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Emotional Intelligence among Medical and Engineering Students in Kerala, India: A Cross-Sectional Comparative Study

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Abstract

Emotional Intelligence (EQ) plays a critical role in academic success, social relationships, and overall well-being, particularly in high-stress fields like medicine and engineering. In high-stress fields like medicine and engineering, EQ is crucial for enhancing empathy, communication, and collaboration. This cross-sectional study compared EQ levels among medical and engineering students in Kerala, India, using "The Quick Emotional Intelligence Self Assessment" questionnaire. The study revealed that engineering students, with a mean EQ score of 27.1 ± 4.8, scored significantly higher than medical students, who averaged 21.8 ± 6.5. Engineering students demonstrated superior emotional awareness, management, social-emotional skills, and relationship capabilities. Factors such as age, rural upbringing, gender, family background, parental education, living arrangements, bullying, and childhood trauma were statistically significant in influencing EQ. The lower EQ scores among medical students may be attributed to their intensive curriculum, which could overshadow emotional and interpersonal skill development. In contrast, the technical focus in engineering may allow for greater emotional growth. This study emphasizes the importance of recognizing these influencing factors and suggests targeted interventions to nurture emotional growth alongside academic pursuits, fostering holistic development in students.

Keywords*: Emotional Intelligence, Applied Psychology, Interpersonal Relations, Emotional Stress, Medical Students, Engineering, Cross-sectional Study, Awareness, Mental Health Service.*

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Introduction

Emotional intelligence (EQ) is a critical aspect of an individual's ability to understand, manage, and express emotions effectively. It significantly influences many facets of a person's life, such as academic success, interpersonal connections, and general well-being (Salovey et al., 1990). Since EQ has been linked to better academic achievement, problem-solving skills, and satisfying learning experiences, it has attracted growing attention in the field of education. Higher EQ is thought to help children manage stress, adjust to difficult circumstances, and build more beneficial interactions with peers and teachers (Bracket et al 2011, Shanafert et al 2005).In the complex landscape of schooling and personal growth, high EQ (EQ) is crucial for schoolchildren and adolescents. High EQ enhances emotion comprehension, self-awareness, and stress management during adolescence, with its emotional challenges and identity development. Empathy and effective communication, fostered by EQ, improve relationships with peers, teachers, and family, promoting better mental health. Studies show that EQ positively impacts academic success, social skills, and well-being, aiding balanced decision-making by integrating emotions and reason. Nurturing EQ equips students with the tools for academic achievement, strong relationships, and emotional resilience (Bracket et al 2011).

Medical (MBBS) students highly value EQ due to demanding academic standards, intense training, and exposure to stress. Assessing their EQ is crucial as higher EQ is linked to greater empathy, improved communication, and better patient care (Shanafert et al, 2005 and Sundaramurthy et al, 2017).High EQ medical students comprehend and relate to patient emotions, leading to better interactions, satisfaction, and outcomes. Strong EQ aids clear, compassionate communication and active listening. It enables handling tough conversations, delivering difficult news, and effective teamwork. EQ enables medical students to integrate clinical facts with emotions, manage stress, reduce burnout, and foster teamwork, essential for effective healthcare (Sundaramurthy et al, 2017 and Dinsmore et al, 2019). EQ builds resilience, enabling students to overcome setbacks and adapt to challenges. It enhances patient safety by reducing errors. High EQ allows for recognizing emotions, assets, and deficiencies, and maintaining professionalism under pressure. Medical students with strong EQ lead with compassion, inclusivity, and effective communication, creating productive workplaces. Patients are more likely to adhere to treatment plans when healthcare providers display empathy. Strong EQ in medical students positively impacts patient adherence and compliance (Dinsmore et al, 2019).

Engineering students frequently encounter complex problem-solving tasks, group projects, and competitive pressures. Their ability to collaborate effectively, manage project-related stress, and achieve a work-life balance can be significantly influenced by their EQ. Strong EQ helps students navigate challenges, excel academically, and professionally by enhancing self-awareness, self-regulation, and informed decision-making. Additionally, EQ boosts interpersonal skills, facilitating clear communication and productive collaboration (Carmeli et al, 2006).The research done by Carmeli et al and Lindebaum et al underscores the link between EQ, academic success, leadership potential, and job adaptability among engineering students. EQ is crucial for stress management and meeting project and academic deadlines.

