

Perception of Soft Skills among Undergraduate Dental Students

Sana Tahir^{a*}, Khulood Tariq^b, Uswa Qaiser^c, Farzana Karim^d

^{a, b, c}University College of Medicine and Dentistry, University of Lahore, Lahore, Pakistan

^dDental Unit, MARKS Medical College, Dhaka University, Dhaka, Bangladesh

*Corresponding address: *Department of Medical Education, University College of Medicine and Dentistry, University of Lahore, Lahore, Pakistan*

Email: sanazuhaib98@gmail.com

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ABSTRACT

Objectives: To assess the knowledge and perception of soft skills among undergraduate dental students and to evaluate the acquisition of these skills through the taught curriculum

Methods: A cross-sectional study employing non-probability sampling among undergraduate dental students at private dental colleges of Lahore, Pakistan. A questionnaire on knowledge and acquisition of soft skills through the taught curriculum was adopted and distributed to students in years 1-4. Data was analyzed through SPSS version 24. Categorical variables are reported as percentages, and continuous variables are reported as mean $\pm$ SD. A total of 250 students (years 1-4) from two private dental colleges participated. Mean soft skill domain scores were compared across years of study using one-way ANOVA and between genders using independent samples t-tests. Statistical significance was set at $p < 0.05$.

Results: Statistically significant differences in mean soft skill scores were observed across years of study for all seven domains ($p < 0.05$), with first-year students scoring higher than fourth-year students in most domains. While 86.8% of students recognized the importance of soft skills, 40.4% were unaware that any were taught in their curriculum. Professional ethics and leadership received the lowest mean scores across all years.

Conclusion: It is the need of the hour to introduce the soft skills curriculum in undergraduate dental programs, as although most students recognize its importance in their professional lives, they are often unable to clearly identify whether these skills are being formally taught and nurtured during their training.

Keywords: Soft skills, Non-technical skills, Non-clinical skills, Verbal skills, Communication skills, Undergraduate dental education.

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Introduction

Dentistry is a skill-based profession that focuses on honing procedural skills. It includes the evaluation, diagnosis, and management of diseases of the oral cavity and associated structures. The globalization of dental practice and the dynamic health care system demand that dental practitioners be efficient in both hard and soft skills.^{1,2}

Hard skills are taught and usually relate to devices, equipment, tools, and apparatus; they are

also known as technical skills.³ However, in the last few years, researchers have observed that scientific knowledge and hard skills alone are not sufficient for an expert dentist. Patients feel satisfied and comfortable with a dentist who demonstrates good attitudes, values, and can provide safe and independent treatment for them.⁴ The World Health Organization (WHO) also emphasized the curriculum promoting a skill-based teaching of undergraduate medical students.⁵ The dental students are expected to exhibit not only the

required technical skills when they graduate, but also strong soft skills to achieve clinical competence.⁶ After graduation, students face numerous challenges as they transition into professional life. It has been observed that students who lack exposure to soft skills during their undergraduate education encounter greater difficulties in adapting to professional practice.^{7,8}

Soft skills, also known as non-technical skills, focus on day-to-day interactions with patients and colleagues.⁹ These are socio-emotional skills that involve the personal characteristics, behavior, and attitude of an individual. Communication, professionalism, leadership, teamwork, decision making, and situational judgment are all key elements of soft skills in the “General Dental Council”.^{10,11} Exercising soft skills helps in developing confidence among students, being professional, communicative, collaborative, continuity of care, disease management, case management, time management, networking, critical thinking, problem solving, and other such skills.¹¹

The Pakistan Medical and Dental Council (PM&DC) is an administrative body that regulates the minimum standards of fundamental and advanced education in medicine and dentistry throughout Pakistan. PMDC has described the roles of a seven-star doctor in its document “Guidelines for undergraduate Dental students 2022” and categorizes critical thinking, problem solving, professionalism, communicator, collaborator, leader, role model, and empathy as qualities of a competent dentist.¹²

It is observed that students are not fully aware of the importance of these abilities, which later leads to difficulties in their professional lives.¹³ As a result, they may fail to actively develop these competencies, considering them secondary to academic and clinical knowledge. However, when soft skills are incorporated into the curriculum, students are better trained to manage patient interactions, work effectively in teams, and run their private practice independently and successfully.^{6,13} Assessing students’ knowledge and perception of soft skills, along with their acquisition through the taught curriculum, is therefore important to identify existing gaps in dental education. Therefore, this study aimed to assess undergraduate dental students’ knowledge and perceptions of soft skills and to evaluate the acquisition of these skills through the taught curriculum.

