

## Emotional intelligence and perceived stress among undergraduate medical, dental, and allied health students: A comparative study

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### ABSTRACT

**BACKGROUND & OBJECTIVES:** Emotional Intelligence (EI) encompasses five key principles: self-awareness, self-management, motivation, social awareness, and relationship management. Perceived stress (PS) refers to the emotions or thoughts someone has about the level of stress they experience, and it is common among undergraduate health students. High EI improves learning and reduces stress. The current study was designed to assess the levels of Emotional Intelligence and Perceived Stress, and the association between the, among undergraduate health students. The study also aimed to check the association between EI and the academic performance of students.

**METHODOLOGY:** A cross-sectional analytical study was conducted at Lahore Medical and Dental College (January 2023 to June 2023), including participants from MBBS, BDS, Pharm D, BS Nutrition and BS Biotechnology. A comparative analysis was performed across gender, academic discipline, and year of study. SPSS version 22 was used for the analysis of the data.

**RESULTS:** A total of 1351 students were enrolled in the study. The mean score with standard deviation for EI and PS were  $121.4 \pm 19.35$  and  $22.53 \pm 10.92$ , respectively. Female students had a higher level of EI, while no significant difference was observed, gender-wise, in the level of PS. EI can predict PS with significant accuracy, as indicated by the ROC curve (AUC of 0.88;  $p$ -value < 0.01). There was no association of academic performance with Emotional intelligence as checked by linear regression ( $p > 0.05$ ).

**CONCLUSION:** The study finds that undergraduate medical, dental, and allied health students have high levels of PS and average EI. Moreover, low EI was associated with higher stress.

**KEYWORDS:** Emotional Intelligence, Psychological Stress, Students.

### INTRODUCTION

Emotional intelligence (EI) is the competency of an individual that enables one to analyze and comprehend one's own as well as others' emotions and manage them according to one's own capacity. Emotional Intelligence (EI) spans five basic principles, including awareness and management of self-emotions, the ability to motivate oneself, and awareness and management of others' emotions. Awareness of self-weaknesses, strengths and feelings enables one to control and modify the response in different challenging situations<sup>[1]</sup>. In the educational process, EI can help students learn and achieve goals. It has been proven and documented that students with high EI not only perform better but also maintain stronger social connections with their classmates and mentors<sup>[2]</sup>. Brackett et al. (2011) reported that emotional intelligence plays a crucial role in fostering effective interpersonal and intrapersonal connections within various

contexts, including school, home, and the workplace. An essential aspect of emotional intelligence involves effectively utilizing emotions in a constructive manner. This encompasses the capacity to utilize one's own emotions to address challenges and find solutions<sup>[3]</sup>.

The key component of EI that enables the students to improve scholastic performance is their ability to manage their emotions under stress and anxiety. Those who can control and manage their emotions and maintain a positive perspective compete through the educational challenges and setbacks smoothly, while students with poor EI find it difficult and become devastated and give up<sup>[4]</sup>. EI can help students learn and achieve goals. Zhoc et al. (2018) reported that students with higher emotional intelligence engage in more helpful social interactions with peers and teachers, who in turn offer advice and insight that help them achieve learning goals<sup>[5]</sup>. Moreover, a direct relationship between EI and academic performance has been reported<sup>[6]</sup>.

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Perceived stress is the subjective feeling of anxiety and distress, and it has been reported to be experienced quite frequently by undergraduate medical, dental and allied health students due to academic stress. Long hours of study, complex cases, emotional challenges, and patient care are among the factors contributing to increased stress among these students<sup>[7,8]</sup>. The difference in the grades in medical institutes as compared to schools is another trigger of stress in these students. Most of these students have excelled in their schools, and having an average score in medical tenure becomes challenging<sup>[9]</sup>.

Perceived stress has a range of negative effects on the physical and emotional health of the undergraduate medical professionals. The symptoms vary from headaches, fatigue, anxiety, and depression to burnout. Suicidal thoughts have been associated with burnout in medical students, and recovery was reported from such negative feelings with recovery from stress<sup>[10]</sup>. Hinderance and interference with memory and learning lead to impairment of academic performance in the state of perceived stress<sup>[11]</sup>. Evidence suggests a reduction in the level of perceived stress with improvements of EI among health professionals. Developing and improving the skills of recognizing, understanding, and managing one's own emotions and the emotions of others, individuals can learn to regulate their emotions more effectively, cope with stress more adaptively, and build better social relationships, all of which can help reduce the experience of perceived stress<sup>[12]</sup>.

