



Perception and Barriers toward Scientific Research Participation among Undergraduate Medical Students

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ABSTRACT

Background: Health research is integral to medical education, shaping the foundations of evidence-based practice and advancing public health. However, undergraduate medical students often show limited interest in or negative perceptions of research, influenced by various personal and systemic factors.

Objectives: This study aimed to assess undergraduate medical students' perceptions of scientific research and identify barriers to their active participation.

Materials and methods: A descriptive cross-sectional study was conducted at North Bengal Medical College between September 2024 and January 2025. A total of 282 undergraduate students, selected through stratified random sampling, completed a structured online questionnaire assessing their research perception, prior experience, and perceived barriers. Perception scores were calculated using a validated 22-item Likert-scale-based tool. Associations between perception and demographic variables were analyzed using chi-square and t-tests.

Results: Among 282 respondents (mean age: 21.39 ± 1.95 years), 64.5% demonstrated poor perception of research, while only 35.5% showed a good perception. Age, gender, and academic phase did not show a significant association with perception ($p > 0.05$). However, prior research experience was significantly associated with a positive perception ($p = 0.011$). Key barriers included lack of time (28.7%), limited research awareness (26.6%), inadequate institutional support (23%), and lack of mentorship (22.7%). Preferred supportive measures included workshops (86.9%), mentorship (86.2%), and improved research infrastructure (77.3%).

Conclusion: Undergraduate medical students' perceptions of research remain suboptimal, largely due to modifiable barriers. Early exposure, skill-building, and institutional support are essential to cultivate research engagement.

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INTRODUCTION

Health research plays a pivotal role in advancing medical knowledge, improving patient care, and shaping evidence-based health policies.¹ Yet, despite its critical role, the way undergraduate medical students—our future healthcare leaders—perceive scientific research varies greatly. Understanding these perceptions is vital for designing educational strategies that cultivate research interest, build essential skills, and foster a lifelong commitment to inquiry and innovation.²

Undergraduate medical students' perceptions of health research are influenced by several factors, including their exposure to research during their education, faculty members' attitudes, and their own career aspirations.³ Generally, students who perceive health research positively recognize its importance in the medical field. They see it as a critical tool for solving clinical problems, discovering new treatments, and advancing the body of medical knowledge. This positive perception is often accompanied by a desire to engage in research activities, either during their studies or in their future careers.⁴

However, not all students share this perspective. Many perceive research as a burdensome requirement rather than an exciting opportunity. This disinterest often stems from limited understanding of research processes, lack of role models, and the perception that research holds little immediate relevance to clinical practice. When students cannot see the direct impact of research on patient outcomes, their motivation may wane.⁵

Despite recognizing the importance of research, several barriers can lead to negative perceptions among medical students. One of the most significant barriers is the lack of time. Medical students often have rigorous academic schedules, leaving little time for extracurricular research. This can result in students viewing research as an optional, even inconvenient, pursuit rather than an integral part of their education.⁶

Additionally, some students may feel that they lack the necessary skills to conduct research effectively. Without adequate training in research methodology, statistics, and data analysis, students may feel intimidated by the prospect of engaging in

research. This lack of confidence can create a psychological barrier, leading some to avoid research altogether.⁷

Another barrier is the perceived lack of immediate rewards or recognition for research involvement. Unlike clinical skills, the benefits of research may not become evident until much later, which can demotivate students seeking more tangible outcomes. This can make it challenging for students to see the value in dedicating time and effort to research activities.⁸

To cultivate a positive perception of health research among undergraduate medical students, medical schools need to address these barriers.² Integrating research training into the core curriculum and providing early exposure to research can help demystify the process and show students the practical applications of research in medicine. By creating an environment where research is valued and supported, medical schools can help students develop a lifelong interest in health research.⁹

In this context, the present study was designed to explore how undergraduate medical students perceive scientific research and what barriers hinder their active participation. The findings aim to inform educational stakeholders and help shape more supportive, engaging environments that foster student-led research. The objectives of the study were:

- To assess the perception, attitudes, and understanding of health research among undergraduate medical students.
- To identify perceived barriers towards scientific research participation among undergraduate medical students.

