Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

Comparison of level of Engagement, Empathy, and Motivation among 2nd year MBBS students with early and conventional clinical exposure, A comparative cross-sectional study

Meerab Ali khan
Allama Iqbal Medical College
Ali Hassan
Allama Iqbal Medical College
Eman Fatima
Allama Iqbal Medical College
Muhammad Yousaf
Allama Iqbal Medical College
Waseem Sajjad Shah
Allama Iqbal Medical College
Muhammad Raza Ansari
King Edward Medical University
Basira Bek
basirbek1999@yahoo.com

Kateb University
Hamza Hussain
Allama Iqbal Medical College

Research Article

Keywords: Early Clinical Exposure, Academic Engagement, Empathy, Motivation, Medical Education, Cross-Sectional Study, Pakistan.

Posted Date: September 3rd, 2026

DOI: https://doi.org/10.21203/rs.3.rs-10533989/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License.
Read Full License

Additional Declarations: No competing interests reported.

Abstract

Background

Medical students' academic involvement, empathy, and motivation could be a potential area of influence of ECE into medical education. The traditional structure of medical curricula has been criticized for failing to establish a meaningful link between knowledge and skills acquired in basic sciences and those in clinical sciences, which may lead to significant loss of interest and empathy in preclinical years. The purpose of this study was to compare academic engagement, empathy and motivation among medical students who had been exposed to an early clinical exposure (ECE) curriculum with those who had not been exposed to an ECE curriculum.

Methods

A comparative cross-sectional study was conducted at two medical institutions in Pakistan: Allama Iqbal Medical College (AIMC), which has adopted an ECE curriculum, and King Edward Medical University (KEMU), which has adopted a traditional curriculum. 423 second-year MBBS students, 196 students from the ECE group, and 227 students from the non-ECE group participated. The Student Course Engagement Questionnaire (SCEQ), the Kiersma–Chen Empathy Scale (KCES), and the Academic Motivation Scale (AMS) were used to collect the data. A series of independent samples t-tests, Pearson correlations, and Cronbach's alpha reliability analyses were conducted on SPSS. The study was reported as per STROBE guidelines for cross sectional study.

Results

The ECE group demonstrated significantly higher engagement scores ($M = 3.64$, $SD = 0.74$) compared to the non-ECE group ($M = 3.41$, $SD = 0.72$), $t(417) = 3.15$, $p = 0.002$, Cohen's $d = 0.31$. Empathy scores were also significantly higher in the ECE group ($M = 3.99$, $SD = 0.56$) than in the non-ECE group ($M = 3.84$, $SD = 0.54$), $t(417) = 2.74$, $p = 0.006$, Cohen's $d = 0.27$. There was no difference for motivation ($p = 0.293$). The Cronbach's α values for all three scales were between 0.805 and 0.836, indicating good internal consistency. Motivation ($r = 0.649$) and empathy ($r = 0.473$) were highly and moderately correlated with engagement, respectively, and both were significant (all $p < 0.01$). However, sociodemographically, ECE students did better academically (58.2% achieving ≥ 70% grades vs 32.6% for non-ECE, $p < 0.001$), and studied for fewer hours per week ($p = 0.012$) despite their superior outcomes.

Conclusions

Medical students who have early clinical exposure tend to be more involved in academics and empathetic, which supports the inclusion of this in the medical curriculum. The low effect sizes and

sociodemographic differences in confounding factors found as a result of the implementation of ECE, however, suggest that ECE needs to be used in conjunction with other strategies in order to have a maximal impact on student outcomes. Future longitudinal studies are recommended to prove causality and to look at the effects of ECE in clinical settings.

Introduction

Medical education is undergoing a worldwide reform from teacher-centred to integrated and student-centred education. The introduction of patients and healthcare settings to the early part of the training or to preclinical students is one of the important innovations in addressing this challenge, and is referred to as Early Clinical Exposure (ECE (1). The overall aim of ECE is to complement and help contextualize basic science education, so that students can learn firsthand how theory can be applied in the diagnosis, management and treatment of patients (2). ECE is intended to connect the classroom learning with the real experience, to make learning more meaningful and to help develop professional attitude and skills since the beginning of medical education (3).

In ECE, students have been demonstrating that it makes basic sciences and clinical practice possible to relate (4). It has also been reported to facilitate the professional development of learning through making learning more meaningful, increasing motivation to learn, and increasing understanding of the patient (5, 6). Research around the world has identified positive impacts of ECE for medical students' learning experiences. It has been linked, for example, to increased career motivation, empathy and engagement in the classroom (7, 8, 9, 10). But, there is limited research available for first year MBBS students. Great studies have value, but they only reflect the first impressions of students as they embark on their medical education.

Second year MBBS students on the other hand, have completed one year of either modular or traditional curriculum. Perceptions allow them to see the relatively long-term impact of ECE on psychological and behavioral outcomes in a more stable and comparative way.

The findings of this study will provide evidence for the comparative effects of modular vs traditional curricula with ECE on engagement, empathy and motivation of medical students. The outcome will give the curriculum planners and policymakers locally relevant information to improve the quality of medical education in Pakistan.

Although there is strong evidence in the world about the impact of ECE, the evidence in Pakistan is limited, especially beyond medical education at the first year. Most of them have been used in short-term studies, but it is unclear how ECE affects students after they have been exposed to medical training for extended periods of time. This study aims to fill this gap, comparing the level of engagement, empathy and motivation of 2nd year MBBS students who study in the modular and traditional curricula. Findings will help to guide medical education reform, including curricular structures that are best suited to achieving these outcomes. This study proposes to evaluate the effect of ECE on engagement, empathy

and motivation in 2nd year MBBS students and compare the engagement, empathy and motivation among the students of modular and traditional programmes.

