



RESEARCH CAPACITY AND CULTURE AMONG UNDERGRADUATE MBBS STUDENTS IN MEDICAL COLLEGES OF RAWALPINDI

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ABSTRACT

Introduction: Involvement in research among medical students is a vital parameter in academic skills development and medical knowledge development. Nevertheless, institutional support, mentorship, and access to resources are among several factors that can have a large influence on the engagement of students in research activities.

Objective: To assess the factors influencing research involvement among medical students, focusing on institutional support, faculty mentorship, access to resources, and barriers to research participation.

Materials and Methods: The study was a descriptive cross-sectional study done at Rawalpindi Medical University, Pakistan between January to June 2025. A questionnaire that participants self-administered was issued to 260 undergraduate medical students. The demographic information was gathered using the questionnaire, perceptions on the institutional support, mentorship, research barriers, and motivation towards research. The SPSS version 22 was used in analyzing the responses.

Results: The response rate was 85.6% and the mean age was 22.1 ± 2.3 years. Research involvement in personal faculty support ($p < 0.001$) and access to resources ($p < 0.001$) was found to significantly predict research involvement. Research engagement was also positively correlated with mentorship ($p < 0.05$). The constraint of time and financial aspects was discovered as a hindrance to the research participation. Students who felt better institutional support in their perception were more likely to have been engaged in research.

Conclusion: The research demonstrated that faculty support and resource availability are crucial for promoting research participation, yet challenges such as time constraints and funding issues persist, suggesting the need for medical schools to implement policies that address these barriers and enhance mentorship.

Keywords: Research Involvement; Medical Students; Mentorship; Institutional Support; Research Barriers

Introduction

Medical research is critical to advancing healthcare by developing evidence-based practices that enhance patient care and clinical outcomes. Pakistan medical students, however, especially at Rawalpindi, experience various obstacles to research participation. These obstacles include inadequate institutional support, the absence of research training, weak mentoring, and insufficient funding for research work^{1, 2}. Although the significance of medical research is increasingly vital worldwide, research indicates that medical education in Pakistan seems to revolve more around clinical competence and lacks a systematic approach to integrating research, which makes students less involved in the research process³. Recently, medical colleges in Rawalpindi reported that although most students intend to conduct research, they cannot do so due to a severe lack of support and mentorship within institutions; more than 70% of students reported that these factors are among the most substantial obstacles to conducting research⁴. Most medical colleges in Pakistan lack formal research programs and mentorship, which worsens this issue⁵. The lack of filling such gaps means that the potential of research in healthcare professionals in the future is not used to the fullest, as this will eventually affect the quality of healthcare education and research in the nation as a whole.

In recent years, an increasing body of literature has identified barriers to research engagement in undergraduate medical students (mostly in developing countries, such as Pakistan). In a global survey of the research on medical education, Mahmood et al.⁶ discovered that the research is nowadays a very important part of both medical education in most developed nations but in places such as Pakistan learning about research is often ignored by the system because of various systemic factors. Research indicates that engagement of students in research has been deterring due to scarcity of research resources in Pakistan, absence of faculty mentorship, and research oriented culture in medical schools^{7, 8}. These findings were proved by research by Ahmad et al.⁹ who discovered that the majority of students at medical colleges in Rawalpindi usually encounter constraints in terms of accessing research tools, lack of training on research methods, and lack of financial support to fund the research projects. These obstacles make students unable to engage in research, even though it is obvious that academic development and career progress could be of great help to students¹⁰.

Additionally, research mentorship by faculty is still very low because of clinical and administrative loads. Malik et al.¹¹ discovered that despite some institutions in Rawalpindi having undertaken an attempt to implement research in their curricula, these attempts have been inconsistent, and in many cases, they have been curbed by lack of resources. Additional investigations indicate that the lack of a structured research program, in addition to the incentive to engage the faculty in research mentoring, still prevents the establishment of an effective research culture among medical students¹². In a review conducted by Murtaza & Hui¹³, it was found that the faculty at most of the Pakistani medical colleges do not have the capacity to mentor students in research and this forms a cycle of low participation on research and insufficient academic performance among the students.