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MATERIALS AND METHODS

This cross-sectional descriptive study was conducted at North Bengal Medical College and Hospital (NBMCH) between September 2024 and January 2025. It aimed to assess undergraduate medical students’ perception of research and explore the barriers to their research engagement.

The study population comprised undergraduate medical students enrolled in phases I through III, Part 1, at North Bengal Medical College. Participation was strictly voluntary, students who opted not to provide consent were respectfully excluded.

The required sample size was determined using Cochran’s formula:

$$n = Z^2PQ/L^2$$

where $Z = 1.96$ (for a 95% confidence interval), $P = 0.27$ (estimated proportion of students with a favorable perception of research),¹⁰ $Q = (1 - P)$, and $L = 0.05$ (margin of error). Based on these parameters, the calculated sample size was 303 students.

To ensure balanced representation across all academic phases, stratified random sampling was employed. Students were grouped by their current academic phase—phase I, phase II, and phase III part 1—and participants were randomly selected in proportion to each stratum.

The data collection instrument was a structured questionnaire comprising both closed- and open-ended questions, distributed online via Google Forms. Participants accessed the form by scanning a QR code with their smartphones and were allotted 30 minutes to complete and submit the questionnaire.

The questionnaire was divided into several sections. Demographic information included age, gender, academic year, and previous research experience. A validated 22-item questionnaire was used to assess students’ perceptions of research across four domains: (1) research awareness, (2) knowledge, (3) skills, and (4) attitude. Responses were scored on a four-point Likert scale (1 = very dissatisfied/very poor to 4 = very satisfied/very good). The total perception score ranged from 22 to 88, with a score of 66 (75% of the total) serving as the cut-off to categorize perceptions as good or poor.

In addition, the questionnaire explored students’ views on barriers to research engagement, as well as their perception of support and motivation, which would increase their interest in pursuing research. Topics such as attitudes toward health research, perceived importance of research, and awareness of research methodology and ethics were included.

The primary outcome variable was the total research perception score, calculated as the sum of the four domain scores. Descriptive statistics, including mean and standard deviation, were used to summarize the data. Inferential statistics—specifically chi-square tests and independent *t*-tests—were used to examine associations between perception scores and sociodemographic factors, including age, gender, academic phase, and prior research experience. A *p*-value < 0.05 was considered statistically significant.

All necessary ethical considerations were strictly followed. The study protocol was reviewed and approved by the Institutional Ethics Committee (IEC), NBMCH. Participation was completely voluntary and anonymous, and

informed consent was obtained electronically before students could access the questionnaire. To ensure confidentiality, the Google Form was configured to prevent the collection of any identifying information. The process involved no coercion, and students’ academic performance was not linked to their participation.

RESULTS

A total of 282 undergraduate medical students participated in the study, yielding a response rate of 93.1%. The mean age of the respondents was 21.39 ± 1.95 years. The sample consisted of 176 male and 106 female students, representing a well-distributed cross-section of the undergraduate medical community. Students were enrolled across different academic phases: 69 from phase I, 68 from phase II, 71 from phase III part 1, and 74 from phase III part 2, ensuring balanced representation across the academic spectrum. Regarding prior research experience, only 61 students (21.6%) reported participating in research activities, while a significant majority of 221 students (78.4%) had no prior involvement. This demographic distribution provides a comprehensive overview of the medical student population at various stages of their education.

Table 1 presents the association between perception of research and various demographic and academic variables among 282 undergraduate medical students. Of the total participants, 64.5% (*n* = 182) had a poor perception of research, while 35.5% (*n* = 100) demonstrated a good perception. The mean age was similar between both groups (21.41 ± 1.86 years for poor perception vs 21.37 ± 2.11 years for good perception), with no statistically significant difference (*p* = 0.880).

