)	

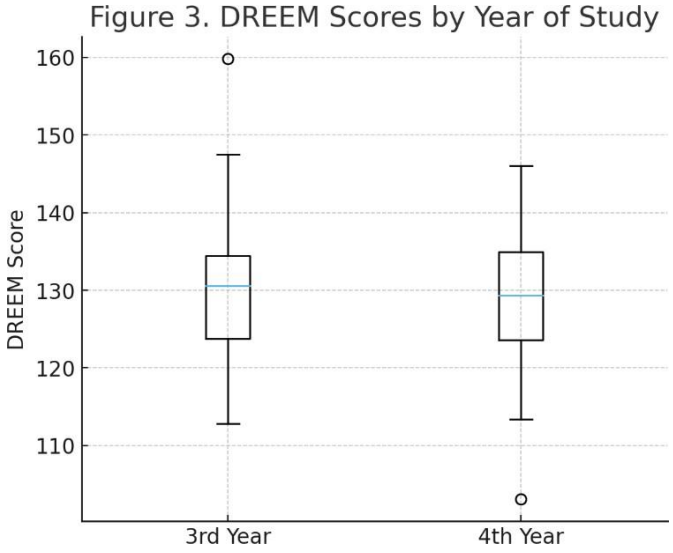
Based on Mann–Whitney U test.

Gender and Year of Study Analysis

No significant differences were observed in DREEM scores between male and female students (median 128.9 vs 129.7, p = 0.94) or between third- and fourth-year students (median 128.8 vs 129.8, p = 0.82). This indicates that

perceptions of the educational environment were broadly consistent across demographic and academic groups.

Figure 3. DREEM scores by year of study.



Boxplot showing similar distribution of DREEM scores between third- and fourth-year students.

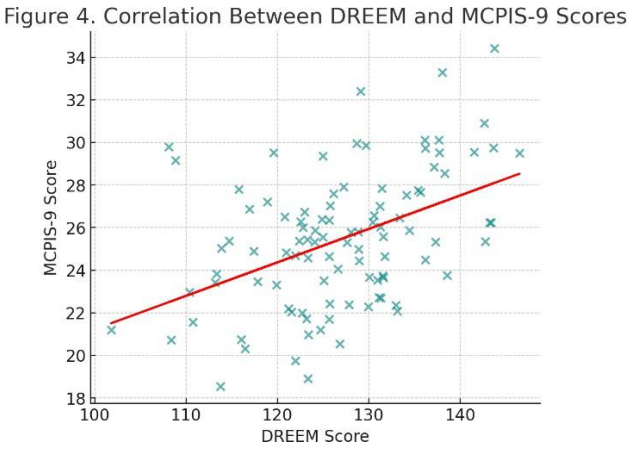
Correlation Between Learning Environment and Professional Identity

Correlation analysis revealed a moderate positive relationship between DREEM and MCPIS-9 scores ($r = 0.51$, $p < 0.0001$), indicating that students who perceived the learning environment more positively also demonstrated stronger professional identity formation. These findings are detailed in **Table 5** and illustrated in **Figure 4**.

Table 5. Correlation between DREEM and MCPIS-9 scores

Variable Pair	Correlation Coefficient (r)	p-value	Interpretation
DREEM vs MCPIS-9	0.51	<0.0001	Moderate positive correlation

Figure 4. Correlation between DREEM and MCPIS-9 scores.



Scatter plot with regression line, showing that higher DREEM scores are associated with higher MCPIS-9 scores.

Qualitative Themes

Themes and Sub-themes

The qualitative phase involved focus group discussions (FGDs) to gain deeper insights into students' perceptions of their learning environment and its influence on their professional identity development. Thematic analysis of the data yielded several key themes and sub-themes:

Theme 1: Experiences Shaping Professional Identity

- **Positive Practical Learning:** Students found hands-on experiences like clinical rotations crucial for building their confidence and identity as future professionals. They felt these experiences helped them apply their knowledge effectively.
- **Challenges with Workload:** Many students felt overwhelmed by the heavy workload, which made it difficult to focus on their professional development and learning.
- **Support from Faculty:** Students appreciated when faculty were supportive and provided helpful feedback. This support was seen as vital in building their confidence and professional identity.

Insights on Faculty Support:

  - **Constructive Feedback:** Students highlighted the importance of receiving detailed and constructive feedback, which helped them improve their academic performance and build confidence.
  - **Accessibility and Approachability:** The approachability of faculty was highly valued, with students appreciating the availability of faculty outside formal teaching sessions.
  - **Role as Mentors:** Faculty members who acted as mentors, offering career guidance and personal development advice, were particularly appreciated and seen as crucial to students' growth as professionals.
  - **Inconsistency in Support:** Some students noted variability in the level of support provided by different faculty members, leading to feelings of frustration when support was perceived as lacking.

