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# Dissecting the Correlation between Pre-Professional and Professional Examination Marks in Forensic Medicine: A Gender, Residence and Attendance Specific Comparison

Khalil Ur Rehman[1], Rizwan Faisal[2], Rizwan Qaisar[3]

[1]*Department of Forensic Medicine, Rehman Medical College, Peshawar, PAKISTAN*

[2]*Department of Pharmacology, Rehman Medical College, Peshawar, PAKISTAN*

[3]*Department of Basic Medical Science, College of Medicine, University of Sharjah, UAE*

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## ABSTRACT

The current study was conducted at Rehman Medical College from April to August 2021 to compare the academic performance of students in forensic medicine based on gender and residential status and to correlate class attendance with students' academic performance in pre-professional and professional examinations. A total of 469 students (male = 255 and female = 214) of the third year MBBS were recruited via universal sampling. Both examinations consisted of two components: theory and viva voce. For academic differences based on gender and locality, students were assigned to five groups. The first consisted of students with marks < 50%. Subsequent groups were constituted of students with marks in the ranges of 51%–60%, 61%–70%, 71%–80% and > 80%, in a progressive sequence. In an additional dimension focused on discerning the symbiotic relationship between frequency of classroom presence and scholastic prowess, students were demarcated into four separate groups: < 75% attendance, 76%–85%, 86%–95% and > 95%. Analytical procedures of a descriptive and comparative nature were conducted through SPSS version 22.0. A *p*-value not exceeding 0.05 was posited as the demarcation line for determining statistical relevance. The academic performance of most students improved in the professional examination. However, the students with ≥ 70% marks in pre-professional examination had less robust, albeit statistically significant, improvement in the professional examination. In terms of academic performance, an important difference was found based on gender and residential status, which were compared in both examinations. A statistically significant correlation was found between class attendance and students' academic performance in pre-professional and professional examinations (all $p < 0.001$).

**Keywords:** *Academic performance, Forensic medicine, Class attendance, Boarders, Day scholars*

## CORRESPONDING AUTHOR

Khalil Ur Rehman, Department of Forensic Medicine, Rehman Medical College, 5/B-2, Phase-V, Hayatabad Peshawar, KP, Pakistan

Email: khalil.rehman@rmi.edu.pk

## INTRODUCTION

Pre-professional examinations are typically taken before professional examinations, as they are crucial for helping students pinpoint their areas of deficiency, refine their preparation methodology, and acclimatise to the examination's format. Pre-professional preparation prepares students for the board examination, serving as a comprehensive revision of all classes attended throughout the session. These examinations equip students to comprehend and adjust to the time constraints and structural components intrinsic to professional assessments. While marks accrued in pre-professional settings do not directly influence professional examination scores, they are indicators of the current level of preparation only. Pre-board will only prepare students to face the main board examination with confidence and enable them to score more (1). Medical students frequently undergo academic evaluation through yearly tests or cumulative grade point average in several universities in Pakistan, as well as around the globe (2). A host of factors affect academic performance. Individual traits and domestic conditions such as familial encouragement, domestic surroundings, cognitive aptitude and the caliber of antecedent scholastic experiences merge as pertinent determinants. Gender stands as another pivotal variable, currently eliciting substantial attention from educators and policy architects across the globe (3). Residential status, whether a student resides on campus as a boarder or commutes as a day scholar, also appears to wield influence over academic results, according to numerous studies. The inception of boarding schools, particularly by Roman Catholics and Anglicans in the 20th century, aimed to facilitate ease of access to educators for students, which ostensibly could influence scholastic achievement (4). Moreover, class attendance has frequently been identified as a decisive element for academic triumph. Common wisdom posits that students who partake in classes with regularity exhibit a greater propensity for success in their scholarly pursuits. But in this technological era where students have easy access to e-libraries, academic videos, and other mediums of learning, this concept needs reevaluation (2).