The purpose of the present study is to assess the level of motivation with adopted items from the Academic Motivation Scale (AMS), and the level of empathy with the scale adopted by Kiersma–Chen (KCES) (11, 12). The Student Course Engagement Questionnaire (SCEQ) was adapted and used for the purpose of evaluation of engagement in this study (13).

Methods

Design and Study setting

This is a comparative and a cross-sectional study conducted at two medical institutions in Pakistan; Allama Iqbal Medical College (AIMC) with ECE Curriculum and King Edward Medical University (KEMU) with traditional Curriculum without ECE (14). The study was carried out between the 2025–2026 school year. The ECE program at AIMC includes systematic clinical exposure activities starting from the 1st year of the MBBS program, which encompasses clinical visits, patient interview, clinical skill sessions etc. Conversely, during preclinical years, students at KEMU are taught primarily in the classroom, and, to a lesser extent, have patient interaction.This study was designed and reported following the guidelines for cross-sectional studies outlined in the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) (15).

Participants

The study population was undergraduate medical students of second year MBBS program at both institutions. Students were eligible to participate in the study if they were currently enrolled in the program and signed an informed consent form. Students who refuse to participate or have major psychological or health issues were not included. A total of 423 students participated in the study, 196 students in the ECE group (AIMC) and 227 students in the non-ECE group (KEMU) were taken through convenience sampling. The number of respondents was selected due to feasibility and this was similar to sample size in other cross-sectional study in medical education that ranges from 100 to 2,579 respondents (14).

Study Instruments

A structured self-administered questionnaire was used to collect data, which consisted of four parts:

Sociodemographic Information

Age, gender, living situation, place of residence, family history of medical professionals, academic performance and mental health history. The number of study hours per week and the time spent on non-

academic digital devices were also captured.

Academic Engagement Scale

A 5-item scale to measure students' academic engagement. For items, the ability to make medical content interesting, desire to learn material, regularity of study habits, relevance of course material to future practice, and application of learning to real life situations were assessed.

Empathy Scale: A 7 item scale for measuring student empathy towards patients that includes three dimensions: perspective taking, compassionate care and patient experience understanding.

Motivation Scale: A 5-item scale that assesses students' motivation in their academic pursuits in terms of both intrinsic and extrinsic motivation.

Each item on the engagement, empathy, and motivation scales was measured using a 5-point Likert scale from "strongly disagree" to "strongly agree. The questionnaires were modified from previously validated questionnaires in medical education research and were content validly approved by experts in the field.

Procedure

The study was approved by the Ethical Review Board (ERB) of Allama Iqbal Medical College and Jinnah Hospital, Lahore, Pakistan (Ref No: SC003/ERB/5./28-11-2025/AIMC/JHL, dated 28th November, 2025). In addition, permission was requested from the relevant academic departments before the collection of data. All participants were informed about the purpose of the study, the procedures employed and the fact that they were free to withdraw at any point in the study without any consequences. All subjects gave informed consent. The students completed the questionnaire in their class during their class time. Completed questionnaires were retrieved straight-away and data anonymized for analysis using unique response numbers.

Statistical Analysis

The data were analyzed in SPSS version 26.0. Demographic variables and scale scores were analyzed using descriptive statistics such as means, standard deviations, frequencies, and percentages. Each scale's internal consistency was measured using Cronbach's alpha with values ≥ 0.70 deemed acceptable. Independent samples t-tests were employed to compare the mean scores of the engagement scale, empathy scale and motivation scale between the ECE and non-ECE groups. The size of the group difference was evaluated by Cohen's d, where 0.2, 0.5 and 0.8 represent small, medium and large group differences, respectively. Pearson correlation coefficients were calculated to explore the relationship between the three study variables. The p value < 0.05 was statistically significant.

Results

The **early clinical exposure (ECE)** to medical students during their study years plays a crucial role in their overall academic performance. Our study aimed to assess the impact of ECE on engagement, empathy, and motivation among second-year MBBS students using the Student Course Engagement Questionnaire (SCEQ), the Kiersma–Chen Empathy Scale (KCES), and the academic motivation scale (AMS), respectively. A total of 423 medical students participated in the study, comprising 196 students from the ECE group at AIMC and 227 students from the non-ECE group at KEMU.

The following are the **sociodemographic** of the student population included in our study:

Out of 423 participants, 219 (51.8%) were females, and 204 (48.2%) were males. The mean age of participants was significantly higher in the ECE group (21.3 ± 1.4 years) than in the non-ECE group (20.3 ± 1.4 years), with a p-value < 0.001. No significant differences were observed regarding having a family member who is a doctor (p = 0.410) or place of residence (p = 0.459) **(**Table 1**)(Graph 1)**.

