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Original Article

A Cross-Sectional Assessment of Dental Undergraduates' Interest and Perception in Pursuing Research Careers in Pakistan

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ABSTRACT

Background: Undergraduate research is increasingly acknowledged as essential for developing critical thinking, innovation, and evidence-based practice in dentistry. Despite demonstrated benefits, participation among dental students in developing countries remains limited, often due to systemic barriers such as insufficient mentorship and lack of institutional support. Objective: This study aimed to assess the level of interest and perceptions of undergraduate dental students in Pakistan toward research careers, while identifying key motivating and deterring factors influencing their engagement. Methods: A cross-sectional observational study was conducted from June to July 2025 among undergraduate dental students across Pakistan. A validated, structured questionnaire covering demographics, research interest, perceptions, barriers, and motivators was distributed online. A total of 381 fully completed responses were analyzed using descriptive statistics and chi-square tests, with a significance threshold of $p < 0.05$. Results: Most students expressed interest in research careers (75.6%), yet less than half (48.6%) had participated in research projects. Awareness of career pathways was limited, with only 10.5% reporting strong knowledge. Key motivators included opportunities for higher studies (48.8%) and passion for innovation (41.5%), while barriers comprised lack of awareness (59.8%) and insufficient mentorship (52.2%). Conclusion: While Pakistani dental undergraduates demonstrate strong enthusiasm for research, systemic obstacles constrain participation. Structured mentorship, curricular integration, and enhanced career guidance are needed to translate interest into active research engagement.

Keywords: dental education; undergraduate research; perceptions; barriers; mentorship; Pakistan.

INTRODUCTION

Advancing the field of dentistry relies on a steady integration of evidence-based practices grounded in high-quality research. Research not only enables innovation in diagnostic and therapeutic modalities but also ensures that patient care remains aligned with contemporary scientific understanding (1). In health professions education, early exposure to research has been shown to improve critical thinking, enhance problem-solving, and cultivate professional growth, thereby fostering clinicians who are not only practitioners but also contributors to the broader knowledge base (2). For dentistry in particular, research is pivotal to sustaining its identity as a science-driven discipline, where treatment protocols and preventive strategies are continuously refined in response to emerging evidence (3). Without consistent engagement in research, the field risks stagnation and reduced capacity to address the evolving oral health needs of populations.

Among undergraduate dental students, research engagement offers multiple benefits beyond academic performance. It facilitates self-directed learning, strengthens communication and teamwork skills, builds resilience in the face of challenges, and provides valuable insights into future career pathways (4). Evidence suggests that students exposed to structured research opportunities during their training demonstrate greater confidence, improved academic performance, and stronger motivation to pursue higher studies (5). Yet, despite these benefits, research involvement among dental undergraduates worldwide remains limited. In many contexts, including Pakistan, this deficit has been attributed to factors such as insufficient mentorship, lack of research infrastructure, curricular overload, and minimal institutional support (6,7).

Globally, there is a growing recognition of the shortage of dental researchers, particularly in developing countries, where limited funding and faculty resources exacerbate the problem (8). A study from Saudi Arabia reported that although dental students showed favorable attitudes toward research, few actively participated in publishing or research projects, largely due to time constraints and lack of guidance (9). Similarly, studies from South Asia have highlighted that students often view dentistry primarily as a clinical profession, perceiving research as secondary to practice-oriented training (10). This reflects a broader gap between students' recognition of the importance of research and their actual engagement with it.

Addressing this gap is critical, as investment in dental research has been shown to improve healthcare outcomes through the development of novel diagnostic tools, enhanced treatment strategies, and greater public health awareness (11). Strengthening research culture during undergraduate training can therefore contribute not only to the scientific advancement of dentistry but also to improving oral health outcomes on a population level. Identifying the motivations and barriers influencing students' interest in research is essential for designing effective strategies to nurture future clinician-scientists.