Contrary to widespread belief, low scores in pre-professional evaluations should not be hastily interpreted as indicative of impending failure in main examinations. Likewise, excelling in these preliminary assessments does not unequivocally guarantee a higher score. To our knowledge, no study has been conducted to compare students' marks in both pre-professional and professional examinations. Therefore, the present study aims to compare pre-professional and professional marks and further categorise the results based on gender, residential status, and class attendance. The findings of this research could potentially serve as the foundational framework for directing enhanced focus and efforts towards academically underperforming cohorts. Such targeted interventions might manifest in the form of supplemental instructional sessions, tutorials, or other pedagogical strategies tailored for those demonstrating deficiencies. Secondly, if students who performed well in both pre-professional and professional examinations, and vice versa, then this study may be helpful for the college's policymakers to design and implement multiple mini-block examinations, similar to the pre-professional examination pattern, to improve the academic performance of students, especially the weaker ones.

## METHODS

Conducted within the confines of Rehman Medical College in Peshawar, Pakistan, this descriptive study spanned from April to August 2021 and encompassed third-year medical students from the academic sessions of 2013 to 2018. Using universal sampling techniques, the study ensured the confidentiality of all participants (5, 6). The academic syllabus under

scrutiny covered various topics within forensic medicine. These topics ranged from law and ethics, forensic aspects of trauma and thanatology, to personal identification, sexual offenses, forensic toxicology, forensic psychiatry, and forensic serology. It is worth noting that this identical course content appeared in both the pre-professional assessments of Rehman Medical College and the professional examinations of Khyber Medical University, Pakistan. The pattern of pre-professional examination was kept the same as that of professional examination.

Both examinations had two components, i.e., theory and viva voce. The theory paper was further divided into multiple-choice questions and short-essay questions. The record of the pre-professional examination results was already available in the department. In contrast, marks from the professional examination of individual students in forensic medicine were obtained from detailed marks certificates present at the student affairs department of the college. For the theory paper, a structured key was provided to the examiners to eliminate bias when the papers were evaluated (7). The student affairs department provided the list of boarder students, and individual students also confirmed this. A total of 469 students were included in the study; 255 students were male, while 214 were female. Those students who were found absent in either pre-professional or professional examination were excluded from the study.

For academic comparison based on gender and residential status, students were categorised into five groups: Group 1 (< 50% marks); Group 2 (51%–60% marks), Group 3 (61%–70% marks), Group 4 (71%–80% marks) and Group 5 (> 80% marks). To find the correlation between class attendance and academic performance, students were divided into four groups based on attendance: < 75%, 76%–85%, 86%–95%, and > 95% (8). Confidentiality of the participants was maintained (9).

### Data Analysis

Data were analysed by SPSS version 20.0. In addition to descriptive statistics, a linear regression analysis was performed to detect the relationship between various parameters and the academic performance of students in both pre-professional and professional examinations. The chi-square test and student's *t*-test were used to detect significant differences in gender and residential status for all analyses; $p \leq 0.05$ was considered statistically significant.

## RESULTS

A total of 469 students of the third year MBBS were enrolled in the study, including 255 male students and 214 female students. Overall, the academic performance of the students improved in the professional examination, except for those who obtained more than 80% marks in the pre-professional examination. Although this improvement was statistically insignificant, it indicated a slight decline in their performance. Students performed much better in practical examinations than in theory (Figure 1).