Table 1
Sociodemographic characteristics

Characteristic	ECE (AIMC) n = 196	Non-ECE (KEMU) n = 227	p-value
Age (years), Mean ± SD	21.3 ± 1.4	20.3 ± 1.4	< 0.001
Gender, n (%)			0.743
Female	103 (52.6%)	116 (51.1%)	
Male	93 (47.4%)	111 (48.9%)	
Family Member Doctor, n (%)			0.410
Yes	63 (32.1%)	65 (28.6%)	
No	133 (67.9%)	162 (71.4%)	
Place of Residence, n (%)			0.459
Urban	109 (55.6%)	133 (58.6%)	
Semi-Urban	53 (27.0%)	51 (22.5%)	
Rural	34 (17.3%)	43 (18.9%)	
Living Situation, n (%)			0.004
Hostel (shared room)	144 (73.5%)	195 (85.9%)	
With family	49 (25.0%)	32 (14.1%)	
Other	3 (1.5%)	0 (0.0%)	
Mental Health History, n (%)			0.091
Yes	67 (34.2%)	95 (41.9%)	
No	129 (65.8%)	132 (58.1%)	
Academic Performance, n (%)			< 0.001
Below Average (≤ 60%)	19 (9.7%)	45 (19.8%)	
Average (60–69%)	63 (32.1%)	108 (47.6%)	
Good (70–79%)	79 (40.3%)	52 (22.9%)	
Excellent (≥ 80%)	35 (17.9%)	22 (9.7%)	
Study Hours/Week, n (%)			0.012
< 5 hours	80 (40.8%)	84 (37.0%)	
5–10 hours	83 (42.3%)	75 (33.0%)	
> 10 hours	33 (16.8%)	68 (30.0%)	

A significant difference was observed in academic performance between the two groups ($p < 0.001$). The study hours per week were higher in the non-ECE group (30.0%) as compared to the ECE group (16.8%), with a p-value = 0.012. At the same time, the academic performance was higher in the ECE group ($p < 0.001$). The ECE group had a higher percentage of students in the "Good" category (40.3%) than the non-ECE group (22.9%) and in the "Excellent" category (17.9%), as compared to the non-ECE group (9.7%). Whereas the non-ECE group had more students in the "Average" category (47.6%) than the ECE group (32.1%) and "Below Average" category (19.8%) than the ECE group (9.7%).

The academic **engagement** was observed to be higher in the ECE group with a mean value of 3.64 ± 0.74 as compared to the non-ECE group with a mean value of 3.41 ± 0.72 ($p = 0.002$) **(**Table 2**)**. The item-level comparison was performed to understand the differences in engagement **(**Table 3**)**. The students of the ECE group scored higher in all five engagement items. However, the largest difference was observed for the item “Apply learning to real-life situations” (mean difference = + 0.32, and the smallest was for "Desire to learn the material" (mean difference = + 0.13). The effect size was small (Cohen’s d = 0.31).

The **empathy** score was higher in the ECE group (mean value = 3.99 ± 0.54) than in the non-ECE group (mean value = 3.84 ± 0.54), with a mean difference of 0.15. The effect size was observed to be small (Cohen’s d = 0.27).

There was no prominent difference in **motivation** observed between the two groups. The ECE group showed a mean value of 3.83 ± 0.69, while the non-ECE group showed a mean value of 3.75 ± 0.79 for motivation. The mean difference was 0.08 with a negligible effect size (Cohen's d = 0.10) **(Graph 2)**.

The relationship among engagement, empathy, and motivation was examined through the Pearson correlation matrix **(**Table 4**)**. All three variables were statistically correlated ($p < 0.01$). The engagement was strongly correlated with motivation ($r = 0.649$) and moderately correlated with empathy ($r = 0.473$). However, the correlation between empathy and motivation was moderate ($r = 0.465$) **(Graph 3)**.

Table 2
Main comparison

Variable	Group	n	Mean	SD	t	p	Cohen's d	Effect
Engagement	ECE (AIMC)	196	3.64	0.74	3.15	0.002*	0.31	Small
	Non-ECE (KEMU)	227	3.41	0.72				
	Mean Difference (95% CI)		0.22	(0.08, 0.36)				
Empathy	ECE (AIMC)	196	3.99	0.56	2.74	0.006*	0.27	Small
	Non-ECE (KEMU)	227	3.84	0.54				
	Mean Difference (95% CI)		0.15	(0.04, 0.25)				
Motivation	ECE (AIMC)	196	3.83	0.69	1.05	0.293	0.10	Negligible
	Non-ECE (KEMU)	227	3.75	0.79				
	Mean Difference (95% CI)		0.08	(-0.06, 0.22)				

Table 3
Item-level comparison between ECE and non-ECE groups

No.	Item	ECE Mean ± SD	Non-ECE Mean ± SD	Diff
E1	Make medical content interesting	3.66 ± 1.09	3.44 ± 1.13	+ 0.22
E2	Desire to learn the material	3.77 ± 0.95	3.63 ± 1.03	+ 0.13
E3	Study on a regular basis	3.23 ± 1.14	2.99 ± 1.18	+ 0.24
E4	Make course material relevant to future	3.77 ± 1.03	3.56 ± 1.08	+ 0.22
E5	Apply learning to real-life situations	3.78 ± 1.05	3.45 ± 1.16	+ 0.32
Overall engagement score		3.64 ± 0.74	3.41 ± 0.72	+ 0.22

Table 4
Pearson correlation matrix of study variables (n = 419)

Variable	1. Engagement	2. Empathy	3. Motivation
1. Engagement	1.000	0.473	0.649
2. Empathy		1.000	0.465
3. Motivation			1.000

Discussion

Integrating early clinical exposure (ECE) into medical education may impact academic engagement, empathy, and motivation among medical students. The purpose of the present study was to assess the academic engagement, empathy and motivation of medical students who have received Early Clinical Exposure (ECE) at AIMC compared with those with a traditional curriculum at KEMU (14, 16). The results offer useful information on the potential advantages of medical education incorporating early clinical experiences.