Developing EQ complements technical knowledge, equipping engineering students with resilience and capabilities for success (Carmeli et al 2006 and Lindebaum et al 2010).

Investigating EQ disparities among medical (MBBS) and engineering students is crucial due to the unique challenges they face. This study aims to uncover differences in EQ scores between these fields. Insights gained can guide integrating EQ training into curricula, benefiting students' well-being, career growth, and patient care (Dinsmore et al 2019, Carmeli et al 2006 and Lindebaum et al 2010).Targeted interventions focusing on empathy, communication, and stress management can enhance teamwork and success. By analyzing EQ in medical and engineering students, this research aimed to contribute to a broader understanding and potential interventions. The goal of the comparative study was to examine and contrast the EQ of medical and engineering students. Additionally, it sought to contribute to the larger discussion on factors associated with EQ in college students as a secondary objective.

Methodology

Study Design and Setting: This was a comparative cross-sectional study conducted among medical and engineering students studying in selected colleges (one medical college and one engineering college) of an urban area in Malappuram district, Kerala, India.

Study Period: 2 months (01 June 2023 to 31 July 2023).

Study Population: The study population comprised medical and engineering students within the age group of 18 and 25 years.

Sample Size, Sampling, and Ethics Approval: Convenient sampling was adopted to select colleges as well as students due to its practicality and ease of accessing students from these specific colleges. The sample size consisted of 100 medical students and 100 engineering students, amounting to a total of 200 participants. The decision to have an equal number of students from both disciplines aimed to ensure a balanced representation and minimize potential biases arising from an unequal sample. The study protocol was accorded Ethical Committee Approval vide MES Medical College Expedite Institutional Ethics Committee. Written informed consent was taken from all the study participants. The study was carried out in accordance with the principles as enunciated in the Declaration of Helsinki.

Method of Data Collection: After ethics committee approval, the study explained its purpose to medical and engineering students aged 18-25 from selected colleges via online forms. Informed consent was obtained, and a validated semi-structured questionnaire was then administered to assess their EQ. The questionnaire consisted of three parts. The first part gathered sociodemographic details of the participants, such as age, gender, type of family, and any other relevant information. The second part of the questionnaire focused on factors associated with EQ, exploring potential factors that might influence EQ levels among the students. The third part of the questionnaire consisted of a validated, standard adopted questionnaireto assess the EQ of the participants (Quick emotional intelligence self

questionnaire, 2023). This section comprised well-established and validated measures to provide reliable insights into their EQ competencies. The entire questionnaire was administered in the English language, ensuring uniformity and ease of comprehension for all participants. To facilitate data collection, the questionnaire was distributed directly through Google Forms after obtaining the participants' consent. In case of any queries or need for clarification regarding the questionnaire or the study, the participants were encouraged to seek assistance and ask questions freely.

Working Definition: Emotional intelligence is a multifaceted skill set that involves the aptitude to accurately perceive and understand one's own emotions and those of others, coupled with the ability to utilize this emotional awareness to manage and regulate emotions effectively (Salovey et al 1990). In this study, the "Quick Emotional Intelligence Self Assessment" questionnaire created by Prof. Paul Mohapel in the Department of Psychology at the University of Victoria was employed as an assessment tool. This standardized questionnaire consisted of 40 questions distributed across four domains: emotional awareness, emotional management, social-emotional awareness, and relationship management. Each domain had 10 questions with each question given a score from 0 to 4. Each domain was scored independently, with total scores ranging from 0 to 40. The total mean score was also calculated and assessed.

The scoring criteria categorize participants' EQ competencies as follows:

- Scores between 0 and 24 (Low EQ) indicate an area for enrichment, suggesting that attention and development are required to strengthen EQ skills.
- Scores between 25 and 34 (Average EQ) suggest effective functioning in the respective domain but also indicate areas that could benefit from strengthening and further development.
- Scores between 35 and 40 (High EQ) signify enhanced EQ skills, which can be utilized as leverage to target and develop weaker areas even further (Quick emotional intelligence self questionnaire, 2023).

Statistical Analysis: Data were entered in MS Excel, cleaned, and analyzed using Statistical Package for Social Sciences (SPSS) version 26. The scores were checked for normality. Percentage, mean, standard deviation, and range were calculated to summarize the descriptive characteristics. An unpaired t-test was used to see the difference within and between mean scores of different domains in medical and engineering student groups. Fisher exact test (FE Test) and Chi-square test were applied to check for the association of different factors affecting EQ.