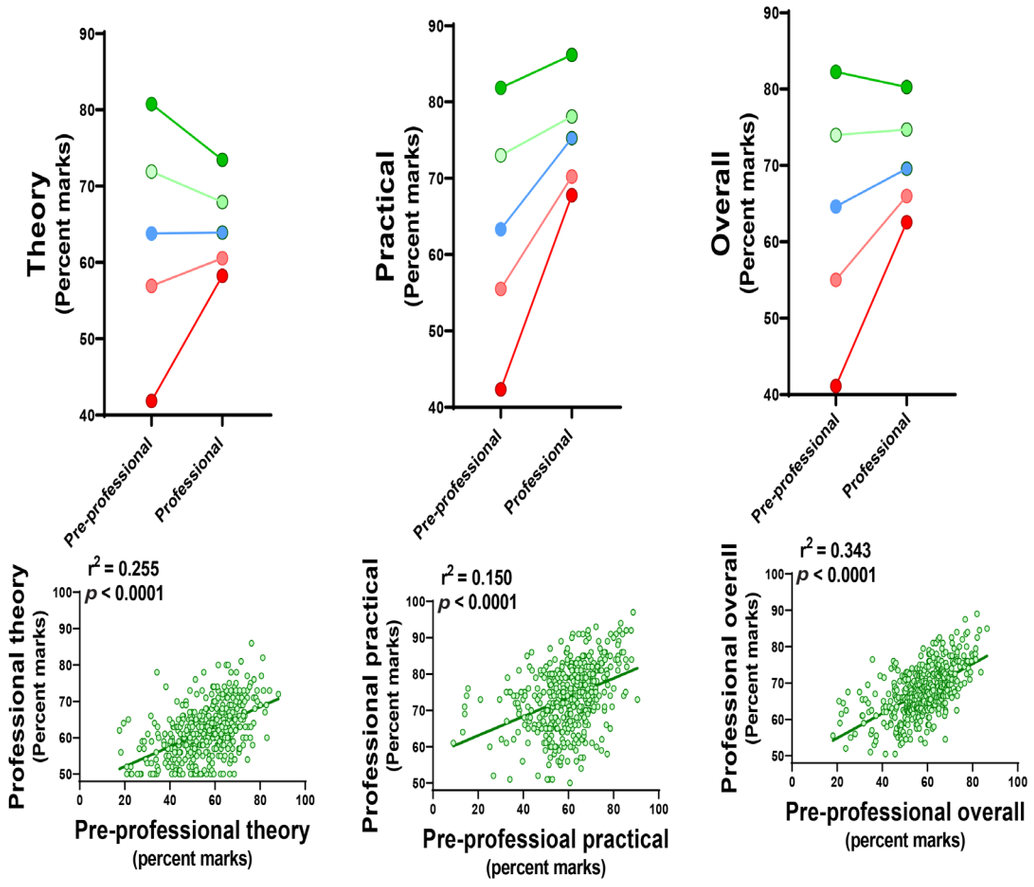


**Figure 1:** Theory and practical marks of students in pre-professional and professional examinations (Mean ± SD).

Both male and female students improved their academic performance in professional examinations, but males showed slightly more improvement than their female counterparts. A significant difference was found when the overall academic performance of each gender was compared in pre-professional and professional examinations (Figure 2).

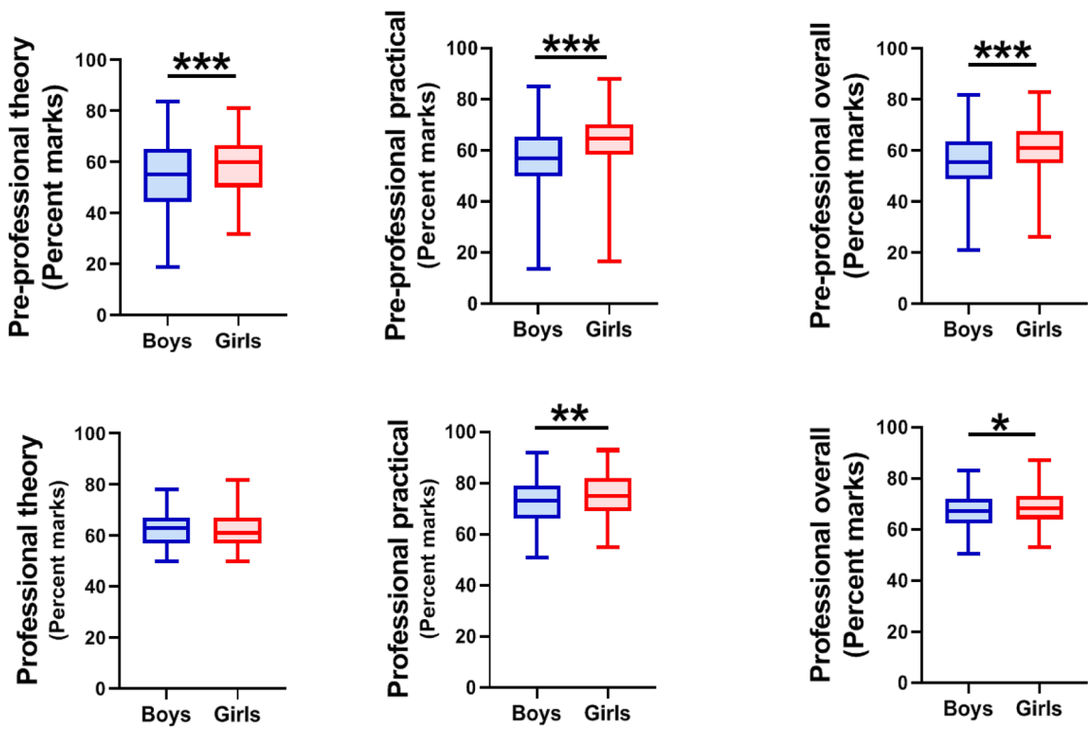


**Figure 2:** Box and Whisker graphs showing the comparisons of male and female students for marks in pre-professional and professional examinations, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.