Higher Engagement in the ECE Group

The difference in engagement between the ECE group and the non-ECE group was statistically significant (p = 0.002), as was the difference in empathy (p = 0.006); with no significant difference in motivation (p = 0.293). These results are consistent with an emerging, positive body of evidence about the benefits of ECE for medical student outcomes. A higher proportion of children in the ECE Group achieved a higher level of Engagement. The differences in engagement scores between the two groups (ECE and non-ECE) provide support for the hypothesis that early clinical exposure will increase student engagement. The results are in line with a recent systematic review that pooled the data from 15 studies with medical students from Asian and African countries on which 2,579 medical students participated and found positive effect of ECE on cognitive and effective learning outcomes (14). The majority of students were found to be in agreement that ECE helped them improve in their communication skills, problem-solving skills, empathy, professionalism and confidence to deal with patients.

The item-level analysis indicated that the highest mean difference (+ 0.32) between groups was in the item "Apply learning to real-life situations", indicating that ECE was successful in closing the gap between theory and practice. This is consistent with studies showing the benefit of ECE for students in gaining first-hand experience of applying theoretical knowledge in the context of the diagnosis, management and treatment of patients, thus providing a sense of utility and purpose to students beyond the classroom (14). A study carried out in Kolkata also found that 91% of first year MBBS students reported that their conceptual clarity improved after ECE and 90% reported better retention of knowledge after ECE (16). Moreover, studies conducted in India revealed that 94% of the students expressed that ECE is more interesting than the traditional didactic lecture approach for teaching learning. This is why it is important to encourage greater empathy in the ECE Group (17, 18).

Higher Empathy in the ECE Group

The ECE group also had significantly higher scores for empathy ($p = 0.006$). This discovery is in line with the studies that indicate that early patient contact builds humanistic attitudes and patient-centeredness. A recent systematic review revealed that after ECE, medical students had significantly higher mean empathy scores (as assessed by the JSE-student version), than before ECE, across both first and second year students and among both males and females. ECE students may become more sensitive to the psychosocial issues of illness by early interaction with patients, and thus enhance an important aspect of empathy (14). This is significant, especially with the evidence of a decrease in empathy during medical school due to the hidden curriculum, heavy workloads, overemphasis on biomedical knowledge, and lowered exposure to role models with empathy (19).

Early clinical exposure, in which the student gets to experience the patient's perspective early in the course, could help ease this erosion. Real patients were also found to have a greater impact on student empathy compared to fictional cases, further supporting the importance of real clinical experiences in developing empathy (20). There was no significant difference in motivation among the two groups.

No Significant Difference in Motivation

Surprisingly, there was no significant difference in motivation between the two groups ($p = 0.293$). This discovery needs to be interpreted. This may be because both groups had a high motivation towards becoming a medical professional from the outset. Medical students are usually an extremely motivated group of students and the effects of the curriculum may be overshadowed by this motivation (14, 21). It may also be that the motivation scale actually measured general academic motivation and not motivation specific to clinical learning. It is important to note, however, that there have been several studies that have found that ECE enhances the medical knowledge of students through motivation to learn (3). For example, a study found mean test scores to be significantly higher as a result of ECE intervention, from 48% to 66% (22). Further, a cross-sectional study conducted in India showed that most of the students thought that ECE helped them read more and provided them a better link between basic sciences and clinical cases. In our study, the negligible effect size ($d = 0.10$) reinforces the above conclusion that ECE does not significantly affect motivation, as measured in this study (17).

Sociodemographic Differences and Their Implications

There are a few key sociodemographic disparities between groups that should be discussed. There was a significantly older age in the ECE group (21.3 years) compared to the other group (20.3 years, $p < 0.001$); this may indicate different admission criteria or pathways. Most significantly, ECE students were more likely to reside with their families (25.0% compared to 14.1%, $p = 0.004$) and had better academic performance ($p < 0.001$). These results suggest that stable family environments and stable housing may be linked to success in school and to the gains of participation in ECE. In addition, the ECE curriculum could have an impact on academic achievement, by making learning more relevant and engaging. Interestingly, ECE students were found to be studying less hours per week than those who were not

studying ECE (p = 0.012), but they also had better academic outcomes. This indicates that ECE can encourage more efficient/effective studying, but not necessarily more time spent studying. The implications of the finding are obvious: medical educators need to emphasize learning strategies that improve learning quality rather than quantity (23). The absence of any significant differences between the two groups on family doctor history, place of residence or mental health history indicates that the study groups were relatively similar with respect to these factors, enhancing the internal validity of the study.

Correlations Among Engagement, Empathy, and Motivation

A high correlation between engagement and motivation (r = 0.649) is predicted and students who are motivated can be expected to engage deeply in their learning. The moderate correlations among empathy and engagement (0.473) and motivation (0.465) indicate that students who are more empathic are also more engaged and motivated. This interdependency suggests that interventions that impact one construct can have a positive effect on the other constructs. For instance, better empathy and more contact with patients early on can lead to an increase in engagement, as this study has shown. Students exposed to immersive role play showed greater emotional and cognitive engagement, and greater emotional engagement was correlated with greater empathy, compared to scenarios that were imagined (23, 24).

Reliability of Instruments

The internal consistency of all three scales was acceptable (Cronbach's α = 0.805–0.836), suggesting that they were reliable instruments for assessing the constructs intended in this sample. It helps support the validity of the results and appropriateness of these instruments for future research with a similar population.

Limitations

It is important to note that there are a few restrictions:

Cross-sectional nature: This study may not capture the changes in engagement, empathy and motivation in the ECE and non-ECE groups in the time leading up to the study.