Strong social relationships and interactions are characteristic of emotionally intelligent people, and this quality acts as a buffer against stress. High EI keeps individuals focused on their aims, values and strengths, leading to motivation and enhancement of self-confidence, all of which help to manage and cope with stress in an effective manner<sup>[13]</sup>.

Improvement of EI is associated with reduced perceived stress and an upgrade of academic status among undergraduate health professionals<sup>[4]</sup>. Individuals with low levels of emotional intelligence encounter numerous challenges in handling stress-related issues. Recently, Paudel U et al. (2022) have reported a significant link between stress and emotional intelligence<sup>[11]</sup>.

Balance can be achieved by improving EI with the help of emotional learning programs, as well as using stress coping strategies, aiming to harmonize oneself with external conditions<sup>[14]</sup>. EI can be improved by introducing social and emotional learning programs. To incorporate a program to improve these parameters, it is important to assess the level of EI and perceived stress. The current study was designed to assess the levels of EI and perceived stress, as well as the association between the two, among medical, dental, and allied health students. The study also aimed to check the association between EI and the academic performance of students.

## METHODOLOGY

It was cross-sectional analytical research carried out at Lahore Medical and Dental College, Lahore, from January 2023 to June 2023 after approval from the Institutional Review Board (LM&DC/22794). The questionnaire was

administered after participants provided verbal consent. Each student was given ample time to fully understand and complete the questionnaire. To ensure confidentiality, students were not asked to provide their names, and they were assured that the information they shared would be kept strictly confidential. All the registered students of Bachelor of Medicine, Bachelor of Surgery (MBBS), Bachelor of Dental Surgery (BDS), Doctor of Physical Therapy (DPT), Doctor of Pharmacy (Pharm D), Bachelor of science in Nutrition (BS Nutrition), and Bachelor of science in Biotechnology (BS Biotechnology) programs (six colleges) that are project of Lahore medical and Dental college, Lahore, who were present and willing to participate were included by convenience sampling.

Data collection was done through distributing the questionnaire, consisting of four sections. The informed written consent of the participants was recorded in section A, and they were assured of the confidentiality of their data. All the students were informed about the questions and asked to complete the questionnaire in one go. It took about 15 minutes to complete the questionnaires. Incomplete questionnaires were excluded.

Demographic information of the participants, including their age, residential status, gender, religion, level of education, parents' employment status and active participation of the participants in non-academic pursuits (sports, societies and clubs, music, dancing, etc.), was recorded in section B of the questionnaire. Section C included the well-validated 33-item self-assessment tool, Schutte Self-Report Emotional Intelligence Test [SEIT], to assess the EI of the participants<sup>[15]</sup>. Participants self-evaluated each of the 33 items using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). Scores can span the range of 33 to 165. Higher scores indicate higher EI. Section D comprised the 10-item Perceived Stress Scale (PSS), which is the most used validated questionnaire worldwide to measure the stress perception of participants across different situations<sup>[16]</sup>.

Each of the 10 items consists of a five-point Likert scale (0 = never to 4 = very often), and the total score can range from 0 to 40, with higher total scores indicating a higher level of perceived stress. A pilot study was conducted to assess the reliability of both questionnaires, yielding values of 0.88 and 0.79 for SEIT and PSS, respectively.

Descriptive statistics (Mean, standard deviation, frequency, and percentage) were given to summarize the data. EI and perceived stress were compared using a t-test for independent groups, and ANOVA was used for comparisons across multiple groups. The chi-square test was used to check the association of Perceived Stress with different variables. Binary logistic regression was used to predict the effect of EI on PS with perceived stress as the dependent variable. Receiver operating characteristic curve analysis was used to predict the sensitivity and specificity of EI for perceived stress. Linear Regression was used to check the direct association of academic performance (Marks/Percentage in FSc or A levels for students enrolled in First Year and Marks Obtained/Percentage in the last University Exam) with Emotional intelligence. The statistical level of significance was set as  $< 0.05$ .

## EI & Perceived Stress in Health Undergraduates

### RESULTS

A total of 1,351 students took part in the study, with 403 being female and 944 being male. Among the study participants, 349 were Hostelite, and 1002 were day scholars. Demographic information of the study participants is given in Table- I.