Male students were found significantly high in the < 50% marks category and females in 60% to 69% marks category, while an insignificant difference was found in the rest of the marks categories in the pre-professional examination. Comparison of male and female students in different marks categories revealed a statistically insignificant difference in professional examination (Figure 3).

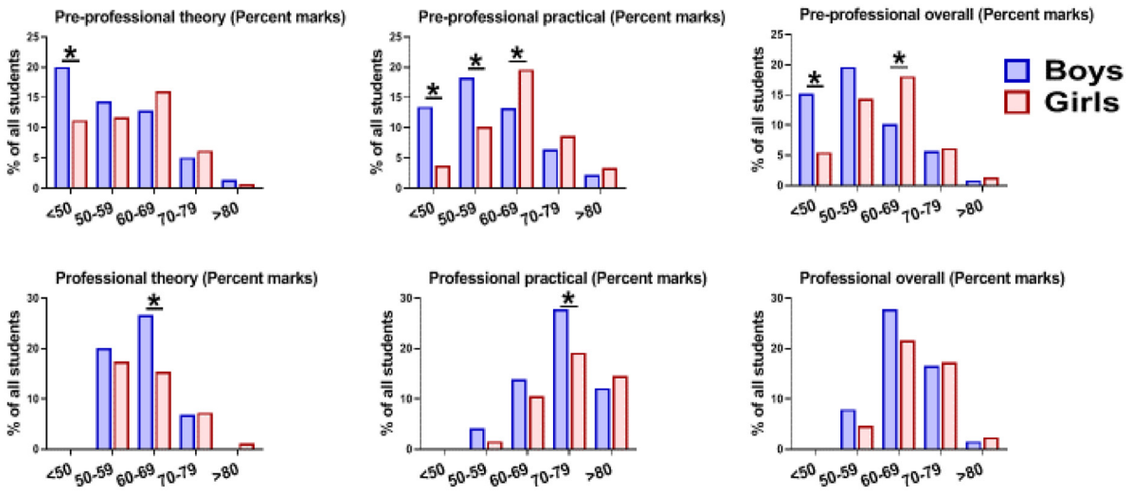


**Figure 3:** Comparison of academic performance (%) of male and female students based on marks categorisation in pre-professional and professional examinations, $^{*}p < 0.05$.

Day scholars performed well in both theoretical and practical examinations, covering pre-professional and professional fields. A significant difference was found when the academic performance of male and female boarder students was compared with male and female day scholar students in the pre-professional examination. An insignificant difference was found between male boarders and day scholars in professional examination, while a significant difference was found between female students based on residential status (Figure 4).