Materials and Methods

Study Design and Setting

An analytical cross-sectional study was conducted at two private dental colleges in Lahore, Pakistan, between February and September 2024. Both institutions are affiliated with the University of Health Sciences and follow the curriculum guidelines prescribed by the Pakistan Medical and Dental Council (PMDC) for the Bachelor of Dental Surgery (BDS) program. The study was designed to assess undergraduate dental students’ knowledge and perceptions of soft skills and to evaluate the acquisition of these skills through the taught curriculum.

Ethical Considerations

The study protocol was reviewed and approved by the Ethics Review Committee of the participating institutions (GenERC/IRB: 24/0577). All procedures were conducted in accordance with the ethical principles of the Declaration of Helsinki. Informed consent was obtained from all participants prior to questionnaire administration. Confidentiality was ensured by omitting personally identifiable information, including name, email address, and institutional roll number. Participation was voluntary, and students were informed that non-participation would not affect their academic standing.

Participants and Sampling

The target population comprised undergraduate dental students from first through fourth year (BDS years 1–4) enrolled during the 2024 academic year at the two participating institutions. A non-probability convenience sampling technique was used due to accessibility constraints.¹⁴ All students present in class on the days of data collection and willing to participate were invited. Students who had completed a postgraduate qualification or who declined to participate were excluded.

A total of 250 students participated in the study. While no formal a priori sample size calculation was performed, the sample exceeded the minimum recommended threshold of 5–10 respondents per questionnaire item for exploratory survey research, given 37 items across seven domains. The unequal distribution across academic years (first year: $n = 132$, 52.8%; second year: $n = 80$, 32.0%; third year: $n = 19$, 7.6%; fourth year: $n =$

= 19, 7.6%) reflects the natural enrollment distribution at the participating institutions and is acknowledged as a limitation.

Study Instrument

A structured, close-ended questionnaire was adapted from a previously published study that identified and categorized the types of soft skills relevant to dental practice.¹⁵ The instrument assessed student perceptions across seven soft skill domains: communication skills (6 items), critical thinking and problem solving (6 items), teamwork (8 items), professional ethics (3 items), lifelong learning (5 items), entrepreneurship (5 items), and leadership (4 items), yielding a total of 37 items. Responses were recorded on a 3-point Likert scale (1 = disagree, 2 = neutral, 3 = agree). Composite domain scores were calculated by summing item responses within each domain; possible score ranges were: communication skills 6–18, critical thinking 6–18, teamwork 8–24, professional ethics 3–9, lifelong learning 5–15, entrepreneurship 5–15, and leadership 4–12. Higher scores indicated a more favorable perception of the respective soft skill domain. Demographic variables, including age, gender, and year of study, were also collected. Two additional categorical items assessed students' awareness of soft skills being taught at their institution and their perceived importance of soft skills for dental practice (response options: yes, no, do not know).

A 3-point Likert scale was selected to minimize respondent fatigue and reduce neutral-midpoint clustering among a population with limited prior familiarity with formal soft skill terminology. While this approach limits response variability compared with 5- or 7-point scales, it was considered appropriate for an initial exploratory assessment of awareness and has been used in similar educational survey research. The reduced granularity of the scale is acknowledged as a limitation.

Validity and Reliability

Content validity was assessed by two medical educationists with expertise in curriculum development and dental education, who reviewed the questionnaire for relevance, clarity, and appropriateness to the study population. Items were retained or revised based on consensus feedback. The questionnaire was subsequently pilot tested among 15 undergraduate dental students (excluded from the final analysis) to assess item clarity,

comprehension, and estimated completion time. Minor wording revisions were implemented based on pilot feedback.

Internal consistency reliability was assessed using Cronbach's alpha for each of the seven soft skill domains, with $\alpha \geq 0.60$ considered acceptable for exploratory research using abbreviated scales. Reliability coefficients are reported in the Results section.