Results

Socio-demographic Characteristics

The mean age of participants was 21.9 ± 2.3 years, with most MBBS students aged 18-21 and engineering students aged 22-25. Gender distribution showed 60% females in MBBS and 54% males in engineering. Urban students were more common in medicine, while rural students preferred engineering. MBBS students included 51% Muslims, and engineering

students 47% Hindus. Both fields favored nuclear families, with joint families more inclined towards engineering. Educational background revealed that 56% of engineering and 71% of medical students had parents with higher secondary education. Hostellers were prominent in both fields: 73% in medicine and 66% in engineering (Table 1).

Table 1: Socio-demographic Characteristics of the Study Population (n=200)

SN	Characteristics	Medical (%)	Engineering (%)
1	Age (In years)		
	18-21	52 (56)	41 (44)
	22-25	48 (45)	59 (55)
2	Gender		
	Male	40 (42.5)	54 (57.5)
	Female	60 (56.5)	46 (43.5)
3	Geography		
	Urban	55 (53)	49 (47)
	Rural	45 (47)	51 (53)
4	Religion		
	Hindu	34 (42)	47 (58)
	Muslim	51 (53.7)	44 (46.3)
	Christian	15 (62.5)	9 (37.5)
5	Type of family		
	Nuclear family	79 (51)	76 (49)
	Joint family	21 (46.7)	24 (53.3)
6	Parental education		
	Below higher secondary	29 (39.7)	44 (60.3)
	Above higher secondary	71 (56)	56 (44)
7	Place of stay		
	Day scholar	27 (44.3)	34 (55.7)
	Hosteller	73 (52.5)	66 (47.5)

Comparison of Mean EQ Score among Medical and Engineering Students

In emotional awareness, the engineering group scored significantly higher (23.6) compared to the MBBS group (20.9). Similarly, in emotional management, the engineering group outperformed the medicine group with a significantly higher score (24.6 vs. 21.2). Social emotional awareness also showed a substantial difference, with the engineering group scoring significantly higher (29.4) than the MBBS group (26.4). The trend continued in relationship management, where the engineering group had a higher score (27.1) compared to the MBBS group (23.3). When the mean average EQ of total scores was taken, the engineering group exhibited a significantly higher mean EQ score (27.1 +/- 4.8) compared to the MBBS group (21.8 +/- 6.5). Based on these scores, the overall EQ grade for the medicine group was classified as "Low EQ," which indicates an area for enrichment. Meanwhile, the engineering group's overall EQ grade was classified as "Average EQ" indicating effective functioning. This significant difference was confirmed by the p-value of 0.0001 obtained from the unpaired t-test, indicating a notable variation between the two groups' EQ levels (Table 2).

Table 2: Overall Mean EQ Comparison of Medical and Engineering Students (n=200)

SN	Domains under EQ	Medical	Engineering	Total Mean EQ	Significance
1	Emotional Awareness	20.9 +/- 5.5	23.6 +/- 5.9	22.2 +/- 5.8	
2	Emotional Management	21.2 +/- 7.1	24.6 +/- 7.9	22.9 +/- 7.7	P value – 0.0001
3	Social Emotional Awareness	26.4 +/- 6.1	29.4 +/- 6.9	27.9 +/- 6.7	
4	Relationship Management	23.3 +/- 8.2	27.1 +/- 4.8	25.4 +/- 8.0	(Unpaired t-test)
	Overall Mean EQ Score	21.8 +/- 6.5	27.1 +/- 4.8	24.5 +/- 6.3	
	Overall EQ Grade	Low EQ	Average EQ	Low EQ	

Comparison of EQ under each Domain in Medical and Engineering Students

In emotional awareness, both medical (68%) and engineering (61%) students had a higher percentage of low EQ grade, but the difference was not statistically significant (p=0.188). However, in emotional management, the MBBS group (66%) had a significantly higher proportion in the low EQ grade compared to the engineering group (45%), with a p-value of 0.001.

