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# Exploring Dental Students' Readiness for Inter-Professional Learning and Collaborative Practice: A Cross-Sectional Survey Study

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**ABSTRACT**

**OBJECTIVE:** To analyze the responses of participants to the readiness for inter-professional learning and collaborative practice questionnaire to determine their perceptions towards inter-professional learning.

**METHODOLOGY:** A cross-sectional analytical study was conducted in a tertiary care hospital in Karachi to assess students' attitudes and readiness for interprofessional learning using the Modified Readiness for Interprofessional Learning and Collaborative Practice questionnaire. Using PASS version 11, a minimum sample size of 42 per academic year was determined. The questionnaire consists of four subscales: teamwork and collaboration (items 1-9), negative professional identity (items 10-12), positive professional identity (items 13-16) and roles and responsibilities (items 17-19).

**RESULTS:** Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) Version 24. Means (M) and standard deviations (SD) were used to analyze and characterize the respondents' demographic data. An independent sample t-test was used to evaluate gender differences, and a one-way ANOVA was used to assess differences across academic years. The *P*-value was set at 0.05. The overall response rate in our study was 95%. High mean scores for teamwork and collaboration were reported. No statistically significant differences across genders or academic years, except for negative professional identity.

**CONCLUSION:** In our study, dental students showed a positive attitude toward inter-professional learning. Findings of the study suggest that embedding inter-professional education into the dental curriculum to enhance collaborative competencies and a culture of teamwork in the practice of future health care.

**KEYWORDS:** dental students, health care, interprofessional education, learning, perception, undergraduate

## INTRODUCTION

Health care collaboration refers to the concept of members of a team playing complementary roles, cooperating, sharing responsibility for problem solving, and developing and implementing patient care plans [1]. In contemporary healthcare, no single profession can completely meet the varied and complex needs of patients. This reality highlights the necessity of inter-professional collaboration (IPC), where professionals of various disciplines act collaboratively to deliver a holistic approach to care [2]. IPC has been proven through research to not only enhance patient outcomes[3] but also improve efficiency[4] and reduce healthcare costs[5]. Different professionals from diverse educational backgrounds unite to care for patients and communities under the Interprofessional Education (IPE) program, whose goal is to promote collaboration among students and professionals. Social Learning Theory (Bandura, 1977) also emphasizes that people learn from observing and engaging with others, an understanding that underlies the notion of students learning with, from, and about one another in IPE contexts.

The World Health Organization and major education institutions firmly promote IPE as a key strategy to improve health systems globally[7]. Recognizing its significance, inter-professional education (IPE) has been integrated into health professional education to prepare students for practice in collaboration. Over the past 40 years, interprofessional collaborative practice (IPCP) has been utilized at various levels in health professions education[8]. Research has demonstrated that health professionals who are trained to collaborate in a team environment during their student years are much less likely to experience difficulties when they begin their careers as health professionals[9].

Dental education, in particular, can significantly benefit from IPC, as dentists frequently collaborate closely with other healthcare professionals. IPC plays a particularly critical role in dentistry as oral health is interrelated with general health through associated risk factors, including diet, smoking, alcohol consumption, stress, and systemic illness[9]. The dental professional must collaborate with physicians, nurses, pharmacists, and other members of the healthcare team to deliver comprehensive patient care. Hence, students must gain exposure to health professions if they are to become effective inter-professional collaborators in the future[10]. Therefore, interprofessional education in dentistry requires both faculty and students to have positive attitudes to be successful[11,12].

Various assessment tools have been developed to evaluate readiness and attitudes for interprofessional learning. Among them, the Readiness for Inter-professional Learning Scale (RIPLS), first developed by **Parsell and Bligh (1999)** and subsequently revised by **McFadyen et al. (2005)**, is most commonly utilized[13,14]. RIPLS is a questionnaire measuring healthcare students' attitudes, knowledge, and skills towards IPC. It is a validated and evidence-based self-reporting instrument to measure the readiness of healthcare students to collaborate and learn from one another. It is valuable in both undergraduate and postgraduate settings[15,8].