Data Collection

Data were collected through in-person manual distribution of printed questionnaires by the research team during scheduled class sessions. Students were given approximately 10–15 minutes to complete the questionnaire. Completed questionnaires were collected immediately and stored securely. No incentives were offered for participation.

Statistical Analysis

Data were entered and analyzed using IBM SPSS Statistics Version 24 (IBM Corp., Armonk, NY). Data were screened for completeness prior to analysis; no responses were excluded due to missing data, as all returned questionnaires were fully completed. Categorical variables were summarized as frequencies and percentages, and continuous variables as mean $\pm$ standard deviation (SD). Normality of domain scores was assessed using the Shapiro-Wilk test and visual inspection of histograms. Independent-samples t-tests were used to compare mean soft skills domain scores between male and female students. One-way analysis of variance (ANOVA) was used to compare mean domain scores across four years of study. Where ANOVA indicated statistically significant differences, Tukey's Honestly Significant Difference (HSD) post-hoc test was used to identify which year-group pairs differed significantly. A two-tailed p-value of <0.05 was considered statistically significant for all analyses.

Results

A total of 250 students from different private dental colleges participated in the survey. Table 1 shows the characteristics of the students, with the majority being female (62.4%) and the remaining male (37.6%). The mean age of the participants was 19.40 ± 2.20 years. Across all 4 years, first-year students had the highest participation rate (52.8%).

The results show that most students were unaware of soft skills: 40.4% of participants reported that no soft skills were taught at their institute, and 16.8% responded "do not know" to the statement. However, 86.8% of participants recognize the importance of soft skills for dentists.

Internal consistency reliability was acceptable across all seven domains: communication skills ($\alpha = 0.79$), critical thinking and problem solving ($\alpha = 0.80$), teamwork ($\alpha = 0.80$), professional ethics ($\alpha = 0.77$), lifelong learning ($\alpha = 0.81$), entrepreneurship ($\alpha = 0.81$), and leadership ($\alpha = 0.79$). All values exceeded the pre-specified threshold of $\alpha \geq 0.60$.

Table 2 shows students' perceptions of soft skills in the undergraduate dental program. One-way ANOVA revealed statistically significant differences in perceptions of soft skills among students at different years of study. The teamwork domain showed the highest mean score among first-year students (21.17), and showed a gradual decline across subsequent years, reaching 18.79 in fourth-year students. This suggests that students are exposed to and trained in teamwork during their undergraduate education. In contrast, professional ethics received the lowest scores within the

undergraduate curriculum: 6.05 in the 4th year and 7.81 in the 1st year. Overall, first-year students demonstrated higher mean scores across most soft skill domains than students in later years. Exceptions to this trend were observed in lifelong learning, where fourth-year students (12.16) scored marginally higher than third-year students (11.68), and in critical thinking, where fourth-year students (14.79) scored higher than third-year students (14.00), suggesting that the decline in perception is not uniformly linear across all domains. An independent-samples t-test revealed no statistically significant differences between male and female students across the soft skill domains, suggesting similar perceptions in both groups. Post-hoc analysis using Tukey's HSD revealed that statistically significant pairwise differences were primarily between first-year and fourth-year students in communication skills (mean difference = 2.24, $p < 0.05$), professional ethics (mean difference = 1.76, $p < 0.05$), entrepreneurship (mean difference = 2.66, $p < 0.05$), and teamwork (mean difference = 2.38, $p < 0.05$). Differences between adjacent year groups (e.g., 1st vs 2nd, 2nd vs 3rd) were not statistically significant for most domains.