Generalizability: This cross-sectional study was implemented in two medical Colleges of Pakistan only, so that the result cannot be generalized to other settings.

Apart from ECE, there may be institutional differences in teaching and assessment methods, or institutional culture that impacts on the academic performance of the students.

Self-report bias: All data were self-reported and there are aspects of recall bias and social desirability. The positive attributes such as empathy and engagement may have been exaggerated due to positive expectations.

Convenience sampling: This type of sampling may cause selection bias because the participants may not be representative of the overall student population.

Causality: Since the study is cross sectional, it is not possible to determine that causality exists between ECE and the outcomes.

Recommendations for future studies

Further research should be conducted to monitor the students' progress in engagement, empathy, and motivation on a longer term to evaluate changes in their motivation in ECE and non-ECE curricula. Longitudinal designs would enable a study of the pathway of these variables and determine when periods of intervention are necessary. To provide effective interventions, institutes would benefit from the exploration of the time, duration and sequence of ECE. Further research is needed to determine if the advantages of ECE continue through the clinical years and if the advantages are linked to better patient care results. Qualitative research may offer more information regarding the ways in which ECE contributes to student learning and identity development.

Conclusion

Our study compares the impact of engagement, empathy, and motivation with respect to early clinical exposure (ECE) in the ECE group (AIMC) and the non-ECE group (KEMU). The ECE group demonstrated significantly higher engagement (6.5% higher mean score, $p = 0.002$) and empathy (3.9% higher, $p = 0.006$) as compared to the non-ECE group, while there was no significant difference in motivation between the ECE and non-ECE groups (2.1% difference, $p = 0.293$). The item-level analysis revealed that the largest difference between groups was for "Apply learning to real-life situations" (+ 0.32), indicating that ECE significantly affects students' academic engagement by making learning more relevant and practical.

Despite the fewer study hours in the ECE group compared to the non-ECE group (40.8% studying < 5 hours vs. 37.0%), the ECE group showed better academic performance than the non-ECE group (58.2% achieving ≥ 70% grades vs. 32.6%). This finding supports the notion that ECE promotes more efficient learning and that strategies should be implemented to make learning more engaging and integrated with the clinical side (25, 26).

These findings support early clinical exposure as a beneficial educational strategy, and interventions should be implemented for effective academic outcomes. However, the small effect sizes (Cohen's $d = 0.27–0.31$) and presence of confounding sociodemographic differences suggest that ECE should be implemented alongside other strategies to fully optimize student outcomes. The limitations of this study, including its cross-sectional design, limited generalizability, institutional differences, and reliance on self-reported data, urge thoughtful study designs to examine the impact of ECE on clinical years and improved patient care outcomes. Future longitudinal studies are recommended to establish causality and examine whether the benefits of ECE persist in clinical practice.

Declarations

Ethics Approval and Consent to Participate

This study was conducted in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments. Ethical approval for this study was obtained from the Ethical Review Board (ERB) of Allama Iqbal Medical College and Jinnah Hospital, Lahore, Pakistan (Ref No: SC003/ERB/5./28-11-2025/AIMC/JHL; dated November 28, 2025). The ERB reviewed the study protocol, informed consent forms, and other relevant documents and approved the conduct of the study for a period of six months. All participants were informed about the study's purpose, procedures, and their right to withdraw at any time without consequence. All data were anonymized prior to analysis to ensure participant confidentiality.

Consent for Publication

Not applicable.

Competing Interests

The authors declare that they have no competing interests.

Ali Hassan

Methodology, investigation, data collection, literature review, data curation, and writing—review and editing.

Eman Fatima

Investigation, data collection, literature review, data entry, and writing—review and editing.

Muhammad Yousaf

Investigation, data collection, data validation, literature review, and manuscript editing.

Waseem Sajjad Shah

Data collection, data curation, literature review, interpretation of findings, and manuscript review.

Muhammad Raza Ansari

Coordination of data collection at King Edward Medical University, investigation, validation, and critical review of the manuscript.

Basira Bek

Supervision, project administration, methodological guidance, interpretation of findings, critical revision of the manuscript, and correspondence with the journal.

Hamza Hussain

Literature review, data validation, manuscript formatting, and writing—review and editing.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or non-profit sectors.

Author Contribution

Authors' ContributionsMeerab Ali Khan: Conceptualization, methodology, investigation, data collection, data curation, formal analysis, interpretation of results, literature review, writing—original draft, and manuscript revision.Ali Hassan: Methodology, investigation, data collection, literature review, data curation, and writing—review and editing.Eman Fatima: Investigation, data collection, literature review, data entry, and writing—review and editing.Muhammad Yousaf: Investigation, data collection, data validation, literature review, and manuscript editing.Waseem Sajjad Shah: Data collection, data curation, literature review, interpretation of findings, and manuscript review.Muhammad Raza Ansari: Coordination of data collection at King Edward Medical University, investigation, validation, and critical review of the manuscript.Basira Bek: Supervision, project administration, methodological guidance, interpretation of findings, critical revision of the manuscript, and correspondence with the journal.Hamza Hussain: Literature review, data validation, manuscript formatting, and writing—review and editing.All authors reviewed and approved the final manuscript and agreed to be accountable for all aspects of the work.