Table 3: Comparison of EQ under each domain in Medical and Engineering Students (n=200)

SN	EQ Domain	EQ Grade	Medical (%) n=100	Engineering (%) n=100	Significance
1	Emotional awareness	Low	68 (52.7)	61 (47.3)	Fisher exact value: 3.22
		Average	32 (47)	36 (53)	P value – 0.188
		High	0 (0)	3 (100)	
2	Emotional Management	Low	66 (59.5)	45 (40.5)	Fisher exact value:15.14
		Average	33 (43.4)	43 (56.6)	
		High	1 (7.7)	12 (92.3)	P value – 0.001
3	Social-emotional awareness	Low	37 (61.7)	23 (38.3)	Chi-square value: 10.41
		Average	53 (51)	51 (49)	
		High	10 (27.8)	26 (72.2)	P value -0.005
4	Relationship Management	Low	48 (56.5)	37 (43.5)	Chi-square value: 5.90
		Average	44 (50)	44 (50)	
		High	8 (29.6)	19 (70.4)	P value – 0.04

Similar trends were observed in social-emotional awareness and relationship management, where the medicine group showed a higher percentage in the low EQ grade compared to the engineering group, and the differences were statistically significant with p-values of 0.005

and 0.04, respectively. On the other hand, the engineering group had higher percentages in the high EQ grade across all domains, indicating better emotional management, awareness, and relationship skills compared to the MBBS group. Overall, the data suggest that Engineering students generally exhibit better EQ than medical students (Table 3).

Factors related to EQ of College Students

In the study, age significantly influenced EQ grades, with 73.1% of students aged 18-21 falling into the low EQ grade compared to 26.2% in the 22-25 years group. Gender differences showed 66.0% of males had low EQ grades, while 32.1% of females did. Environmental factors also affected EQ, as 39.6% of rural students and 55.8% of urban students had low EQ grades. Parental education played a role, with 40.9% of students with higher secondary-educated parents having low EQ grades compared to 60.3% with lower-educated parents. Day scholars had a higher proportion of low EQ grades (75.4%) than hostellers (36.0%). Students who experienced bullying had a 60.7% rate of low EQ grades, while those who did not experience bullying had higher proportions of average and high EQ grades (56.9% and 4.3%, respectively). Those without childhood trauma had a lower proportion of low EQ grades (25.8%) and a higher proportion of average EQ grades (72.7%), compared to those with childhood trauma, who had 50% in the low EQ grade (Table 4).

Table 4: Factors affecting Emotional Intelligence among College Students (n=200)

SN	Factors	Low EQ	Average EQ	High EQ	Significance
1	Age				
	18-21 years	68 (73.1)	22 (23.7)	3 (3.2)	FE test : 46.48
	22-25 years	28 (26.2)	75 (70.1)	4 (3.7)	P value – 0.001
2	Gender				
	Male	62 (66.0)	29 (30.9)	3 (3.2)	FE test : 23.65
	Female	34 (32.1)	68 (64.2)	4 (3.8)	P value : 0.000
3	Geography				
	Urban	58 (55.8)	41 (39.4)	5 (4.8)	FE test: 7.36
	Rural	38 (39.6)	56 (58.3)	2 (2.1)	P value: 0.024
4	Religion				
	Hindu	44 (54.3)	33 (40.7)	4 (4.9)	FE test : 4.27
	Muslim	41 (43.2)	52 (54.7)	2 (2.1)	P value : 0.405
	Christian	11 (45.8)	12 (50.0)	1 (4.2)	
5	Type of family				
	Nuclear	82 (53.0)	68 (44.0)	5 (3.2)	FE test : 6.90
	Joint	14 (31.1)	29 (64.4)	2 (4.4)	P value : 0.031
6	Parental education				
	Below higher secondary	44 (60.3)	25 (34.2)	4 (5.5)	FE test: 9.82 P value : 0.005