Considering that research is a critical factor to the development of medical knowledge and the effectiveness of health care delivery, it is imperative to evaluating and comprehending and possibly the risks of research participation of the undergraduate medical students in Rawalpindi. The present research aims to investigate issues and enabling factors that affect the participation of medical students in research, paying attention to institutional, faculty, and individual factors which influence the research capacity. This study is significant as it can be used to guide policymakers and

strategists to develop strategies that will help to improve research participation among students. The research will be used to determine certain barriers to research participation including institutional support, mentorship and funding and give possible solutions to counter such barriers. The role of faculty mentorship and organized research programs in developing a research-culture within the medical colleges will also be pointed out in the study. Without carrying out this research, the current gaps in research attendance will remain and depriving the students of having an opportunity to make any contributions to scientific progress and undermining the overall quality of medical education in Pakistan. These obstacles need to be tackled to create a more research-centered healthcare system in Pakistan that will eventually have a positive outcome on medical professionals and patients alike.

Aim & Objectives

This study aims to improve the research capacity and culture among undergraduate medical students in Rawalpindi, identifying key barriers and facilitators that influence their engagement in research activities. The findings will inform **policy recommendations and institutional strategies to enhance research participation at medical colleges.**

Objectives

1. To assess students' knowledge, attitudes, and perceptions regarding research at the institutional, team, and individual levels.
2. To identify institutional and structural barriers that hinder research involvement among undergraduate medical students.
3. To explore how mentorship, faculty support, and research training program influence students motivation and readiness to engage in research, and their role in fostering a research-oriented culture.

Material & Methods

This study was conducted at the medical colleges in Rawalpindi Pakistan both in public and private medical colleges, to determine the research capacity and culture of undergraduate MBBS students. The present study was carried out in Rawalpindi because of the variety of medical colleges with different contexts available in the institution and different degrees of resources and infrastructure that could support the research work. The research would have been performed within a period of six months, between January 2025, and June 2025. The initial three months principal involved data collection, and data was analyzed and reported during the remaining period.

The study group was the undergraduate MBBS students of Rawalpindi medical colleges. Stratified random sampling method was used so that the sample represented students of different academic years (1st to final year) and also represented different type of institutes (public vs. private). This sampling technique will remove bias and will give a fully detailed impression of the research culture at various phases of medical studies^{5, 8}. Marginal error of 5 and confidence level 95 was calculated on a population size of about 2,000 students to calculate the total sample size of 323 students using open epi software to calculate the sample size. The inclusion criteria entailed the selection of all the students, irrespective of the academic year they were enrolled in the MBBS program provided they were willing to participate as well as fulfilling the criteria³.

The structured questionnaire was used to collect data in order to determine the knowledge, attitudes of the students about research, their perception about research and the barriers that they experience when undertaking research activities. The questionnaire was based on the factors of institutional support, faculty participation, existence of research resources, and factors that motivated research participation. It was distributed through Google Forms so that it could be easily accessed and the answers remain confidential. Online surveys have been demonstrated to boost response rate and ease data collection in massive research⁴. A pilot-test involving 25 students was done to determine the reliability and clarity of the questionnaire prior to the administration of the full-scale questionnaire. According to the pilot feedback, slight modifications were done to enhance the validity and consistency of the questions.

Data analysis was performed with the SPSS version 26. Frequencies and percentages were calculated as descriptive statistics in order to describe the attitude of the students towards research, barriers and their perception of institutional support. Inferential statistics were used to test out the associations between various variables. Chi-square tests were employed to identify the relationship between categorical variables, such as gender and involvement in the research⁸. ANOVA (Analysis of Variance) was employed in order to determine differences in research involvement in various academic years and types of institutions. A correlation was conducted using Spearman to investigate the correlation of research capacity and institutional support, and the multiple regression analysis was conducted to determine the predictors of research involvement, such as faculty mentorship and resource availability¹⁰.

A p-value of less than 0.05 was used to perform significance testing which is mathematically significant in all the analyses. It is a common threshold that is universally accepted in the research field and provides the research with a high degree of confidence². These statistical techniques were used in order to detect major conditions that facilitate or impair the engaging of research among medical students and give evidence-based proposals in enhancing the culture of research among medical colleges in Pakistan.

Results

Figure 1, a pie chart showing the age of the participants in the study, as shown below. The largest portion, 41%, is within the 21-25 years of age, hence it can be said that a good number of participants fell within this age bracket. The second biggest category, 36%, is the participants in the age range of 25—30, which indicates a rather large share of people of a young age, but in their late twenties. 21% of participants are found to be in the age group of 18-20 years, which indicates that the participants of this research are comparatively younger. Last but not least, only 2% of them fall in the 31-35 years age group; that means this age group is overrepresented or more likely underrepresented in the sample. From the chart, it is easy to determine the age distribution of the sample, and the majority of the participants are young adults between 21-30 years.