Acknowledgement

The authors would like to thank all the medical students who participated in this study and the faculty members who facilitated data collection.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

References

1. Verma. Verma M. (2016). Early clinical exposure: New paradigm in Medical and Dental Education. Contemporary Clinical Dentistry, 7(3), 287–288. https://doi.org/10.4103/0976-237X.188536. 2016.
2. Gupta K, Gill GS, Mahajan R. Introduction and Implementation of Early Clinical Exposure in Undergraduate Medical Training to Enhance Learning. Int J Appl Basic Med Res. 2020;10(3):205–9.
3. Sharifı A, Shohani M, Abedi Gheshlaghi L, Shafiei E. Comparing the Effects of Early Clinical Exposure on the Attitude and Motivation of First-year Medical Students from Ilam University of Medical Sciences Based on Video-based Education and Learning-in-Hospital Settings Methods. Shiraz E-Medical J. 2022;23.
4. Sawant SP, Rizvi S. Early Clinical Exposure (ECE) as an Effective Learning Tool in Anatomy. Adv Concepts Med Med Res. 2023;11:1–10.
5. Chhatani RV, Rahul Vikaskumar Chhatani MR, Dave, Ravindra Kumar B. To Assess the Attitude of MBBS Students towards Implementation of Early Clinical Exposure Module in First Professional Year Subjects. Int J Anat Res. 2024;12(2):8940–8944. 10.16965/ijar.2024.122 2024.
6. Kori SPK. SP, C. N. Effectiveness of early clinical exposure as a learning tool among 1st and 2nd year MBBS students' perspective. Natl J Physiol Pharm Pharmacol. 2024; 14(12): 2660–2664. 10.5455/NJPPP.2024.v14.i12.25. 2024.
7. Kumar. Kumar PN, Kumar PA, Ramalingam S, Govindarajan S. (2023). Developing a module for early clinical exposure: Experience of five yearsJournal of Education and Health Promotion, 12(1). https://doi.org/10.4103/jehp.jehp_946_22. 2023.
8. Jafarzadeh Esfehani R, Jalal Yazdi M, Kamranian H, Jafarzadeh A, Rezaei Kalat A, Mahmudi Gharai A. Effect of Early Clinical Exposure on Learning Motivation of Medical Students. Future Med Educ J. 2012;2(2):3–7.
9. Nimkuntod P, Kaewpitoon S, Uengarporn N, Ratanakeereepun K, Tongdee P. Perceptions of Medical Students and Facilitators of an Early Clinical Exposure Instructional Program. J Med Assoc Thai. 2015;98(Suppl 4):S64–70.
10. Srivastava PGS, Singh K, Sehgal DS. Exploring the benefits of early clinical exposure for medical students in MBBS undergraduate courses. IJNTI. 2024;2(8):a1-5. 2024.
11. Vallerand. Vallerand R, Pelletier L, Blais M, Brière N, Senécal C, Vallieres E. (1992). The Academic Motivation Scale: A Measure of Intrinsic, Extrinsic, and Amotivation in Education. Educational and Psychological Measurement. 52. 1003–1003. 10.1177/0013164492052004025. 1992.
12. Kiersma ME, Chen AMH, Yehle KS, Plake KS. Validation of an Empathy Scale in Pharmacy and Nursing Students. Am J Pharm Educ. 2013;77(5).
13. Handelsman MM, Briggs WL, Sullivan N, Towler A. A Measure of College Student Course Engagement. J Educational Res. 2005;98(3):184–92.
14. Shaban EE, Elmelliti H, Shaban A, Shaban A, Zaki HA. Impact of early clinical exposure on medical students' competency development: a systematic review of evidence from Asian and African countries. BMC Med Educ. 2025;25(1):1723.

15. Peng X, Yang L, Yang S, Wang X, Song W. Effects of clinical learning environment on the professional identity of Chinese nursing students: multiple mediating effects of learning engagement and stress-related growth. BMC Nurs. 2025;24(1):1387.
16. Sarkar SKT, Biswas B, Banerjee R, Chipurupalli A, Bain A, Sarkar S, Kundu T, Biswas B, Banerjee R, Chipurupalli A, Bain A. Perception of First-year MBBS Students on Early Clinical Exposure in Medical College, Kolkata. Bengal Physician Journal. 2026; 13 (1):6–13. 2026.
17. Dwivedi AKAN. Perception of Phase I MBBS Students on the Early Clinical Exposure Module in Anatomy: A Cross-sectional StudyJ Clin of Diagn Res.2026; 20(2):AC09-AC12. https://www.doi.org/10.7860/JCDR/2026/82643/22400. 2026.
18. Yadav S, Piyush A, Sethi Y. Shaping future healers: The impact and implementation of Early Clinical Exposure in medical education. Indian J Forensic Community Med. 2024;11:1–4.
19. Xie J, Cao X, Jiang L, Zhu M, Wang X, Cai M. Impact of early clinical exposure and preclinical tutorial guide on undergraduate dental students in Shanghai. Global Med Educ. 2025;2(1):125–33.
20. Leigh LMZ. The effect of different patient-based learning models on student perceptions of empathy, engagement, knowledge, and learning experience. Medical Teacher. 2025;47(2):292–299. 2025.
21. Jafarzadeh Esfehani R, Mardaneh J, Kamranian H, Jafarzadeh Esfehani AJE, Kalat A, Mahmoudi Gharaee A. The effect of Early clinical exposure on learning motivation of medical students. Future Med Educ J. 2012;2.
22. Warkar ABAA. Introduction to early clinical exposure as learning tool in physiology. Indian J Physiol Pharmacol. 2020;64(Suppl_1):S62-S9. 2020.
23. Mindaye ET, Tesfay GK. Clinical Competence and Perception of Medical Students after Early Clinical Exposure through Pre-clerckship Education at an Ethiopian Medical School: A Cross-sectional Study. Ethiop J Health Sci. 2022;32(6):1211–20.
24. Tien YMLC, Pai PY, Tsai CH, Hsu LC, Tien YM, Lin CY, Pai PY, Tsai CH, Hsu LC. Investigating the Influence of Role-Playing on Empathy and Perspective-Taking by Analyzing Level of Engagement. JoVE. 2025. 2025.
25. Tayade M, Giri P, Latti R. Effectiveness of early clinical exposure in improving attitude and professional skills of medical students in current Indian medical education set up. J Family Med Prim Care. 2021;10:681–5.
26. Liu C-i, Tang K-p, Wang Y-c. Chiu C-h. Impacts of early clinical exposure on undergraduate student professionalism—a qualitative study. BMC Med Educ. 2022;22(1):435.