Table 1: Correlates of perception of research (*N* = 282)

	Perception of research		Total	Statistical tests of significance
	Poor	Good		
Age of the participant	21.41 ± 1.86	21.37 ± 2.11	21.39 ± 1.95	<i>F</i> = 0.023, <i>p</i> = 0.880
Gender				
Male	111 (63.1%)	65 (36.9%)	176 (100%)	$\chi^2 = 0.443$ <i>df</i> = 1, <i>p</i> = 0.297
Female	71 (67.0%)	35 (33.0%)	106 (100%)	
Phase of the medical college				
Phase I	42 (60.9%)	27 (39.1%)	69 (100%)	$\chi^2 = 1.324$ <i>df</i> = 3, <i>p</i> = 0.723
Phase II	47 (69.1%)	21 (30.9%)	68 (100%)	
Phase III (Part 1)	44 (62.0%)	27 (38.0%)	71 (100%)	
Phase III (Part 2)	49 (66.2%)	25 (33.8%)	74 (100%)	
Prior participation in research				
Yes	31 (50.8%)	30 (49.2%)	61 (100%)	$\chi^2 = 6.401$ <i>df</i> = 1, <i>p</i> = 0.011*
No	151 (68.3%)	70 (31.7%)	221 (100%)	
Total	182 (64.5%)	100 (35.5%)	282 (100%)	

*statistically significant

Table 2: Perceived barriers to engagement in health research (N = 282)

Perceived barrier	Frequency	Percentage (%)
Lack of time due to academic workload	81	28.7
Limited awareness of research opportunities and benefits	75	26.6
Inadequate institutional support for research activities	65	23
Lack of proper mentorship or guidance	64	22.7
Insufficient knowledge about research methodology	63	22.3
Fear of being judged for lack of expertise	63	22.3
Limited access to research facilities or equipment	63	22.3
Limited access to research funding or resources	62	22
Lack of motivation or encouragement from faculty	49	17.4
Difficulty in finding research topics of interest	42	14.9
Competing personal or professional obligations	40	14.2
Complexity of ethical/consent procedures	35	12.4
Concerns about privacy and confidentiality	32	11.3
Perception that research participation does not add significant value to my career	31	11
Lack of interest in scientific research	27	9.6

significant barriers included lack of proper mentorship (22.7%), insufficient knowledge of research methodology (22.3%), fear of being judged for lack of expertise (22.3%), and limited access to research facilities or equipment (22.3%).

Furthermore, 22% of students reported limited access to funding, while 17.4% felt a lack of motivation or encouragement from faculty. Less frequently mentioned challenges included difficulty in identifying topics of interest (14.9%), competing obligations (14.2%), and complex ethical or consent procedures (12.4%). A smaller proportion expressed concerns about privacy and confidentiality (11.3%), or believed that research would not significantly benefit their career (11%), and 9.6% admitted to a general lack of interest in research.

These findings indicate that both systemic issues (e.g., institutional support, access to resources) and personal factors (e.g., motivation, confidence) contribute to the low engagement of students in research.

Figure 1 highlights the types of support perceived by the study participants as helpful for promoting student research. The most cited were workshops or training on research skills (86.9%) and availability of mentors (86.2%). Improved access to research facilities was noted by 77.3%, while financial support and recognition or incentives for research participation were each reported by 68.1%. These findings underscore the importance of skill-building, mentorship, and institutional support in encouraging undergraduate research involvement.