**Table-I: Demographic information of the participating students (n = 1351).**

Variables	Categories	n(%)
Gender	Female	407 (30.1)
	Male	944 (69.9)
Residential status	Hostelite	349 (25.8)
	Day Scholar	1002 (74.2)
Course of study	MBBS	384 (28.4)
	BDS	134 (9.9)
	DPT	280 (20.7)
	Pharm D	499 (36.9)
	BS Nutrition	30 (2.2)
	BS Biotechnology	24 (1.8)
Satisfied with course of study	Yes	1036 (76.7)
	No	315 (23.3)
Distinctions	Yes	260(19.3)
	No	1091(80.7)
University Positions	Yes	55(4.1)
	No	1296(95.9)

Female participants had a higher level of EI as compared to male participants while no significant difference was observed gender wise for the level of PS. EI as well as PS both were significantly different across the different study

**Table III: Comparisons of Emotional Intelligence and Perceived stress.**

Emotional Intelligence				
Variables	Categories	Mean ± SD	P- value	95% Confidence Interval
Gender	Male	119.72 ± 19.21	0.03*1	(0.17-4.68)
	Female	122.15 ± 19.39		
Residential status	Hostelite	128.84 ± 17.8	≤0.0011	(5.23-9.95)
	Day Scholar	121.25 ± 19.87		
Course of study	MBBS (a)	123.97 ± 15.65	0.001*2	p-value with 95% CI post-hoc Tukey's test
	BDS (b)	119.58 ± 17.11		
	DPT (c)	119.14 ± 19.8		
	Pharm D (d)	120.59 ± 22.18		
	BS Nutrition (e)	122.7 ± 14.9		
	BS Biotechnology (f)	132.08 ± 14.12		
Perceived Stress				
Gender	Male	22.49 ± 10.66	0.941	(-1.23-1.31)
	Female	22.53 ± 11.04		
Residential status	Hostelite	22.78 ± 10.41	0.631	(-1.00-1.65)
	Day Scholar	22.45 ± 11.1		
Course of study	MBBS (a)	21.94 ± 9.66	< 0.001*2	p- value with 95% CI post-hoc Tukey's test
	BDS (b)	27.70 ± 10.56		
	DPT (c)	23.9 ± 10.8		
	Pharm D (d)	21.0 ± 11.4		
	BS Nutrition (e)	22.7 ± 11.01		
	BS Biotechnology (f)	19.08 ± 11.13		

Data presented as Mean ± SD, 1 p value calculated by t test, 2 p value calculated by ANOVA, 3 p value calculated by post-hoc Tukey's test, \*p value < 0.05 considered significant.

The means for EI and PS were 121.4 ± 19.35 and 22.53 ± 10.92 respectively. Table II provides the Mean ± SD for Emotional Intelligence, its components, and Perceived stress across the study population. The distribution of participants having high, medium, and low levels of EI as well as PS is also described in Table-II.

**Table-II: Distribution of Emotional Intelligence and Perceived stress.**

Variables	Mean ± SD		
Overall Emotional Intelligence	121.4 ± 19.35		
Perception of Emotions	35.9 ± 6.33		
Managing owns Emotions	33.34 ± 6.12		
Managing others' Emotions	28.56 ± 4.94		
Utilization of Emotions	23.41 ± 4.46		
Perceived Stress	22.53 ± 10.92		
Graded Emotional Intelligence (Frequency)	High	Medium	Low
	290	708	353
Graded Perceived Stress (Frequency)	High	Medium	Low
	578	323	450

Data presented as Mean ± SD (Standard deviation).

courses as checked by ANOVA (Table III). Post-hoc analysis revealed significant differences in PS across BDS, MBBS and DPT students with students of BDS having the highest level of perceived stress. Similarly, EI level was significantly different across MBBS, BDS, DPT, and BS Biotechnology students as revealed by post-hoc Tukey's test (Table III). Emotional intelligence was found to be associated with stress (Table- IV).