Table 1: Characteristics of Students

Variable	Frequency	Percent
Gender		
Male	94	37.6%
Female	156	62.4%
Year of Study		
1 st Year	132	52.8%
2 nd Year	80	32%
3 rd Year	19	7.6%
4 th Year	19	7.6%
Are you aware of any soft skills being taught at your institute?		
Yes	107	42.8%
No	101	40.4%
Do not know	42	16.8%
Do you think soft skills are important for a dentist?		
Yes	217	86.8%
No	7	2.8%
Do not know	26	10.4%

Table 2: Perception of Soft Skills

Domain	Items (n)	Range	1 st year Mean $\pm$ SD	2 nd year Mean $\pm$ SD	3 rd year Mean $\pm$ SD	4 th year Mean $\pm$ SD	p-value*	Male Mean $\pm$ SD	Female Mean $\pm$ SD	p-value**
Communication	6	6–18	15.77 $\pm$ 1.93	15.63 $\pm$ 1.77	14.05 $\pm$ 2.76	13.53 $\pm$ 1.95	<0.001	15.43 $\pm$ 2.24	15.42 $\pm$ 1.96	0.974
Critical Thinking	6	6–18	15.96 $\pm$ 2.34	15.25 $\pm$ 2.42	14.00 $\pm$ 2.79	14.79 $\pm$ 1.99	0.002	15.65 $\pm$ 2.43	15.40 $\pm$ 2.44	0.442
Teamwork	8	8–24	21.17 $\pm$ 2.65	20.80 $\pm$ 3.24	20.37 $\pm$ 2.89	18.79 $\pm$ 3.03	0.009	20.81 $\pm$ 3.00	20.81 $\pm$ 2.93	0.988
Professional Ethics	3	3–9	7.81 $\pm$ 1.38	7.71 $\pm$ 1.35	7.16 $\pm$ 1.64	6.05 $\pm$ 1.65	<0.001	7.56 $\pm$ 1.53	7.62 $\pm$ 1.46	0.791
Lifelong Learning	5	5–15	13.08 $\pm$ 1.74	11.94 $\pm$ 2.68	11.68 $\pm$ 2.03	12.16 $\pm$ 1.98	<0.001	12.44 $\pm$ 2.42	12.60 $\pm$ 2.05	0.562
Entrepreneurship	5	5–15	14.55 $\pm$ 2.18	14.28 $\pm$ 2.38	13.79 $\pm$ 2.68	11.89 $\pm$ 2.28	<0.001	14.94 $\pm$ 2.49	13.36 $\pm$ 2.31	0.175
Leadership	4	4–12	10.30 $\pm$ 1.53	10.17 $\pm$ 1.56	9.42 $\pm$ 1.98	9.37 $\pm$ 1.77	0.024	10.11 $\pm$ 1.90	10.13 $\pm$ 1.43	0.923

† SD = standard deviation. Scores based on a 3-point Likert scale (1 = disagree, 2 = neutral, 3 = agree). Range = possible minimum to maximum composite score per domain. * One-way ANOVA across years of study; ** Independent samples t-test between genders. Post-hoc pairwise comparisons using Tukey's HSD test indicated significant differences ($p < 0.05$) between 1st-year and 4th-year students in communication skills, teamwork, professional ethics, and entrepreneurship.

Discussion

Statistically significant differences were observed across years of study in all soft-skill domains, including communication, critical thinking and problem-solving, teamwork, professional ethics, lifelong learning, entrepreneurship, and leadership ($p < 0.05$). First-year students generally reported higher mean scores than students in later years, whereas fourth-year students showed comparatively lower scores in most domains.

Despite significant literature demonstrating the importance of soft skills in undergraduate dental programs, there is a dearth of evidence on whether students are aware that these skills are taught in their programs. This study investigates undergraduate dental students' knowledge of soft skills in relation to their dental curricula. The results show that students recognize the importance of soft skills for their career development (86.8%), but they are unaware of any skills taught in their program (42.8%). Teaching soft skills in undergraduate programs is extremely important for producing competent dentists. The majority of dentists who graduate do not acquire the desired soft skills, thus struggle a lot in their initial phase of professional life. A similar study in Malaysia found that its graduates lacked basic soft skills upon graduation.¹⁵ This study claims that hard and soft skills are both required for a successful career and better job opportunities, as both these skills complement each other.