The present study was designed to assess the perceptions and interest of undergraduate dental students in Pakistan regarding research careers. Specifically, it aims to identify motivating factors, perceived barriers, and the impact of early exposure to research during undergraduate training on shaping students' attitudes toward research. By exploring these dimensions, this study addresses the knowledge gap surrounding research engagement among Pakistani dental students and informs strategies for integrating research into undergraduate curricula.

MATERIAL AND METHODS

This study employed a cross-sectional observational design to evaluate the interest and perceptions of undergraduate dental students in Pakistan regarding careers in research. The rationale for selecting this design was to capture a snapshot of students' attitudes and experiences across multiple institutions within a defined timeframe, thereby providing an overview of the prevailing trends and barriers to research engagement. The study was conducted between June 2025 and July 2025 across recognized Bachelor of Dental Surgery (BDS) programs in Pakistan.

Participants included undergraduate dental students from first to final year of study who were currently enrolled in accredited institutions. Eligibility criteria required students to be proficient in reading and comprehending English, as the survey instrument was administered in English. Those who declined participation or submitted incomplete responses were excluded. Recruitment was carried out through academic channels, with students invited during their scheduled classes and through online distribution links. Informed consent was obtained digitally via Google Forms prior to survey initiation, ensuring that only voluntary participants proceeded to complete the questionnaire. A non-probability convenience sampling approach was adopted to maximize feasibility and participation across geographically diverse institutions. Based on a 95% confidence level, a 5% margin of error, and an expected 50% response distribution, the calculated sample size was 380. A total of 381 fully completed responses were obtained, meeting and slightly exceeding the estimated requirement.

Data collection was performed using a structured, self-administered questionnaire, which underwent face and content validity review by academic experts in dental research and education. The instrument was divided into five sections: demographic characteristics, interest in research, perceptions of research careers, barriers and motivators, and educational exposure. Responses included categorical options and Likert-scale items designed to measure both dependent and independent variables. Dependent variables included the level of interest in pursuing research as a career and overall perception of the role of research in dentistry. Independent variables encompassed demographic factors (such as year of study and gender), prior exposure to research, perceived faculty and institutional support, personal motivations, and awareness of career pathways. Additional contextual factors such as perceived barriers—mentorship deficits, time constraints, financial limitations—and motivators including academic recognition and career advancement were also assessed.

To ensure data accuracy and integrity, all responses were anonymized prior to entry. Data were initially tabulated using Microsoft Excel and subsequently exported to IBM SPSS Statistics version 26 for analysis. Descriptive statistics including frequencies and percentages were computed for categorical variables. Associations between independent variables and outcome measures were assessed using chi-square tests, and a two-tailed p-value of <0.05 was considered statistically significant. Missing data were minimized by requiring all questions to be answered before submission; as such, no imputation procedures were necessary. Subgroup analyses were performed by year of study and gender to evaluate potential variations in research interest and perception. Bias and confounding were addressed by standardizing the questionnaire administration, anonymizing responses to reduce social desirability bias, and limiting participation to currently enrolled students across multiple institutions to enhance external validity. Nonetheless, convenience sampling is acknowledged as a potential source of selection bias. Ethical approval was granted by the Ethical Review Board of the PRIDE Center for Research and Learning Institute (Reference number: PRIDE/ERB/2025/003). Participation was voluntary, and students were assured that no academic or financial incentives were provided. Confidentiality of responses was maintained throughout the study, and the research adhered to ethical principles outlined in the Declaration of Helsinki (12).

RESULTS

A total of 381 undergraduate dental students participated, with the majority being female (n = 293, 76.9%) compared to males (n = 88, 23.1%). Almost half of the respondents were in their fourth year of study (n = 185, 48.6%), while smaller proportions represented the first (n = 69, 18.1%), second (n = 52, 13.6%), and third year (n = 75, 19.7%). This distribution indicates a higher level of participation from senior students, reflecting their increased exposure to academic and professional demands. Regarding interest in research, three out of four