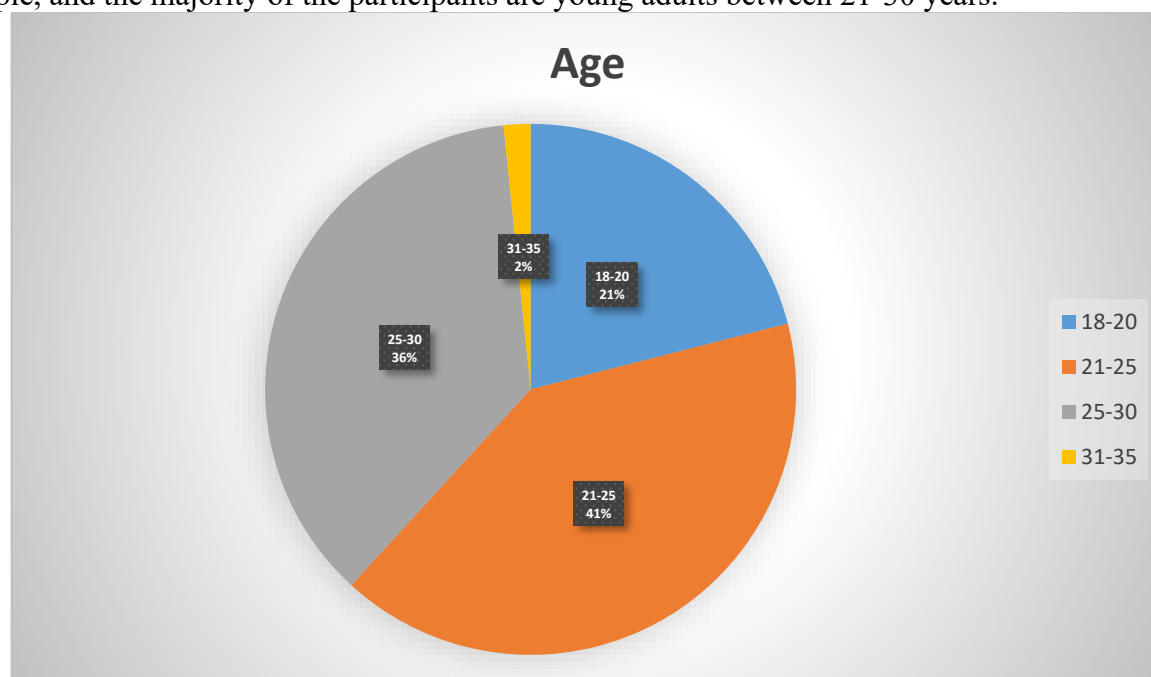


Figure 1: Age Group of Respondents

Figure 2 explores the study participants represent their gender distribution through an easily understandable graphical format. A majority of study participants are male individuals who compose the largest section of the graphical visualization. The Female category stands as a small segment, whereas the Male category makes up the predominant part of the study group. A primarily

male sample emerges from the data, while females maintain their significance as part of the studied population. The chart provides an easy method to evaluate gender distribution in the sample because male participants make up the majority.