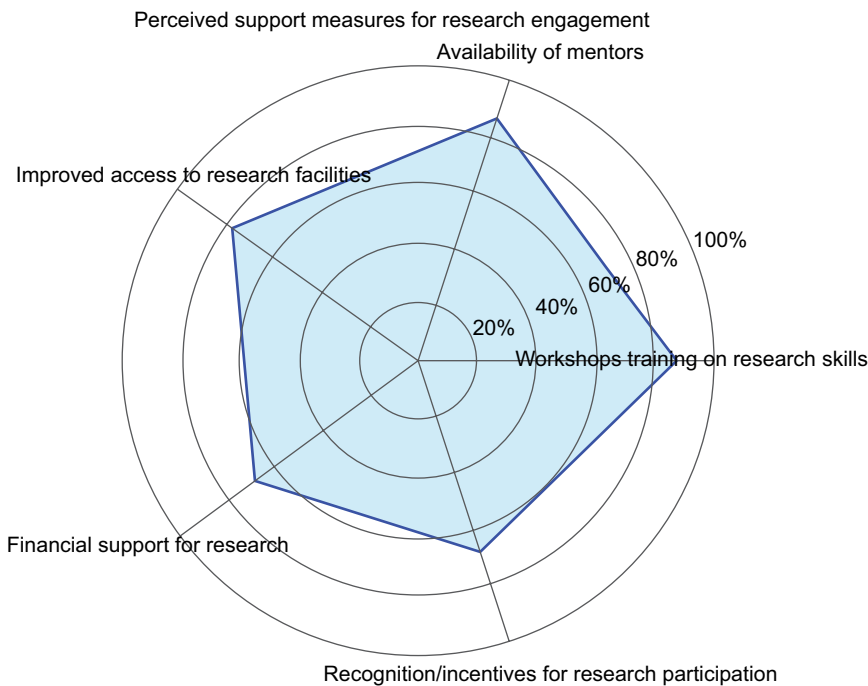


Fig. 1: Perceived supportive measures to enhance undergraduate research engagement

In terms of gender, 63.1% of males and 67.0% of females had a poor perception of research, and the difference was not statistically significant ($p = 0.297$). When analyzed by academic phase, the proportion of students with poor perception remained high across all groups: phase I (60.9%), phase II (69.1%), phase III part 1 (62.0%), and phase III part 2 (66.2%), again without a significant association ($p = 0.723$).

However, prior participation in research was associated with perception in a statistically significant manner. Among students with research experience, 49.2% had

a good perception, compared to only 31.7% among those without experience ($p = 0.011$). This suggests that involvement in research activities positively influences students' perception of research.

Table 2 outlines the perceived barriers faced by undergraduate medical students in engaging with research activities. The most commonly reported barrier was lack of time due to academic workload, cited by 28.7% ($n = 81$) of respondents. This was followed by limited awareness of research opportunities and benefits (26.6%) and inadequate institutional support (23%). Other

DISCUSSION

The attitude of undergraduate medical students towards research is a critical area of study, as it influences the future of medical practice and the advancement of healthcare. Research plays an essential role in evidence-based medicine, enabling healthcare professionals to understand diseases, develop new treatments, and reform health policies.¹¹ Yet, despite the recognized role of research in modern medicine, a surprising undercurrent of ambivalence—and at times, quiet resistance—runs through the student body.

A majority of students (64.5%) had a poor perception of research, while only 35.5% exhibited a good perception. This highlights systemic gaps in fostering undergraduates' interest and enthusiasm for research. Addressing these gaps through mentorship, skill development, and improved infrastructure is crucial to cultivating a research-oriented culture in medical education.¹²

CORRELATES OF PERCEPTION TOWARD SCIENTIFIC RESEARCH

Age

Age influences perception of scientific research, with younger individuals more receptive to innovation, while older adults may rely on established knowledge due to cognitive and experiential factors.¹³ The study found no significant difference in research perception based on the age of participants ($F = 0.023, p = 0.880$). This suggests that age alone does not influence how undergraduate medical students perceive research. These findings align with prior studies, which highlight that other factors, such as exposure to research opportunities, may play a more critical role than chronological age.¹⁴

Gender

Research has also shown that gender can influence attitudes towards research. Although earlier studies¹⁵ have suggested that male students may report greater confidence in research-related skills, this study found no significant gender difference in perceptions ($\chi^2 = 0.443, p = 0.297$). This result indicates that male and female students encounter similar barriers and motivations regarding research engagement. Similar conclusions were drawn by Marhoon et al.¹⁶ who noted that perceptions are influenced more by institutional and experiential factors than by gender.