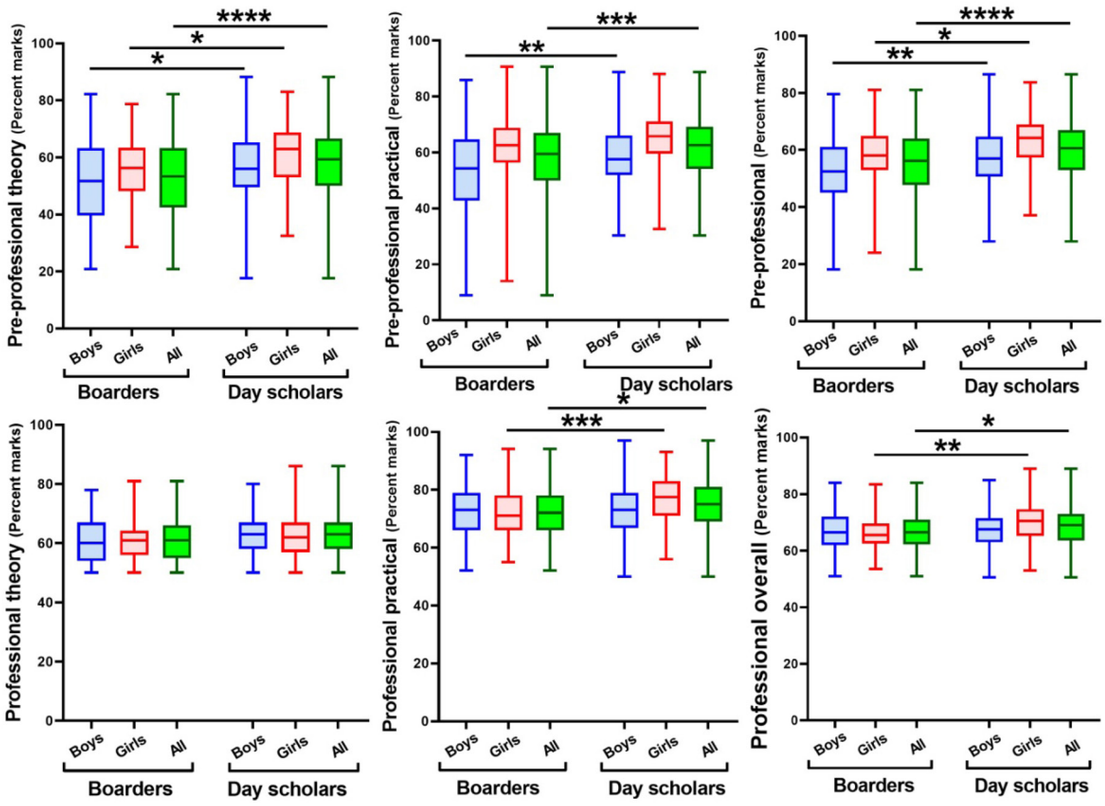


**Figure 4:** Comparison of academic performance (%) of boarders and day scholars in the pre-professional and professional examinations, $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$, $^{****}p < 0.0001$.

The majority of students (42.13%) fell in the 76% to 85% attendance group, followed by 40.57% students in 86% to 95% group. About 13.31% of students had attendance of more than 95%, while the remaining 3.99% had attendance below 75%.

Linear regression analysis was utilised to explore the relationship between class attendance and academic outcomes in pre-professional and professional examinations. Attendance correlated with outcomes in both theoretical and practical examinations of the pre-professional and experienced, as indicated by all $p$-values being less than (all $p < 0.001$). Class attendance showed relatively less robust but statistically significant correlations with examination performances (Figures 5 and 6).