Figures

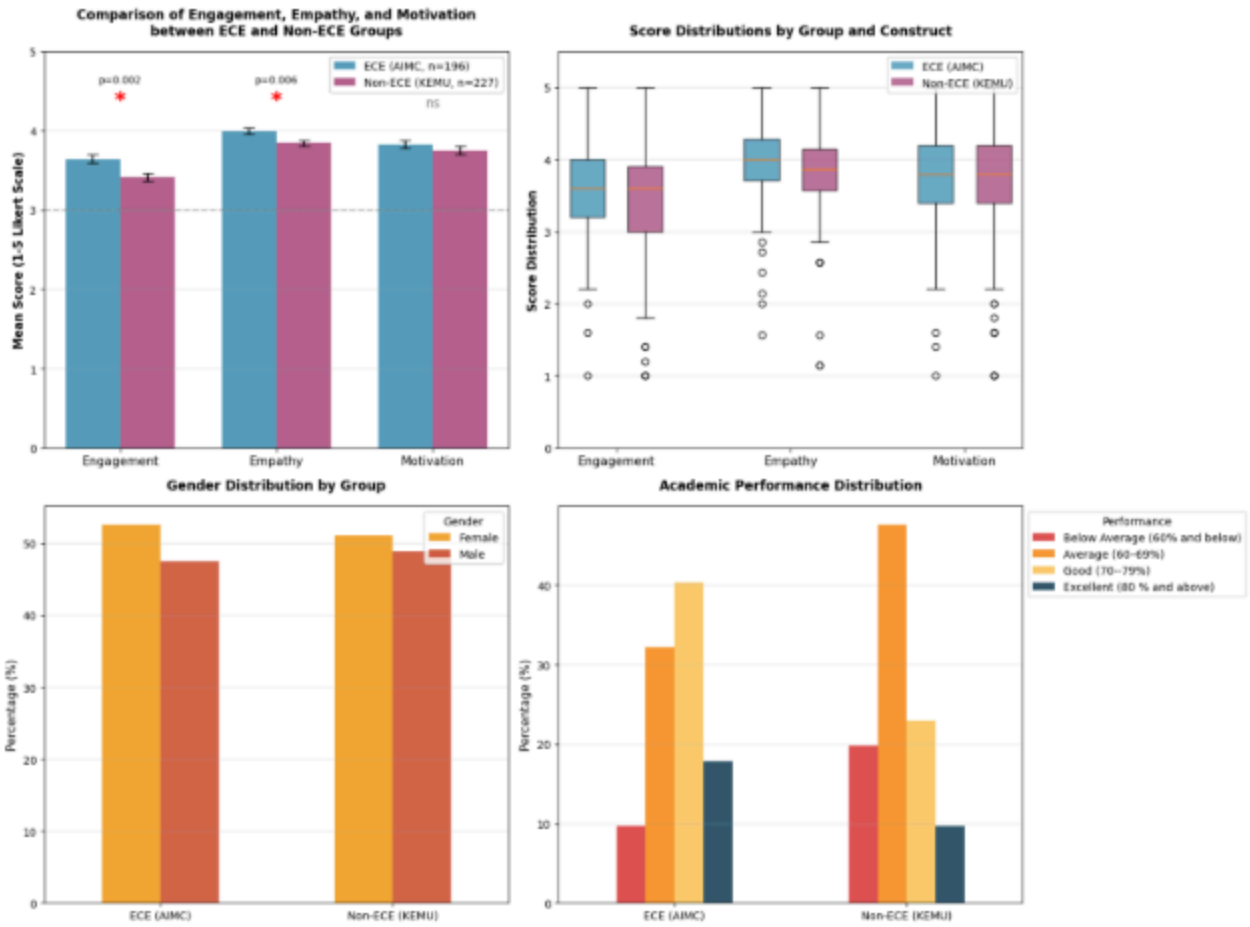


Figure 1

Graph 1: Sociodemographics

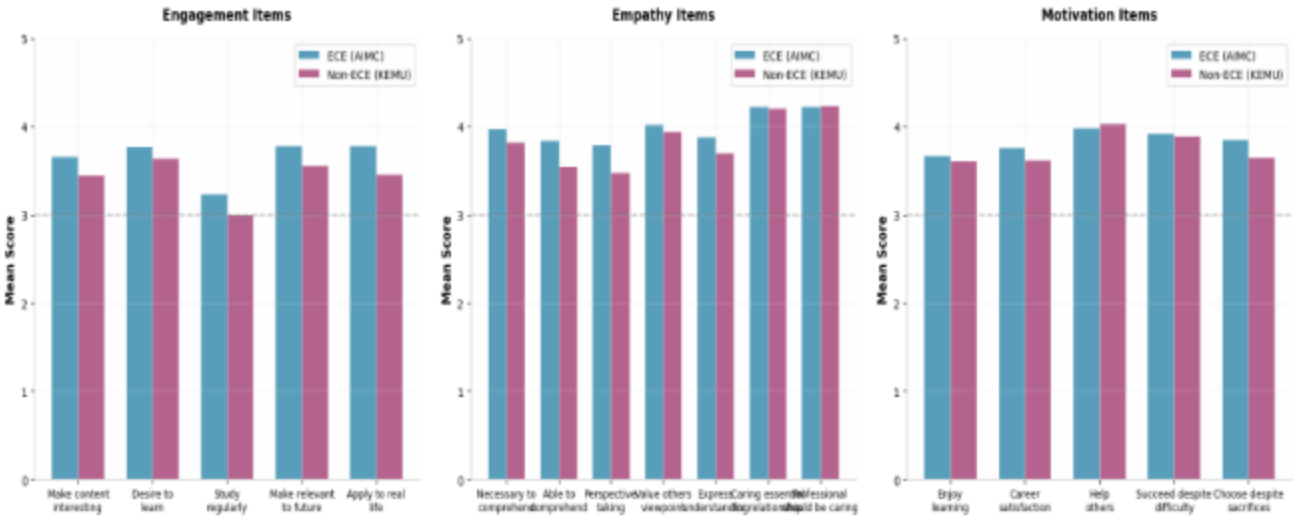


Figure 2