students (n = 288, 75.6%) expressed enthusiasm for pursuing research careers, while only one-quarter (n = 93, 24.4%) reported no such interest. Despite this strong inclination, fewer than half of the students (n = 185, 48.6%) had participated in any research projects during their undergraduate studies, suggesting a gap between interest and actual engagement. Engagement with dental research literature was similarly limited, as only 30 students (7.9%) reported reading research articles regularly, compared with 232 (60.9%) who did so occasionally and 119 (31.2%) who never engaged with dental literature. Awareness of research pathways was modest, with just 40 students (10.5%) describing themselves as "very aware," while the majority (n = 249, 65.4%) were "somewhat aware," and nearly one-quarter (n = 92, 24.1%) acknowledged having no awareness at all. Future aspirations reflected a similar trend: 238 students (62.5%) planned to pursue research-related postgraduate training, whereas 143 (37.5%) did not intend to follow this pathway.

Table 1. Demographic characteristics of undergraduate dental students (N = 381)

Variable	n	%	p-value*
Gender			
Male	88	23.1	
Female	293	76.9	
Year of study			
1st year	69	18.1	
2nd year	52	13.6	
3rd year	75	19.7	
4th year	185	48.6	

Table 2. Interest in research among undergraduate dental students (N = 381)

Variable	Categories	n	%	p-value (Chi-square)
Interest in pursuing a research career	Interested	288	75.6	<0.001†
	Not interested	93	24.4	
Participation in research projects	Yes	185	48.6	0.042
	No	196	51.4	
Frequency of engaging with dental literature	Regularly	30	7.9	<0.001
	Occasionally	232	60.9	
	Never	119	31.2	
Awareness of research career pathways	Very aware	40	10.5	<0.001
	Somewhat aware	249	65.4	
	Not aware	92	24.1	
Plan to pursue research-related postgraduate program	Yes	238	62.5	0.018
	No	143	37.5	

Table 3. Perceptions of research among undergraduate dental students (N = 381)

Variable	Categories	n	%	p-value (Chi-square)
Research should be essential in undergraduate curriculum	Agree	301	79.0	<0.001
	Neutral	71	18.6	
	Disagree	9	2.4	
Research career as rewarding as clinical practice	Agree	212	55.6	0.003
	Neutral	138	36.2	
	Disagree	31	8.1	
Research increases stress for students	Agree	168	44.1	0.021
	Neutral	96	25.2	
	Disagree	117	30.7	
Research advances healthcare & societal progress	Agree	328	86.1	<0.001
	Neutral	48	12.6	
	Disagree	5	1.3	
Faculty motivate students toward research	Yes	283	74.3	<0.001
	No	46	12.1	
	Maybe	52	13.6	
Research opportunities for undergraduates are sufficient	Agree	89	23.4	0.002
	Neutral	143	37.5	
	Disagree	149	39.1	
Research experience matters for postgraduate admission	Yes	301	79.0	<0.001
	No	16	4.2	
	Maybe	64	16.8	
Confidence in contributing to research	Agree	184	48.3	0.047
	Neutral	135	35.4	
	Disagree	62	16.3	

Table 4. Key motivators and barriers for pursuing a research career (N = 381)

Category	Factor	n	%	p-value
Motivators	Opportunities for higher studies	186	48.8	<0.001
	Passion for innovation and discovery	158	41.5	
	Better job opportunities in academia	143	37.5	
	Support from faculty	67	17.6	
	Contribution to dental science	79	20.7	
Barriers	Lack of awareness of opportunities	228	59.8	<0.001
	Insufficient mentorship	199	52.2	
	Lack of financial incentives	93	24.4	
	Research perceived as too time-consuming	90	23.6	
	Lack of interest	45	11.8	