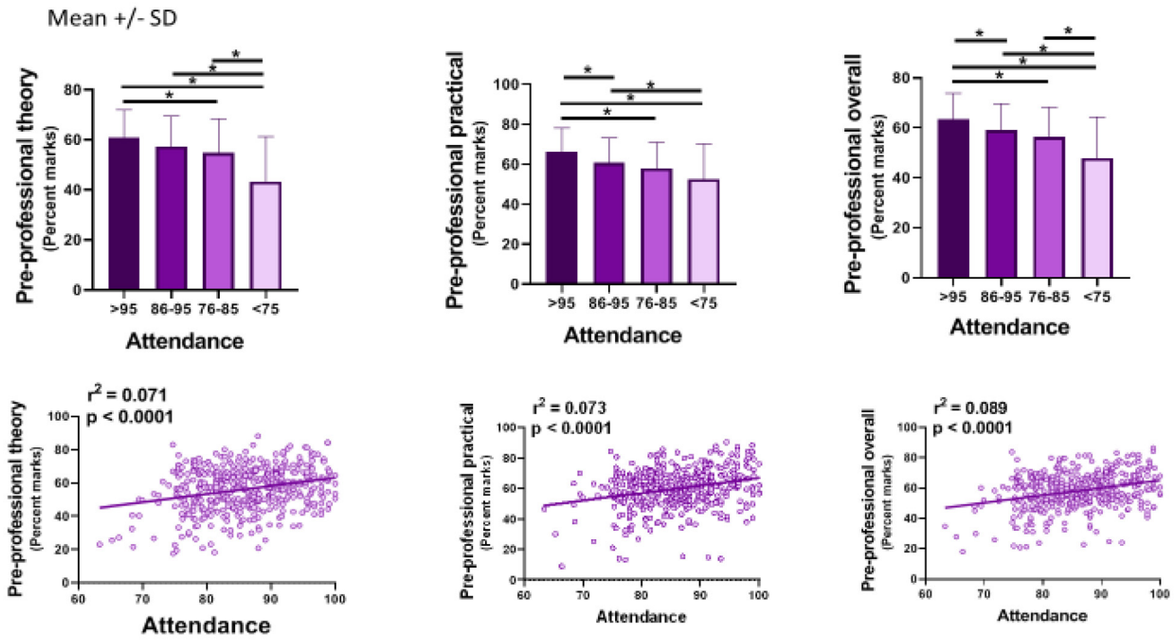


**Figure 5:** Bar graphs showing the percentage marks according to the attendance and the correlation graphs showing the associations of percentage marks with attendance in pre-professional examination, $^{*}p < 0.05$.

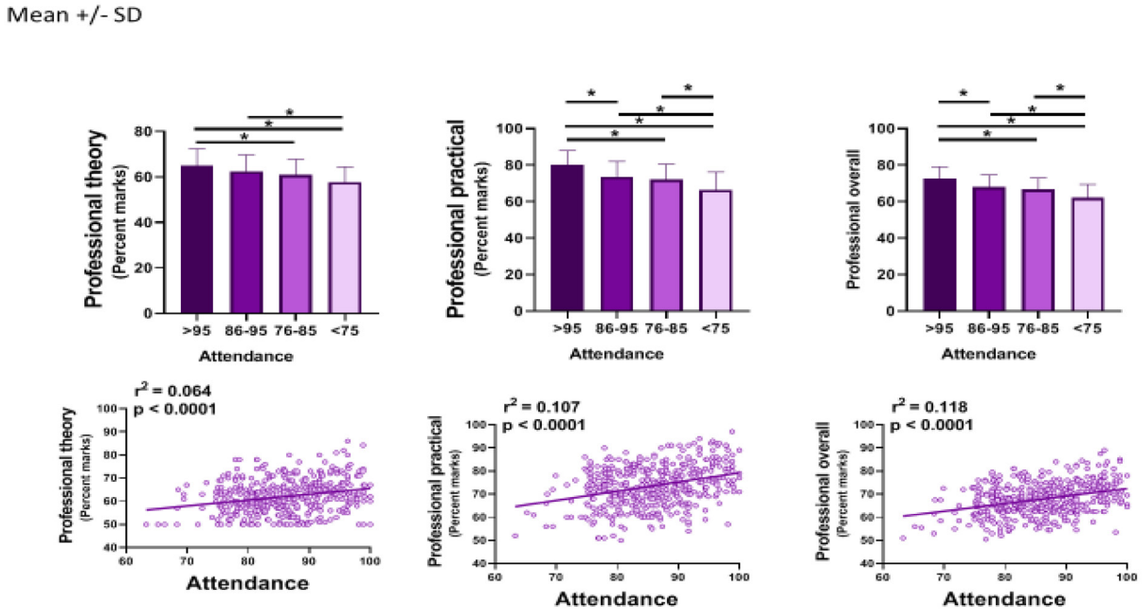


**Figure 6:** Bar graphs showing the percentage marks according to the attendance and the correlation graphs showing the associations of percentage marks with attendance in the professional examination, $^{*}p < 0.05$.

## DISCUSSION

Unquestionably, education stands as humanity's most potent tool for self-advancement. While societies across time and cultures have embraced education in multiple forms, the applications of this intellectual capital diverge widely. Scrutiny into the determinants affecting student academic performance has increased over time, intriguing educators and academics, investigators and institutional overseers alike. Among these influencing factors, gender, residence and class attendance have been spotlighted as significant determinants. Recent studies in developing countries have also shown marked improvement in female academic performance (10).