Theme 2: Perceptions of the Learning Environment

- **Physical Environment:** Students had mixed feelings about the learning spaces. While some facilities were appreciated, others were seen as outdated or overcrowded, which hindered their learning experience.
- **Social Support and Peer Relationships:** Positive relationships with peers were important, but some students felt the university could do more to support those dealing with stress and anxiety.
- **Approachability of Faculty:** Students valued faculty who were approachable and willing to engage with them outside of formal teaching sessions. This approachability made a significant difference in their overall learning experience.

Theme 3: Emotional and Mental Well-being

- **Coping with Stress:** Prominent levels of stress were common, with some students managing well through peer

support and organization, while others struggled, leading to burnout.

- **Need for Better Mental Health Support:** There was a clear call for more accessible mental health resources and better institutional support for student well-being.

Theme 4: Ideal Learning Environment

- **More Practical Learning Opportunities:** Students wanted more hands-on learning, especially earlier in their education, to better prepare them for their careers.
- **Enhanced Support Systems:** Students felt that more support, including academic advising and mental health services, would improve their academic performance and help them build a stronger professional identity.
- **Use of Technology in Learning:** Integrating more technology, like simulations and online resources, was seen as a way to enhance learning and stay current with healthcare advancements.

Thematic analysis of focus group discussions provided a richer understanding of students' experiences. Four broad themes emerged: (1) experiences shaping professional identity, (2) perceptions of the learning environment, (3) emotional and mental well-being, and (4) features of an ideal learning environment. Sub-themes included the importance of practical learning opportunities, inconsistent faculty support, stress management challenges, and calls for greater integration of technology in learning. These are outlined in **Table 6**.

Table 6. Themes and sub-themes from focus group discussions

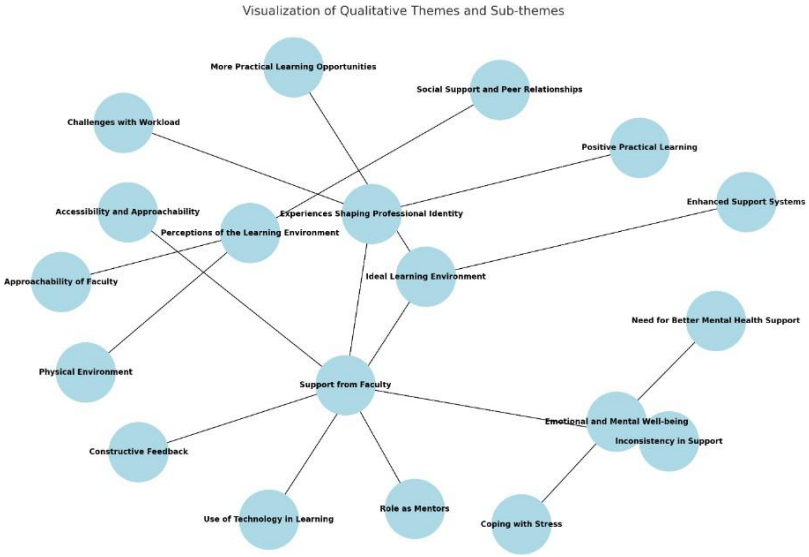
Theme	Sub-themes
Experiences shaping identity	Practical learning, workload challenges, faculty support, mentorship
Perceptions of environment	Physical infrastructure, peer relationships, faculty approachability
Emotional & mental well-being	Coping with stress, need for better mental health resources
Ideal learning environment	Practical exposure, support systems, technology-enhanced learning

Integrated Interpretation

When considered together, the quantitative and qualitative results indicate that the learning environment at Jhalawan Medical College is perceived more positively than negatively. However, **low social self-perception scores**, inconsistent faculty support, and limited mental health resources highlight areas needing urgent improvement. Importantly, the **positive correlation between learning environment and professional identity** underscores the necessity of cultivating supportive educational settings to strengthen professional growth.

Scatter Plot of DREEM Scores vs MCPIS-9 scores:

The scatter plot with a regression line further illustrates the moderate positive correlation between DREEM and MCPIS-9 scores. The positive slope indicates that students who perceive their learning environment more positively tend to have a stronger professional identity.



Discussion

The present study provides a valuable lens into how undergraduate students at Jhalawan Medical College perceive their learning environment and how these perceptions shape their emerging professional identity. By combining quantitative measures with qualitative insights, the findings capture not only the broad trends in student satisfaction but also the subtleties of their lived experiences. Together, these results illustrate that while the academic climate is generally seen as supportive, there remain areas in need of strengthening, particularly in relation to social support, faculty consistency, and emotional well-being.

The Dundee Ready Educational Environment Measure (DREEM) scores obtained in this study indicated that students overall viewed their learning environment as "more positive than negative." This is in line with a wide body of international research showing that medical students often report moderately positive perceptions of their academic context, though always tempered by concerns about workload, quality of teaching, and peer support [18,19]. Within Pakistan, similar results have been reported: Shahzad et al. compared public and private sector medical colleges in Lahore and noted that while both scored within the positive range, issues of heavy workload and limited feedback were consistent stressors [20]. Thus, the findings from Jhalawan echo what has been seen both locally and globally—that the quality of the learning environment is not static but requires continuous evaluation and targeted interventions.