The results show that as students approach the final year of their studies, their performance in the professional ethics domain becomes increasingly unsatisfactory. This finding is concerning and may reflect the limited emphasis placed on formal ethical education within undergraduate dental programs. Insufficient awareness and understanding of professional ethical codes can lead to inappropriate clinical decision-making and compromised patient care. Previous studies have also reported variability in dental professionals' awareness of dental ethics. The study suggested introducing structured ethical training and continuing dental education (CDE) programs focused on dental ethics and jurisprudence to enhance professional ethics awareness.¹⁶

The results of our study indicate that professional ethics and leadership recorded lower mean scores, suggesting areas that may require greater attention and improvement. This shows that the undergraduate dental curriculum places less

emphasis on developing students' leadership skills, although this domain is crucial for running an independent practice.^{17, 18} The barriers to implementing leadership in the curriculum can stem from several factors, including time constraints, untrained faculty, and the unwillingness of the institute's leadership. Another study conducted in Iran found that dentists face a range of ethical challenges after graduation, and that dental curricula need to be modified to address them.¹⁹

The perception of teamwork and communication skills was mostly acknowledged among undergraduate dental students in the survey, as indicated by mean scores of 21.17 and 15.77, respectively. Participants are aware of the teamwork domain, as the curriculum now includes methodologies such as small-group discussion, case-based learning, and problem-based learning that develop these skills. The students are aware of these skills, and the undergraduate programs are training them to work as a team in their professional lives. This value decreases to 18.79 and 13.53 as they move towards the final year. The consistent pattern of higher mean scores among first-year students and declining scores in later years warrants consideration. Several factors may contribute to this finding. First-year students may have heightened awareness of soft skills due to recent orientation programs and foundational courses that emphasize professional development. As students progress into clinical years, the increasing demands of clinical quotas, examination preparation, and technical skill acquisition may shift their focus away from soft skill development, leading to a form of "curricular displacement" in which non-technical competencies receive diminishing attention. Additionally, the observed decline may reflect a gap between the formal and hidden curricula: while institutional documents emphasize soft skills, students in clinical rotations may observe that technical proficiency is consistently rewarded and assessed more than interpersonal or ethical competencies. This discrepancy between stated values and observed practice could contribute to declining engagement with soft skill domains over time.

The decline in scores may be attributed to the increased academic and clinical workload in the later years of dental education, particularly the pressure of completing clinical quotas and requirements. Under such stress, students may prioritize individual clinical performance and task completion over collaborative learning and teamwork. Stress among dental students may significantly affect their effort and commitment.²⁰

Further studies are needed to explore the underlying factors contributing to this decline and to identify strategies for promoting teamwork skills within demanding clinical training environments. Understanding undergraduate dental students' perceptions of soft skills can help identify gaps in current training and support the integration of soft skills development into dental education curricula. Policy makers should formally integrate soft skill training into the undergraduate dental curriculum through structured modules and dedicated learning activities. Faculty development programs should also be conducted to train educators to teach and assess soft skills effectively.

This study has a few limitations. First, non-probability sampling was employed, limiting the generalizability of the findings to the broader population of undergraduate dental students. Additionally, the comparatively small sample size of third- and fourth-year students may have weakened the study's statistical power and reduced the ability to compare across all academic years. Furthermore, the use of a 3-point Likert scale may have limited response variability and reduced the instrument's sensitivity to detect nuanced differences in perception. Finally, the cross-sectional design precludes causal inference; the observed association between year of study and soft skill scores may reflect cohort effects rather than a true decline over time.

Conclusion

Institutes offering undergraduate dental programs must incorporate soft skills into their curricula and train their students to compete in the global dental industry as competent, professional individuals with both soft and hard skills. A gradual decline in soft skills perception, particularly in communication skills, teamwork, entrepreneurship, and professional ethics, highlights the need for educational institutions to strengthen training programs that enhance soft skills development, including ethical practice, leadership abilities, and lifelong learning. Emphasis on these competencies is essential to preparing students to become competent professionals capable of meeting the demands of the modern workplace.

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Author Contribution

ST conceived the idea and designed the study, supervised the overall project, and performed the final editing and critical revision of the manuscript. KT contributed to the study methodology, statistical framework, and critical review of the manuscript for important intellectual content. UQ conducted the initial literature review, organized the references, and assisted in manuscript preparation. FK contributed to literature research and background review. All authors read and approved of the final manuscript and agree to be accountable for all aspects of the work.

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Data Availability Statement

The dataset generated during this study is available from the corresponding author upon reasonable request.

Conflict of Interest

The authors have no conflicts of interest to disclose.

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