We report that the performance of most students in terms of academics improved in the professional examination, except for those who obtained ≥ 70% marks in the pre-professional examination. Students scored higher in practical examinations than in theory, likely due to their active participation in practicals during tutorials and small group discussions, the reinforcement of theoretical knowledge through practicals, and the repeated rehearsals. An apparent variation was found when the performance of both genders was compared in pre-professional and professional examinations in terms of academics. Males showed a slight improvement over their female counterparts, likely because most boys tend to focus less on academics during the active session but concentrate more on studies during preparatory leaves. Similarly, a significant difference was also found when the academic performance of the day scholar and boarder students was compared in both pre-professional and professional examinations. However, both improved their academic performance in professional examinations. Class attendance had a positive impact on students' academic performance both in pre-professional and professional examinations.

Prior research studies on the differences in classroom performance between male and female students showed mixed results. While no differences existed in some studies, others showed significant differences. Results of some studies showed female gender to be better academically, while other suggests male gender (11). For instance, Conger and Long (12) found that in a cluster of 11 public, four-year educational institutions in Florida, females outperformed males in terms of grades. Contradictorily, research emanating from Nigeria portrayed male students as outpacing their female peers in scholastic achievements (13). Josiah and Adejoke, and Abubakar et al. (14, 15) also reported the same results. Our study suggests that females have better academic performance than males in medical examinations.

Khan et al. (16) conducted a study at Rawalpindi Medical University, Pakistan, to compare the academic performance of boarders and day scholars. The total students included in the study was 287; 183 were boarders, and 104 were day scholars. When scrutinised for academic performance, day scholars were observed to outperform their boarding counterparts in various studies. An analogous inquiry in India corroborated these findings, presenting day scholars as academically superior (17). A survey of the academic performance of Somali students revealed that day scholars' academic performance was poor due to a lack of parental contribution and support (18). Similarly, another study showed better academic performance of boarders over day scholars (19). It is believed that due to an unsustainable home environment, the day scholars cannot study properly. In harsh weather conditions, the long distance to the school is another problem. Faisal et al. (4) performed a study at Rehman Medical College, Peshawar, to compare the academic performance of boarders and day scholars. Results showed no significant difference between the two groups (4). Another study also reported the same results (8). The results of the present study are in favour of day scholars.

In an academic inquiry emanating from SIMAD University in Mogadishu, a robust positive correlation between student attendance and scholastic achievement was observed (20). Neri and Meloche (21) also probed this association, corroborating that class attendance indeed exerts a positive influence on academic outcomes. Gottfried's (22) study yielded analogous findings, confirming that attendance plays a pivotal role in student academic success. Another study also discovered a meaningful relationship between the two (23). Deane and Murphy (24) conducted a similar investigation specifically targeting medical students and concluded that a positive linkage exists between attendance and academic performance. These recurrent findings amplify the argument that attendance is not merely a peripheral factor but rather a central determinant in the realm of academic achievements (24). As far as the correlation of attendance and academic performance is concerned, our findings are similar to the results of all the above-mentioned studies.

This study offers valuable insights to educationists, researchers, and policymakers, highlighting the importance of providing a comfortable environment at hostels with access to the internet, libraries, and other resources, as well as considering the physical attendance of students in classes, particularly in developing countries like Pakistan. The capacity for generalising our data remains circumscribed due to its derivation from a singular educational institution. Factors such as assessment methodologies, faculty competencies, student demographics, curricular elements, and pedagogical approaches could manifest differently across various institutes. Nonetheless, our study contributes a meaningful building block to the existing corpus of academic research. As aptly stated, scrutinising elements that influence academic outcomes constitutes an incremental process akin to bricklaying; no solitary study can purport to form the entire structure. Based on the results of this study, future studies are recommended to investigate the causes of better academic performance of female and day scholars in professional exams than in pre-professional exams. Similarly, the correlation of the academic performance of medical students to their preferred learning style can also be evaluated.

## CONCLUSION

Overall academic performance of students significantly improved in professional examinations as compared to pre-professional examinations. A significant difference was found when the academic performance of male and female students was compared in pre-professional and professional examinations. The academic performance of day scholars and boarder students showed a significant difference both in professional and pre-professional examinations; however, both improved their academic performance in professional examinations. Class attendance was found to have a positive impact on students' academic performance both in pre-professional and professional examinations.

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## ETHICAL APPROVAL

The ethical approval for this study was obtained from the Research and Ethics Committee of Rehman Medical Institute, Pakistan (Ref No: RMI-10-01-115 dated 10 January 2021).

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