Within the domain breakdown of the DREEM, the relatively lower scores for perceptions of atmosphere and social self-perception stand out. This indicates that while students felt teaching and curriculum structure were reasonable, they experienced stress related to competition, academic demands, and inadequate peer or institutional support. These findings mirror prior work demonstrating that the "hidden curriculum" of stress and competition in medicine can undermine students' confidence and satisfaction [21,22]. Indeed, social and emotional climate has been repeatedly cited as one of the most crucial factors influencing student well-being and performance [23]. In contexts such as Balochistan, where institutional resources are often stretched and class sizes relatively large, the risk of students feeling unsupported is particularly acute.

Professional identity formation, as measured by the Macleod Clark Professional Identity Scale (MCPIS-9), was generally positive, with students reporting a strong sense of belonging to their profession. The moderate positive correlation between DREEM and MCPIS-9 scores suggests that the quality of the learning environment is closely tied to how students internalise their

professional roles. This link is consistent with theories of socialisation, where professional values and behaviours are not simply taught but are absorbed through interactions, role-modelling, and the culture of the institution [24,25]. Mukhalalati et al. similarly showed in a large mixed-methods study that students who rated their educational environment more favourably also demonstrated stronger professional identity scores, highlighting that institutions cannot separate questions of teaching quality from questions of professional formation [26]. A positive educational climate not only helps students succeed academically but also nurtures their motivation, ethical behaviour, and lifelong learning orientation [27].

The comparison between MBBS and BDS students revealed that although overall scores were similar, dental students reported lower social self-perception. This observation warrants further exploration. Dentistry students often face unique pressures: early exposure to clinical requirements, high patient expectations, and the technical precision required in practice. Prior research has shown that dental students frequently experience higher levels of stress and burnout compared to their medical counterparts [28]. In Pakistan, this pattern has also been noted, with dental students reporting more challenges related to workload and anxiety [29]. The lower social support perception among BDS students may therefore reflect both curricular design and a relative lack of tailored support structures for this subgroup. Addressing these disparities by enhancing mentoring and peer-support programs within the dental stream could be one concrete way forward.

Interestingly, no significant gender differences were observed in perceptions of the learning environment. This is consistent with several studies that report broadly similar educational environment perceptions between male and female students [20], though others have shown that female students sometimes report higher stress and lower support [30]. The absence of large gender gaps in this study might reflect a relatively cohesive institutional culture at Jhalawan or shared challenges that cut across gender divides. Nevertheless, the global literature reminds us that gender dynamics in medical education are complex and context-dependent, and ongoing monitoring is important.

The qualitative findings in this study provided depth and richness beyond the numbers. Students repeatedly emphasised the centrality of faculty support, noting that constructive feedback, mentorship, and faculty approachability were vital to their academic and professional growth. Faculty who were accessible outside of class, who treated students as junior colleagues, and who provided guidance on career and personal development were described as transformative. This aligns with a long literature on the power of role-models and mentors in medicine, where supportive faculty not only transmit knowledge but also shape the professional ethos of their students [31,32]. However, students also spoke of inconsistency: some faculty were highly supportive, others less so, and this variability created feelings of frustration and inequity. This inconsistency in faculty engagement is not unique to public sector universities; it has been highlighted internationally as a key barrier to improving the student experience [33].

Mental and emotional well-being emerged as another strong theme. Many students described stress, anxiety, and burnout linked to workload, exams, and expectations. They expressed a clear need for better mental health resources, counselling, and structured support for stress management. This echoes findings from Pakistan and beyond that medical students are at heightened risk of mental health issues and that institutional support systems are often underdeveloped [34,35]. Given that mental health challenges can directly undermine both academic performance and professional identity formation, this area deserves urgent attention from policymakers and administrators.

The vision of an ideal learning environment described by students—more practical learning earlier in the curriculum, stronger support systems, integration of technology, and improved

feedback mechanisms—is remarkably consistent with evidence-based reforms proposed in medical education worldwide. Early clinical exposure, simulation, e-learning resources, and reflective practices have all been shown to strengthen both competence and identity formation [31,26].

The implications of these findings are clear. Faculty development should be prioritized, focusing on skills in giving effective feedback, mentoring, and creating supportive environments. Specific support structures should be created for dental students, who appear to face unique challenges. Mental health resources must be expanded, with counselling and peer-support programs normalised as part of the academic fabric. Finally, curricular innovations that integrate practice, feedback, and technology should be embraced. Future research could track the impact of such interventions longitudinally, examine sub-groups more closely, and evaluate the long-term impact of environment improvements on professional identity.

In conclusion, this mixed-methods study demonstrates that a supportive learning environment is fundamental to students' educational experiences and professional identity formation. Although the overall learning environment was perceived positively, challenges related to social support, faculty engagement, and student well-being remain. Addressing these areas through targeted educational and institutional strategies may strengthen both learning outcomes and the development of competent, ethical, and professionally confident healthcare graduates.

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