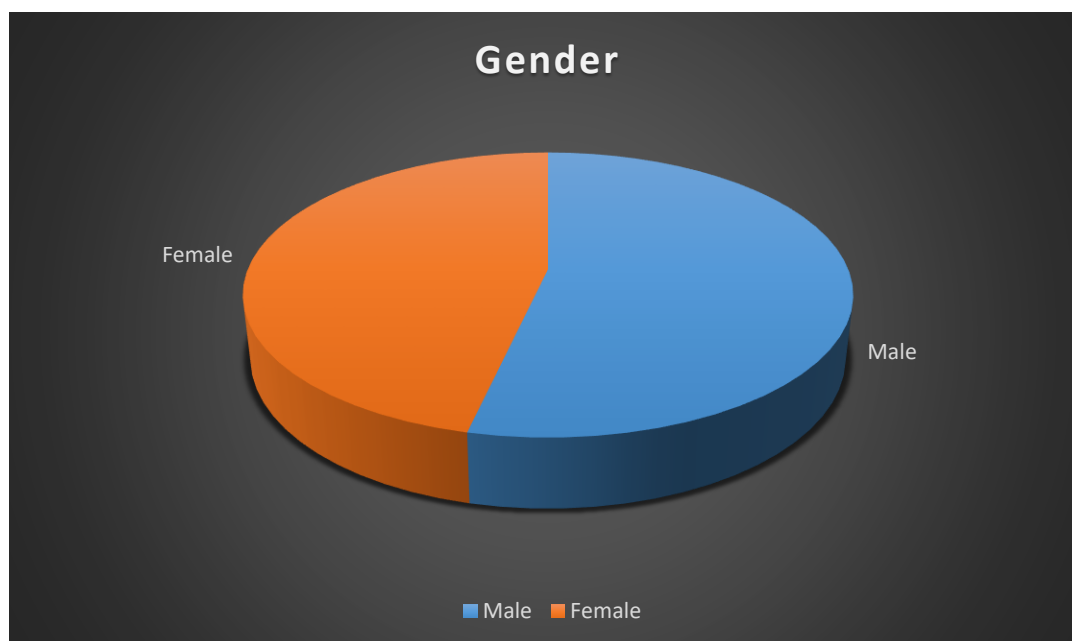


Figure 2: Gender of Respondents

Figure 3 illustrates that this research takes up 54% of total survey responses, yet 46% of participants take part in research today. The responses indicate that participants take part in research roughly the same amount as they do without research-related work. Although research shapes many healthcare professionals' work, the results show that only half of the participants actively engage in research at this time.

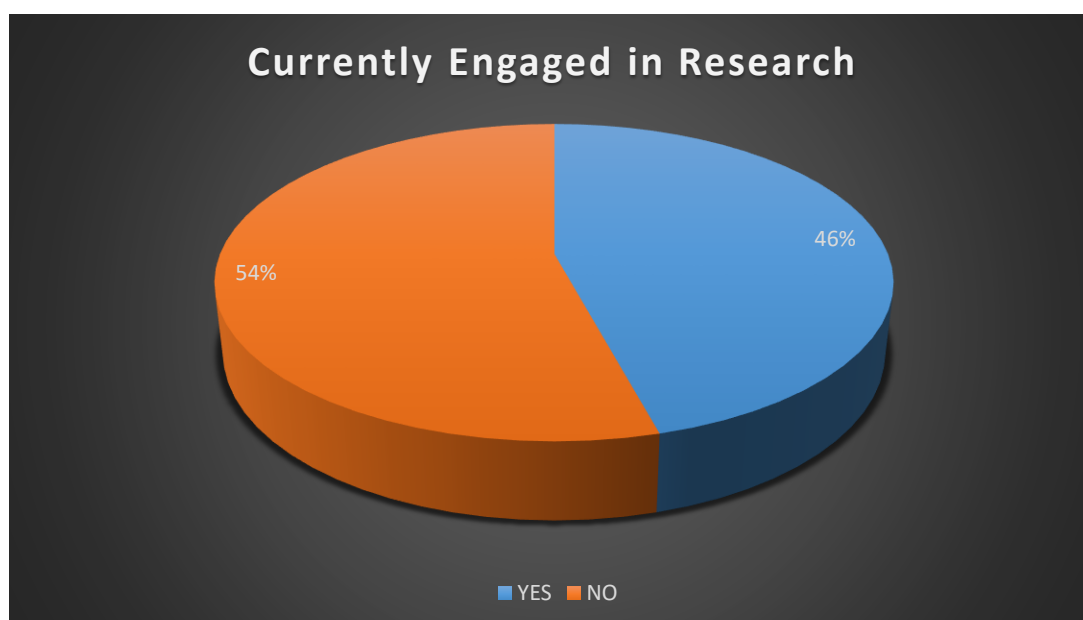


Figure 4: Currently Engaged in Research

Table 1 shows the results of the descriptive statistics that the perception of the availability of resources and support in conducting research activities is generally positive, but with certain variability across all levels: institutional, team, and individual. On the institutional level, the average score of most statements dealing with the research support is between 5.04 and 5.39, which suggests