Graph 2: main comparison

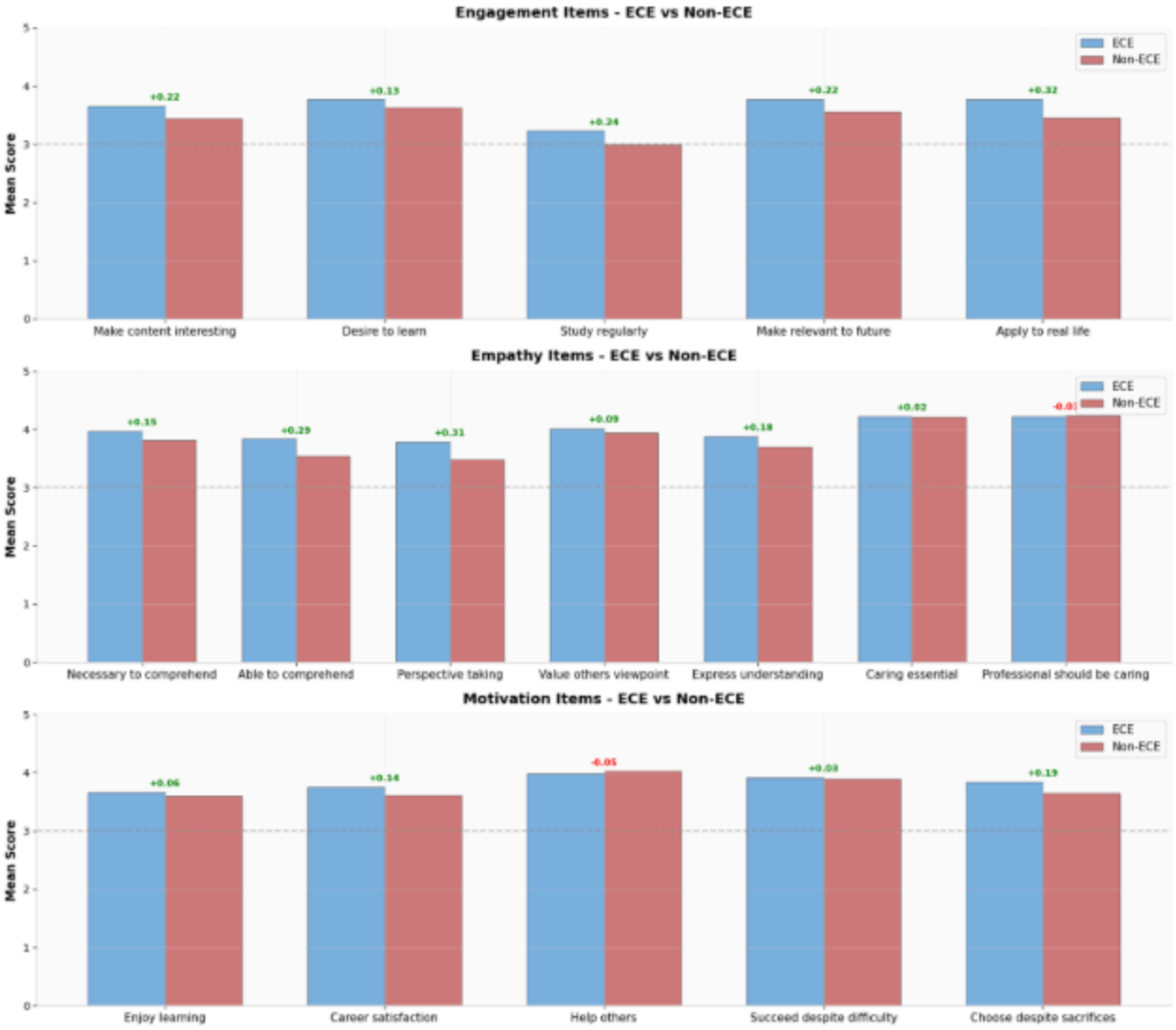


Figure 3

Graph 3: relationship between empathy, engagement and motivation score