Phase of Medical College

Perception of scientific research varies by phase of medical education. Early-phase students often show limited engagement due to academic pressures, while clinical-phase students value research more for its relevance to practice.¹⁷ In the current study, the perception of research did not significantly vary across the different phases of medical education ($\chi^2 = 1.324, p = 0.723$). This finding implies that the curriculum across phases may not adequately emphasize research or its importance, thereby limiting the growth of positive perceptions. Prior research has stressed the need for integrating research-oriented learning across all stages of medical education.¹⁸

Prior Participation in Research

Individuals with research experience are more likely to value evidence-based findings and advocate for science-informed policies.¹⁹ Students with prior research experience had significantly better perceptions (49.2%) than those without such experience (31.7%) ($\chi^2 = 6.401, p = 0.011$). This highlights the transformative impact of direct involvement in research

activities on student perceptions. Participation builds confidence and understanding, emphasizing the need to promote early research exposure in medical education.²⁰

Barriers to Research Engagement

Despite a general acknowledgment of research's importance, many students hesitate when it comes to actual involvement.²¹ A significant number of students reported feeling overwhelmed by the complexities of research, which can lead to reluctance in pursuing research opportunities.²² The most frequently cited obstacle in the current study was lack of time due to academic workload (28.7%), consistent with previous reports by Siemens et al.¹⁷ and Chang and Ramnanan.²³ Additional barriers included limited awareness of research opportunities (26.6%), inadequate institutional support (23%), lack of mentorship (22.7%), and insufficient knowledge of research methodology (22.3%).

Psychosocial barriers were also noted, including fear of judgment, limited confidence, and perceived lack of motivation. These findings underscore the need for holistic interventions—combining curriculum reform, mentorship programs, and institutional encouragement—to foster a conducive environment for undergraduate research engagement.²⁴

Supportive Measures to Enhance Undergraduate Research Engagement

Supportive measures play a crucial role in enhancing undergraduate research engagement. Key strategies include structured workshops to build research skills and confidence, as well as access to dedicated mentors who provide guidance and motivation.²⁵ Participants identified several supportive strategies to enhance research participation. The most frequently endorsed strategies include workshops or training on research skills (86.9%) and access to mentorship (86.2%), reflecting findings by Chang and Ramnanan²³ and Amgad et al.,²⁴ who emphasize structured training and mentor availability as essential for fostering research participation. Improved access to research facilities (77.3%) and financial support (68.1%) align with barriers identified by Siemens et al.¹⁷ Recognition or incentives (68.1%) further motivate students, as noted by Griffin and Hindocha,²⁶ highlighting the importance of institutional support and academic acknowledgment in promoting a research-oriented culture.

This study has several limitations. The cross-sectional design restricts causal inferences and captures perceptions at a single

time point. Data were self-reported, which may introduce response bias. Additionally, as the study was conducted at a single institution, findings may not be generalizable to all medical colleges. Selection bias is also possible, as students with a preexisting interest in research may have been more inclined to participate.

CONCLUSION

This study highlights that, while research is crucial in medical education, most undergraduate medical students have a poor perception of it. Factors such as age, gender, and the study phase did not significantly influence perception, but prior research participation did. Common barriers included lack of time, limited mentorship, and insufficient institutional support. Supportive measures such as skill-building workshops, mentorship, improved access to facilities, and financial aid were widely endorsed.

Recommendations include integrating research into the curriculum, enhancing mentorship, and organizing skill-building workshops. Increasing awareness of opportunities and conducting multicenter, longitudinal studies can further strengthen undergraduate research engagement and foster a sustainable, research-oriented academic culture.

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