SN	Factors	Low EQ	Average EQ	High EQ	Significance
	Above higher secondary	52 (40.9)	72 (56.7)	3 (2.4)	
7	Place of stay				
	Day scholar	46 (75.4)	14 (23.0)	1 (1.6)	FE test: 26.5
	Hosteller	50 (36.0)	83 (59.7)	6 (4.3)	P value: 0.001
8	Experienced any form of child abuse				
	Yes	22 (44.0)	26 (52.0)	2 (4.0)	FE test:0.613
	No	74 (49.3)	71 (47.3)	5 (3.3)	P value: 0.725
9	Experienced any form of suicidal thoughts				
	Yes	20 (55.6)	15 (41.7)	1 (2.8)	FE test: 0.995
	No	76 (46.3)	82 (50.0)	6 (3.7)	P value: 0.712
10	Experienced any form of bullying				
	Yes	51 (60.7)	31 (36.9)	2 (2.4)	FE test: 9.31
	No	45 (38.8)	66 (56.9)	5 (4.3)	P value: 0.008
11	The death of a close person made a long-term impact on you				
	Yes	41 (47.7)	42 (48.8)	3 (3.5)	FE test: 0.087
	No	55 (48.2)	55 (48.2)	4 (3.5)	P value: 1.000
12	Ever dependent on alcohol/drugs/ smoking to cope with stress				
	Yes	3 (37.5)	4 (50.0)	1 (12.5)	FE test: 2.59
	No	93 (48.4)	93 (48.4)	6 (3.1)	P value: 0.300
13	Experienced breakup with best friends				
	Yes	50 (49.0)	49 (48.0)	3 (3.0)	FE test: 0.300
	No	46 (47.0)	48 (49.0)	4 (4.0)	P value: 0.905
14	Experienced/ Watched any form of childhood trauma (eg: Accidents)				
	Yes	79 (50.0)	49 (36.6)	6 (4.5)	FE test: 23.11
	No	17 (25.8)	48 (72.7)	1 (1.5)	P value: 0.001
15	Regular absenteeism in class due to loss of interest				
	Yes	56 (49.1)	53 (46.5)	5 (4.4)	FE test: 0.831
	No	40 (46.5)	44 (51.2)	2 (2.3)	P value: 0.661

Discussion

The study found that engineering students consistently outperformed MBBS students in various EQ domains, aligning with global research showing that engineering students generally scored higher in emotional awareness and regulation compared to medical students. Forinstance, Mitrovic et al investigated the EQ of students from various disciplines and observed that those with engineering backgrounds exhibited stronger social-emotional skills and relationship management abilities (Mitrovic et al 2020). Furthermore, the trend of higher

EQ scores in the engineering group echoes the results of studies conducted by Karkada et al., which also highlighted the decreasing EQ of medical students compared to other educational fields (Karkada et al 2020). These studies collectively support the notion that individuals in technical fields, such as engineering, might develop heightened EQ due to the demands of teamwork, problem-solving, and adaptability. In contrast, diverse findings emerge from various studies. Some studies emphasize higher EQ scores among MBBS than the engineering group, yet a comprehensive understanding requires consideration of a broader literature. Sundarrajan et al. noted elevated EQ in medical students, of both genders (Sundarrajan et al 2018). However, Ibrahim et al. found paramedical and non-medical students scored higher than medical students, especially in emotion utilization (Ibrahim et al 2016). Medical education's focus on stress and knowledge may limit EQ growth, while engineering's lower stress and problem-solving emphasis may support emotional development. Medical roles require high emotional management, potentially overshadowing EQ, whereas engineering's fewer emotional interactions might aid EQ development.

The trend of higher emotional EQ scores in the 22-25 age group compared to 18-21 among college students highlighted the intricate relationship between age, emotional development, and life experiences. This observation aligned with psychological theories suggesting EQ generally increases with age. Chapman et al. using different EQ measures found older individuals displayed higher scores than young adults (Chapman et al 2006). Kaufman et al. attributed this to lifelong learning and acquired knowledge (Kaufman et al 2008). Meanwhile, Blanchard et al.'s research suggested that practice over time contributes to better emotional control, supported by several pieces of literature (Blanchard et al 1997). Late adolescence to early adulthood fosters emotional growth through increased exposure to challenges and responsibilities. Higher EQ scores among female college students compared to males suggest potential gender disparities in emotional development, possibly influenced by societal norms on emotional expression. Numerous research, including one by Wing et al., suggested that women have greater EQ than men. Early encouragement for girls to embrace emotions fosters their familiarity and comfort, contributing to elevated EQ scores (Wing et al 2001). Psychological studies also indicate females' greater empathy and responsiveness to others' emotions, as noted by Petrides et al (2006). Further, Siegling et al. highlighted gender-specific traits; empathy is valued in females while aggressiveness is aligned with masculinity (Siegling et al 2015). Formative experiences lead girls to prioritize nurturance and interpersonal connections more than males according to Gunkel et al (2007). Despite our findings, research by Ran et al. reported males with higher EQ than females, attributed to diverse geographical, cultural, and economic factors (Ran et al 2021).