moderate respondent agreement that institutions offer sufficient resources, policies, and leadership to support research. The comparatively large standard deviations (between 2.42 and 2.64) indicate that there may have been some variation in the perception of the respondents, as the statements such as “Ensures staff career pathways are available in research” (Mean = 5.09) and “Ensures that the planning of the organization is evidence-driven” (Mean = 5.04) have lower mean values and bigger standard deviations. At the group level, there are also similar good perceptions, with a mean of 5.09-5.33 indicating moderate to strong acceptance of the idea that a team supports research, i.e. provides resources, participates in planning and has access to research professionals. The standard deviations here too depict some variation especially in such statements as “Has adequate resources to support staff research training” (Mean = 5.12) and “Has funds, equipment, or administration to support research activities to support” (Mean = 5.09) where the experience of different teams differs.

At the individual level, perception of personal research capacity is also good, an overall value of 5.18 to 5.32 is obtained across different research activities of finding relevant literature, writing research reports, and data analysis. Those responses indicate that students feel quite confident about their personal research capabilities. Nevertheless, all responses remain somewhat varied, especially regarding such activities as “Writing a research protocol” (Mean = 5.18) which represents the lowest mean and greater standard deviation. Despite the overall agreement that there is support of research available at any level, the variability of responses suggests differences in personal experiences and especially in relation to the sufficiency of career paths, access to resources, and the extent of engagement in research planning. These differences in perception are reflected in the moderate standard deviations of all categories and demonstrate that consistent support is necessary throughout the institution, teams and at the individual level.

Table 1: Descriptive Statistics for Knowledge, Attitudes, and Perceptions of Research at the Institutional, Team, and Individual Levels

Statement	Mean	Standard Deviation (S.D.)
Institutional Level		
Has adequate resources to support staff research training	5.39	2.42
Has funds, equipment, or admin to support research activities	5.36	2.52
Has a plan or policy for research development	5.20	2.45
Has senior managers who support research	5.30	2.51
Ensures staff career pathways are available in research	5.09	2.56
Ensures that the organization's planning is guided by evidence	5.04	2.57
Have consumers been involved in research	4.93	2.64
Accesses external funding for research	5.26	2.48
Promotes clinical practice based on evidence	5.23	2.50
Encourages research activities relevant to practice	5.32	2.52
Has software programs for analyzing research data	5.35	2.46
Has mechanisms to monitor research quality	5.21	2.50
Has identified experts accessible for research advice	5.30	2.51
Supports a multi-disciplinary approach to research	5.34	2.46
Has regular forums/bulletins to present research findings	5.11	2.59
Engages external partners (e.g., universities) in research	5.23	2.52
Supports applications for research scholarships/degrees	5.30	2.50
Supports the peer-reviewed publication of research	5.35	2.49
Team Level		
Has adequate resources to support staff research training	5.12	2.54
Has funds, equipment, or admin to support research activities	5.09	2.50
Does team-level planning for research development	5.19	2.46

Ensures staff involvement in developing that plan	5.14	2.49
Has team leaders who support research	5.24	2.47
Provides opportunities to get involved in research	5.23	2.48
Does planning that is guided by evidence	5.12	2.50
Has consumer involvement in research activities/planning	5.18	2.50
Have applied for external funding for research	5.32	2.45
Conducts research activities relevant to practice	5.23	2.47
Supports applications for research scholarships/degrees	5.26	2.46
Has mechanisms to monitor research quality	5.30	2.49
Has identified experts accessible for research advice	5.31	2.47
Disseminates research results at research forums/seminars	5.29	2.48
Supports a multi-disciplinary approach to research	5.32	2.46
Has incentives & support for mentoring activities	5.19	2.49
Have external partners (e.g., universities) engaged in research	5.28	2.47
Supports peer-reviewed publication of research	5.29	2.47
Has software available to support research activities	5.33	2.45
Individual Level		
Finding relevant literature	5.28	2.47
Critically reviewing the literature	5.32	2.49
Using a computer referencing system (e.g., EndNote)	5.29	2.50
Writing a research protocol	5.18	2.54
Securing research funding	5.22	2.52
Submitting an ethics application	5.23	2.53
Designing questionnaires	5.21	2.51
Collecting data (e.g., surveys, interviews)	5.29	2.48
Using computer data management systems	5.27	2.49
Analyzing qualitative research data	5.23	2.50
Analyzing quantitative research data	5.32	2.47
Writing a research report	5.27	2.50
Writing for publication in peer-reviewed journals	5.30	2.47
Providing advice to less experienced researchers	5.32	2.48