Students' perceptions toward research underscored their perceived value in education and practice. A large majority (n = 301, 79.0%) agreed that research should be an essential component of the undergraduate curriculum, while only nine (2.4%) disagreed. More than half (n = 212, 55.6%) viewed research careers as equally rewarding as clinical practice, though 138 (36.2%) remained neutral and 31 (8.1%) disagreed. The impact of research involvement on student stress levels was mixed: 168 students (44.1%) reported it significantly increased pressure, while 117 (30.7%) considered it beneficial, and 96 (25.2%) perceived little impact. Importantly, the vast majority (n = 328, 86.1%) believed research contributes to healthcare advancement and societal progress, highlighting widespread acknowledgment of its broader value. Faculty support was also recognized, with 283 students (74.3%) reporting motivation from faculty members, although 149 (39.1%) felt that research opportunities available to undergraduates were insufficient. Additionally, 301 students (79.0%) considered research experience an advantage in postgraduate admissions, and nearly half (n = 184, 48.3%) felt confident in their ability to contribute to or design a research project.

When examining motivators, the most frequently cited factor was the opportunity for higher studies, endorsed by nearly half the students (n = 186, 48.8%), followed by passion for innovation and discovery (n = 158, 41.5%). Better job opportunities within academia motivated 143 respondents (37.5%), while support and encouragement from faculty (n = 67, 17.6%) and the potential to contribute to dental science (n = 79, 20.7%) were also recognized, though to a lesser extent. In contrast, barriers to research engagement were prominent. The most commonly reported obstacles were lack of awareness about research opportunities (n = 228, 59.8%) and insufficient mentorship (n = 199, 52.2%). Additional hindrances included lack of financial incentives (n = 93, 24.4%), the perception of research as too time-consuming (n = 90, 23.6%), and outright disinterest (n = 45, 11.8%). These findings highlight a clear mismatch between students' interest in research and their actual participation, driven largely by systemic and institutional challenges.

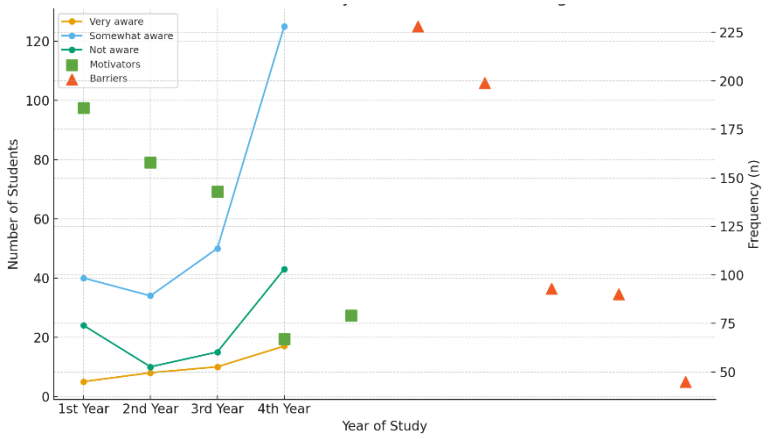

Figure 1 Awareness of Research Pathways and Factors Influencing Career Choice

The figure demonstrates a dual perspective on research engagement. Awareness of research pathways increases progressively from first year (very aware: n = 5) to fourth year (n = 17), with the majority of students in each cohort remaining only "somewhat aware." In parallel, systemic motivators and barriers exert significant influence on career choice. Opportunities for higher education (n = 186) and passion for innovation (n = 158) emerged as the most powerful drivers, while insufficient mentorship (n = 199) and lack of awareness (n = 228) were the most critical deterrents. The combined trends highlight that although awareness grows with academic progression, structural barriers continue to overshadow intrinsic motivation, underscoring the need for early and sustained institutional support to transform interest into meaningful research participation.

DISCUSSION

In the context of health professions education, undergraduate research is increasingly regarded as a cornerstone for fostering critical thinking, innovation, and professional development. Our study demonstrates that a large majority of dental undergraduates in Pakistan (75.6%) expressed interest in research careers, yet less than half (48.6%) reported prior participation in research projects. This discrepancy between interest and actual engagement echoes findings from other Pakistani cohorts, where students acknowledged the importance of

research but faced barriers to active involvement (13). Such findings highlight a persistent gap between aspiration and opportunity that requires systemic interventions.