**Table- IV: Association of Perceived Stress with different variables.**

Variables	Categories	Stress n (%)	No Stress n (%)	P-value
Gender	Male	278 (68.3)	129 (31.6)	0.41
	Female	623(65.9)	321 (34.0)	
Residential status	Hostelite	249 (71.3)	100 (28.7)	0.03*
	Day Scholar	652 (65.1)	350 (34.9)	
Course of study	MBBS	272 (70.9)	112 (29.1)	0.000*
	BDS	108 (80.6)	26 (19.4)	
	DPT	194 (69.2)	86 (30.7)	
	Pharm D	295 (59.1)	204 (40.9)	
	BS Nutrition	20 (66.7)	10 (33.3)	
	BS Biotechnology	12(50)	12 (50)	
Year of Study	First Year	324 (65.5)	171 (34.5)	0.18
	Second Year	162 (64.8)	88 (35.2)	
	Third Year	189 (64.3)	105 (35.7)	
	Fourth Year	109 (72.2)	42 (27.8)	
	Final Year	117 (72.7)	44 (27.3)	
Satisfied with the course of Study	Yes	692 (66.8)	344 (33.2)	0.89
	No	209 (66.3)	106 (33.7)	
Graded EI	High	57 (19.7)	233 (80.3)	0.000*
	Medium	496 (70.1)	212 (29.9)	
	Low	348 (98.6)	5 (1.4)	

"Chi square test" was applied to calculate the "p" value. \*p of < 0.05 is statistically significant.

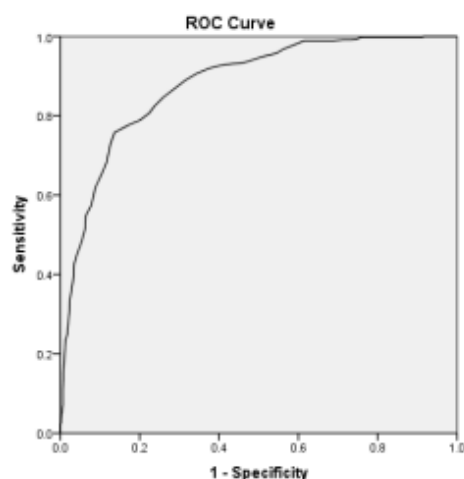
Regarding residential status, day scholars showed a positive association with stress. Predictability of PS on EI was 82.8% as calculated by binary logistic after controlling for residential status and gender with an odds ratio of 0.88. The test revealed that students with higher levels of EI had lower probability of having stress (Table-V). EI can predict PS at

a significant level as calculated by ROC curve with an Area Under the Curve (AUC) of 0.88, a cutoff level of 126.5 can be used with 80% sensitivity and 78% specificity (Fig-I). There was no association of academic performance with Emotional intelligence as checked by linear regression ( $p > 0.05$ ).

**Table -V: Predictability of Perceived Stress by Emotional intelligence.**

Variables	B	S.E.	Wald	Sig.	(95% CI)
Emotional Intelligence	-0.12	0.007	300.6	< 0.001*	0.88 (0.86-0.89)

Binary logistic test applied to check predictability of perceived Stress (dependent variable) on Emotional Intelligence (EI) after controlling for residential status and gender, ODDs Ratio (OR), 95% Confidence Interval (CI), \*p value < 0.05 was considered significant.

**Figure- I: ROC curve for Emotional intelligence as predictor of perceived stress, AUC: 0.88, p value < 0.01, 95% CI: (0.86-0.89)**

## DISCUSSION

Emotional intelligence enables one to polish the positive aspects of attitude and control one's emotions. It has the intellectual potential to modify perceptions and to develop reasoning skills, which are essential for collaboration and understanding of social complexity. In contrast to the Intelligence quotient that is inherent, the EI of an individual can be developed and improved [17]. The mean EI was  $121.4 \pm 19.35$  in the present study, with 52% of the students having average EI, while 26.1% had low and 21% high levels, respectively. Regarding PS, the current study found a high perceived stress level in 42% of the students, while 33% had low levels. Previously, a study has reported similar results with an average level of EI in 53% of the medical students, while 24% had a poor level of EI in a medical college in Pakistan, and the perceived stress was reported at a moderate level in 68.8% of the students, and 21.1% had a high stress level [18].

EI was significantly different across study courses, with higher scores for MBBS, BS Nutrition, and BS Biotechnology. The results contrast with a study that reported no significant difference in EI across various study programs [19]. The present study involved a significantly

smaller number of participants from the BS programs, which may have accounted for the disparities observed in the results. Regarding PS, students of BDS had the highest PS, followed by DPT students.