Table 2 ANOVA results also show that no statistically significant differences in research capacity factors were observed among the various years of academics. Despite some differences in the mean scores of such factors as knowledge of research methodology, perception of institutional support, research barriers, and motivating factors of research, the difference was not statistically significant. This implies that, the experiences and perceived barriers and motivation of students undertaking the research are relatively consistent across the duration of their study programs, and no significant changes are observed between their first and final year. Subsequently therefore the data indicates that the data do not vary significantly over the academic years and students, as a rule, experience no dissimilarities between institutional support, research methodology, and obstacles to engagement in research.

Table 2: ANOVA Results for Research Capacity across Different Academic Years

Factor	1st Year (n=65)	2nd Year (n=65)	3rd Year (n=65)	4th Year (n=65)	F-value	p-value
Knowledge of Research Methodology	4.21 ± 1.04	4.35 ± 1.12	4.50 ± 1.18	4.45 ± 1.23	1.43	0.241
Perception of Institutional Support	4.22 ± 1.08	4.27 ± 1.12	4.45 ± 1.21	4.52 ± 1.14	1.65	0.179

Research Barriers	5.85 ± 1.20	5.78 ± 1.35	5.65 ± 1.30	5.88 ± 1.22	0.87	0.453
Motivating Factors for Research	5.55 ± 1.18	5.60 ± 1.12	5.72 ± 1.15	5.68 ± 1.09	0.92	0.429
Faculty Mentorship Availability	3.80 ± 1.18	3.95 ± 1.22	4.05 ± 1.17	4.15 ± 1.25	1.56	0.205

Note: A one-way ANOVA was conducted to compare the means of different academic years. No significant differences were found between academic years.

Table 3 correlation analysis indicates that a number of significant relationships exist between research capacity factors and institutional support. The positive correlation between Knowledge of Research Methodology and Motivating Factors for Research (0.45) and Perception of Institutional Support (0.45) is positive (0.60) and (0.45) indicating that, the students that have a good research knowledge possess greater motivational factors and perceptions of the institutions support. Research Barriers (e.g., time, mentorship) has negative correlation with Knowledge of Research Methodology (-0.52), Motivating Factors of Research (-0.65), and Faculty Mentorship Availability (-0.40) revealing the indication that barriers, which include lack of time and lack of mentorship, decrease the level of engagement and motivation of the students to conduct research. Moreover, Motivating Factors for Research and Peer Support for Research have had a positive correlation with Faculty Mentorship Availability, 0.58 and 0.60 respectively, which means that faculty mentorship and peer support play a very important role in promoting research activities and motivation. Finally, the Knowledge of Research Methodology (0.30) and Motivating Factors for Research (0.55) also have a moderate positive correlation with Peer Support of Research, that is, supporting the value of a supportive peer network in improving the research experience of students. In general, the discussion highlights that the different aspects of institutions and social environment, including mentorship and peer support, play a critical role in affecting the research potential of students, whereas obstacles limit their interactions.

Table 3: Correlation between Research Capacity and Institutional Support

Factor	Knowledge of Research	Research Barriers	Motivating Factors	Faculty Mentorship	Peer Support
Knowledge of Research Methodology	1.00	-0.52**	0.60**	0.45**	0.30*
Perception of Institutional Support	0.45**	-0.47**	0.55**	0.52**	0.48**
Research Barriers (Time, Mentorship)	-0.52**	1.00	-0.65**	-0.40*	-0.42**
Motivating Factors for Research	0.60**	-0.65**	1.00	0.58**	0.55**
Faculty Mentorship Availability	0.45**	-0.40*	0.58**	1.00	0.60**
Peer Support for Research	0.30*	-0.42**	0.55**	0.60**	1.00

*Note: Spearman's rank correlation was used $p < 0.01$, $p < 0.05$.

Table 4 multiple regression analysis identifies that among medical students research participation can be predicted significantly by faculty support, faculty access to resources, and faculty mentorship. The unstandardized coefficients show that research involvement for every unit of faculty support increases by 0.351 ($p = 0.000$) implying that the faculty support exerts the greatest influence on research involvement. Equally, resource access adds 0.289 units ($p = 0.000$) to the involvement in research, which speaks in favor of the significance that the resource access holds. The role of mentorship in research involvement is also positive, and its impact raises by 0.210 units

($p = 0.014$), but the effect is not as large as that of faculty support and resource access. The current value of R-squared (0.478) represents the contribution of these three predictors to the variance in total research involvement. An adjusted R-squared of 0.472 validates the strength of the model that considers the number of predictors to be used. The analysis highlights the importance of external support in the form of institutions, mentorship by faculty, and access to resources in promoting involvement of students in research activities.