The finding that college students from joint families had higher EQ levels than those from nuclear families highlighted the impact of family structure on emotional development. Joint families provided diverse social interactions and emotional experiences, supporting greater self-awareness and empathy, as noted in Manuel et al.'s study (Manuel et al 2002). Family communication, vital for positive relationships, may contribute to joint family members' higher EQ, as noted by Alegre et al (2010). Nuclear families' smaller size might limit emotional exposure, whereas joint families, with their focus on cooperation and

communication, support greater EQ development. Higher parental education also correlated with increased EQ, highlighting the role of family background in emotional growth during college. Cermacova et al. show a link between parental education and children's cognitive and emotional abilities (Cermacova et al, 2023). Similarly, Gilbert et al. and Squire et al. confirm this influence. Well-educated parents model effective emotional expression, empathy, and conflict resolution, fostering a broader emotional skill set in their children (Gilbert et al, 2006 and Squire et al 2015). Students with higher parental education and diverse upbringings had better EQ scores, as this education emphasized emotional well-being, adaptability, and empathy. Our finding of better EQ in rural college students compared to urban students offers insight into geographic upbringing's impact on emotional development. Close-knit rural communities foster interpersonal interactions, enhancing empathy and interpersonal skills, and may be the reason for higher EQ in rural students supported by Charan et al (2015). Rural environments foster cooperative problem-solving and self-awareness, while urban areas' fast pace and focus on achievement may hinder emotional growth. Higher EQ scores among hostel students compared to day scholars suggested that hostel living provides unique opportunities for emotional development. Hostel environments foster diverse relationships, enhancing emotional awareness and interpersonal skills. Bhatt et al.'s study supported this, showing dormitory residents' greater emotional capability (Bhatt et al, 2018). Hostel life promotes independence, self-reliance, and decision-making, leading to improved emotional self-awareness as individuals navigate challenges and prioritize emotional needs.

The lower EQ scores among college students who experienced bullying compared to those who did not highlighted the psychological impact of adversity, with bullied students developing heightened emotional sensitivity. Lomas J et al. suggested that bullying victims might have lacked aspects of EQ linked to becoming bullies (Lomas J et al 2012). Conversely, bullying might have enhanced empathy and emotional awareness by highlighting the impact of hurtful actions. However, psychological distress from bullying likely diverted resources from developing EQ, resulting in lower scores. The discovery of lower EQ scores in college students who experienced childhood trauma reflects the profound impact of early life adversities on emotional development. Childhood trauma, including abuse and neglect, impairs brain functional connections leading to lower EQ, as shown by research done by Thomason et al (2015). Research by Aas M. et al. connected diminished cognitive control and emotional processing skills to trauma-induced changes (Aas M et al, 2012). Childhood trauma disrupts emotional regulation and interpersonal skill development, hindering emotional growth's natural progression. Trauma distorts emotional understanding and coping mechanisms, hindering emotional self-awareness. The current study underscores the intricate relationship between academic backgrounds and EQ among MBBS and engineering students in Northern Kerala, urging tailored interventions for emotional growth within specific academic domains. These interventions can equip individuals to navigate their chosen fields effectively.

Conclusion and Recommendations

Our research offers captivating insights into EQ disparities between medical and engineering students, revealing the intricate connection between academic domains and emotional development. Lower EQ scores among medical students may stem from the demanding nature of their education, potentially leaving little room for emotional awareness and interpersonal skills. Conversely, engineering students' focus on technical skills might allow more time for emotional growth. Significant differences in EQ domains stress the need for targeted interventions for medical students, emphasizing emotional management, awareness, and relationship skills. Our study uncovers a comprehensive picture of EQ development, shaped by factors like age, upbringing, gender, family dynamics, and personal experiences. These factors reflect the complex interplay of individual experiences and environmental influences. As institutions prioritize holistic development, understanding these factors can guide tailored interventions promoting emotional growth. Our research underscores the importance of nurturing EQ alongside academics, equipping students for prosperous personal and professional lives.

Several limitations in our study warrant acknowledgment. The cross-sectional design prevents establishing causal relationships, while self-reported measures introduce response bias. Geographical and institutional focus limits generalizability. The exclusion of variables like culture, parenting, and personality narrows the scope. Unmeasured factors and confounding variables may impact outcomes, requiring cautious interpretation.

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