The perception of elevated stress levels in the BDS program can be attributed to the extensive course content covered in a four-year program. The results correspond very well to the other study by Jahan et al.<sup>[20]</sup>. A statistically significant association was found between stress and residential status, study program, and EI. A higher frequency of day scholars was reported to be associated with perceived stress. Time management and group studies might be an advantage for students living of hostels. Female participants had higher EI than male participants, consistent with another study, but the level of PS did not differ between genders<sup>[21]</sup>.

The association between PS and satisfaction with the study program was also checked, but no significant result was found. Low levels of EI were significantly associated with stress and vice versa ( $p < 0.01$ ). The current study reported that the higher the EI in students, the lower the probability of having stress, and the findings are in accordance with a previous study by Jahan et al.<sup>[20]</sup>. Similarly, Fatima et al. (2021) measured the relationship between emotional intelligence and perceived stress among healthcare students in Pakistan and reported an inverse association between EI and PS<sup>[18]</sup>.

The current study highlights the inverse relationship of EI with PS, regardless of gender, course of the study, satisfaction with their profession and residential status. The findings imply the necessity of training programs aimed at enhancing Emotional Intelligence, as they help them handle the demanding conditions of training and studies.

Although EI has been reported to be significantly associated with academic performance, the current study found no significant association between the two<sup>[6,22]</sup>. The difference may be attributed to differences in sample sizes and diverse study programs, as the current study included students from six domains: MBBS, BDS, DPT, PharmD, BS Human Nutrition, and BS Biotechnology. Another factor contributing to the difference is the method used of measure academic performance. The present study focused only on annual percentage as a measure of academic performance in contrast to continuous assessment scores throughout the year, and the findings are supported by the results of Austin et al., who reported no significant association between EI and percentage of end-of-year examinations, although EI was positively correlated with performance in Problem-based learning (PBL)<sup>[23]</sup>.

The results of a recent study aid in comprehending the association of EI with performance in sessions such as PBL, as EI was positively associated with flourishing (i.e. the ability to live within an optimal range of human functioning, generativity, growth, and resilience) and teacher-student relationship<sup>[24]</sup>. Improving EI can reduce the level of stress and enable the students to deal with stressful conditions<sup>[25]</sup>.

The current medical education focuses on diverse teaching methods, e.g., peer-assisted learning, problem-based learning, etc., involving lots of communication, all focused on improving the knowledge, skills, and attitudes of the students. Effective communication is a vital element essential for dealing proficiently with peers, teachers, and patients. Enhancing Emotional Intelligence (EI) can significantly improve this crucial skill. Improving EI will help the students to communicate effectively, build trust, and collaborate effectively, all of which can improve the quality of group work and academic performance.

Given the importance of EI in academic settings, programs and interventions can be planned to improve the EI and help the students in developing these skills. The study suggests the incorporation of training in emotional intelligence and related skills into the curriculum. These programs may include activities such as mindfulness meditation, journaling, role-playing, and group discussions, as well as training in specific EI skills, such as self-awareness and empathy. There is evidence that these interventions can improve students' academic outcomes, as well as their overall well-being and social relationships. Moreover, professional support such as counselling services can be provided to the students to avoid serious mental health concerns and to develop strategies for stress management.

### CONCLUSION

Undergraduate medical, dental, and allied health students experience high levels of perceived stress. Emotional intelligence was found to be inversely and significantly associated with perceived stress, with lower levels of emotional intelligence linked to higher stress among these students. This study was cross-sectional in design, conducted at a single centre, and relied on self-reported data, which may introduce reporting bias, limit the generalizability of the findings, and do not allow causal relationships to be established. The study proposes integrating training in emotional intelligence and related skills into the curriculum of undergraduate health science students. Additionally, offering professional support, such as counselling services, can reduce the level of stress and prevent severe mental health issues.

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**Authors Contributions:**

**Zaima Ali:** Substantial contributions to the conception or design of the work.

**Uzma Zafar:** The acquisition of data for the work.

**Atiqa Khalid:** Analysis of data for the work.

**Saima Zaki:** Drafting the work.

**Sheharyar Tariq:** Reviewing it critically for important intellectual content.

**Hamza Naveed Virk:** Final approval of the version to be published .

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