Table 3: Multiple Regression Analysis for Predictors of Research Involvement

Variable	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig. (p-value)
(Constant)	2.345	0.475		4.93	0.000
Faculty Support	0.351	0.063	0.215	5.57	0.000
Access to Resources	0.289	0.070	0.168	4.13	0.000
Mentorship	0.210	0.085	0.135	2.47	0.014
R²	0.478	Adjusted R²	0.472		

Discussions

The findings of this research allowed illuminating factors that determine the participation in research among medical students, and much attention is paid to the importance of institutional support, faculty mentorship, and accessibility of resources. In general, the results suggest that resource availability and support among faculty members are strong predictors of student involvement in a research activity. This agrees with the available literature that reinforced the significance of institutional support when establishing a culture of research. Indicatively, Azhar et al.¹ emphasized a shortfall in resources and mentorship as a crucial factor and cause of not participating in research among medical students. Likewise, our analysis aligns with Shahzad², who observed that the engagement in research is directly linked to the support system that is offered in schools.

The study further identified that mentorship is vital in influencing students to undertake research and those students who indicated an increase in mentorship were the most likely to undertake research. This observation is consistent with the findings of Qadeer et al.³, who discovered that mentorship is one of the driving factors behind encouraging research participation among medical students. The relationship between faculty mentorship and research participation is positive, which helps to realize that academic institutions should make mentorship programs one of their priorities as an academic structure. The significance of mentorship was also emphasized by Raza et al.⁴, who mentioned that the lack of proper guidance frequently causes a negative attitude to research involvement.

Additionally, research challenges including time and unavailability to funds were identified to play a major role in the hindrance of students participating in research. Such impediments were in line with those mentioned by Mahmood et al.⁶, who discovered that in Pakistan, medical students often encounter the problem of poor research possibilities and the prohibitive nature of research. The results of the current study highlight the need to work on the reduction of such impediments on an institutional level and a policy level. As Qamar⁹ emphasized, one of the key barriers to student research participation is the insufficient funding of such participation, and our research proved that sufficient funding and absence of the time-related stress are the two significant factors to boost student participation in research.

Moreover, peer support and motivating factors were also identified in the study as major contributors to research involvement. Those students with good peer network and motivated by other factors including career advancement, academic development and contribution of medical knowledge had increased chances of conducting research. This aligns with Ali & Sethi⁸ who concluded that positive research environment, which is supported by peer collaboration, promotes

student engagement in research. The above positive correlation of peer support and research activity is another point that underlines the necessity to promote collaborative learning settings that promote research activities^{17,15}.

Although the most notable effect on predicting participation in research was the faculty support and mentorship, in this study, gender was not also found to be a key indicator to predict participation in research. Shahid et al.¹⁶ reported gender disparities in research participation with females being more probable to participate in research. Nevertheless, we did not detect this great difference in our study and this indicates that institutional support and mentorship can reduce gender differences in research involvement¹³. This contributes to the importance of institutional support, faculty mentorship, and peer collaboration as necessary conditions to enhance student participation in research activities in medical schools.

Limitations & Future Recommendations

Limitations of the research is that it uses self-reported data, which could be a source of bias students with regard to their perceptions of involvement in research and their institutional support. The future research would employ longitudinal designs and objective measurement on actual research participation across time. Furthermore, it might be beneficial to expand the sample to incorporate students representing various medical schools and give a more general picture of what influences research participation.

Conclusion

This study emphasizes that institutional support, faculty mentorship, and peer networks are all important in motivating the participation of medical students in research. The results highlight that time constraints and resource scarcity are major factors that need to be overcome to improve student engagement in research. The faculty mentorship, specifically, turned out to be a fairly robust indicator of research engagement, which highlights the significance of organized mentoring programs in medical schools. By focusing on these areas and creating a favorable research experience, institutions can greatly enhance interest of medical students in research, which in the end lead to progress in medical knowledge and practice.

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