Mentorship emerged as a particularly influential determinant of engagement, with more than half of respondents citing insufficient guidance as a major barrier. Mentorship has been well-documented as a catalyst for research participation, not only by accelerating skill acquisition but also by fostering reflective practice and academic confidence (14). Lack of structured mentorship has similarly been identified in other South Asian contexts, where inadequate faculty-student ratios and overburdened academic schedules limit access to supportive supervision (15). The findings from this study therefore reinforce the need for institutional policies that prioritize faculty development and structured research guidance as integral elements of undergraduate training.

Awareness of research pathways was another critical barrier, with nearly one-quarter of students reporting no awareness and only 10.5% describing themselves as very aware of career options in research. Comparable results have been reported in Egyptian and Middle Eastern cohorts, where limited visibility of research opportunities at the undergraduate level reduced participation and hindered the development of long-term research trajectories (16). Without systematic exposure to available pathways, students may struggle to integrate research into their professional identity. Incorporating early career counseling and research seminars within the curriculum could help bridge this gap and enhance sustained engagement.

Stress associated with research participation also warrants consideration. Approximately 44.1% of students in our study perceived research as an additional burden, potentially exacerbating existing academic pressures. Previous investigations have linked heavy workloads and high expectations with psychological distress among medical and dental students, particularly when research is perceived as compulsory rather than intrinsically motivated (17). These findings emphasize the importance of balancing research engagement with well-structured mentorship, adequate time allocation, and mental health support to prevent burnout while maintaining enthusiasm for scholarly work.

Despite these challenges, perceptions toward the value of research were overwhelmingly positive. Nearly 80% of participants considered research an essential element of the undergraduate curriculum, while 86.1% recognized its role in advancing healthcare and societal progress. Such optimism is encouraging and resonates with reports from global studies that demonstrate early exposure to research cultivates not only critical thinking but also improved academic performance and career readiness (18). Motivating factors identified in this study, particularly opportunities for higher studies (48.8%) and passion for innovation (41.5%), suggest that academic institutions could further enhance research participation by aligning programs with students' long-term career goals, such as postgraduate admissions and academic advancement.

The findings of this study carry important implications for dental education in Pakistan. While student interest in research is evident, systemic barriers—including lack of mentorship, insufficient awareness, and limited research opportunities—remain major obstacles. Addressing these requires institutional reforms that extend beyond individual motivation. Structured curricular integration of research methodology, faculty-mentored projects, and accessible platforms for dissemination of student work are necessary to transform enthusiasm into active participation. Similar reforms have shown success in international models, where experiential learning approaches and early integration of research into coursework significantly increased student participation and output (19).

This study is not without limitations. As a cross-sectional survey based on self-reported data, it is subject to recall and social desirability bias, which may have led to overestimation of interest or underreporting of challenges. The use of convenience sampling may also restrict generalizability to all dental institutions across Pakistan. Nevertheless, the sample size exceeded the calculated requirement, and the inclusion of students from diverse institutions improves representativeness.(20-23).

In conclusion, our study underscores both the promise and the challenges of fostering a research culture among undergraduate dental students in Pakistan. By implementing structured mentorship, increasing awareness of research pathways, and balancing academic demands with adequate support systems, dental schools can bridge the gap between interest and participation. These reforms not only strengthen the scientific foundation of dentistry but also prepare a new generation of clinicians capable of advancing oral health through innovation and evidence-based practice.

CONCLUSION

This study reveals that Pakistani dental undergraduates exhibit a strong interest in research careers, with more than three-quarters recognizing its professional and societal value. However, systemic obstacles—including insufficient mentorship, limited awareness of research pathways, and an already demanding curriculum—restrict meaningful participation. The resulting gap between enthusiasm and engagement highlights the urgent need for curricular reforms and structured institutional support. Integrating research training into undergraduate education, strengthening mentorship frameworks, and creating clear pathways to academic advancement can transform latent interest into active contribution. By addressing these barriers, dental schools can cultivate graduates who are not only skilled clinicians but also innovators and contributors to the advancement of oral health research.

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