It is therefore crucial for the implementation of inter-professional learning to assess dental students' readiness. Dental undergraduate students in Pakistan have not been thoroughly studied using the RIPLS questionnaire, and there are limited studies specifically focusing on their perceptions regarding inter-professional learning[16,17]. To address this gap, the present study aims to analyze participants' responses to the Readiness for Interprofessional Learning and Collaborative Practice questionnaire and determine their perceptions of interprofessional learning.

## METHODOLOGY

This was an analytical cross-sectional study conducted at a tertiary care hospital of Karachi from August to September 2023 to assess dental students' readiness for inter-professional learning at a single point in time. There were 50 students in each academic year, giving a total population of 200. Using PASS version 11, a minimum sample size of 42 per academic year was determined. Students in their first, second, third, and fourth years studying at Dow Dental College were included via convenience sampling. One hundred ninety students completed the survey out of 200, i.e., 50, 47, 45, and 48 students in successive years, which exceeded the minimum sample size required.

### *Setting, participants and Ethical consideration*

This study was conducted in the lecture halls assigned to each batch of students, without interfering with the course of academic instruction. DUHS' Institutional Review Board approved the research ethics for this study with approval number 3060/DUHS/Approval/2023/229. This study followed relevant guidelines, and only students who signed an informed consent form were included. The form clearly explained that participation was voluntary and that responses would remain anonymous. At the same time, students who were not present when the questionnaires were distributed were excluded from the analysis.

### *Research instrument*

In this study, the modified RIPLS instrument was used to assess the attitudes and readiness of undergraduate healthcare students for interprofessional learning. The questionnaire consisted of two parts. The first part collected information on social demographics, including age, study year, and gender. On the second part of the questionnaire, there were 19 questions, divided into four subscales: teamwork and collaboration (items 1-9), negative professional identity (items 10-12), positive professional identity (items 13-16) and roles and responsibilities (items 17-19), each of which is rated on a 5-point Likert scale.

1. A maximum score of 45 was assigned to statements 1 through 9 under the teamwork and collaboration category. High scores indicate that students were receptive to sharing their knowledge and working in small groups with other health profession students.
2. Statements numbered 10 through 12 constituted the negative professional identity, with a maximum score of 15. Scores that were low in this section were preferred because the majority of the statements were negative, implying that shared learning and collaboration were not valued.
3. There was a maximum score of 20 for the positive professional identity statements, i.e. 13–16. These statements assessed students' readiness to learn interpersonal and patient-centred skills. It would be ideal to get high marks.
4. Among the last three statements, 17 to 19, a maximum possible score of 15 was assigned to Roles and Responsibilities. The purpose of these questions was to evaluate students' knowledge of their professional roles and responsibilities, as well as others. A high score indicates a positive attitude towards IPE.

### *Data Analysis*

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) Version 24. Means (M) and standard deviations (SD) were used to analyze and characterize the respondents' demographic data. A gender-based comparison was conducted to determine if RIPLS subscale scores

differed between male and female students. A comparison was also assessed across four BDS academic years (first, second, third, and final year) to determine whether perceptions of inter-professional learning varied by year of education. An independent sample t-test was used to evaluate gender differences, and a one-way ANOVA was used to assess differences across academic years. The *P*-value was set at .05.

## RESULTS

Out of 200 dental students, 95% responded (n = 190). All 190 completed questionnaires were fully analyzable, and no cases were excluded due to missing or incomplete responses. The other 10 questionnaires were not retrieved because the students were absent on the day of data collection.

In **Table I**, demographic information is provided for the study participants. The participants consisted of 26 males and 164 females, with their ages ranging from 18 to 24, with a mean of (21±1) years. Fifty questionnaires were distributed among each academic year, with 50 received from the 1st year, 47 from the 2nd year, 45 from the 3rd year, and 48 from the 4$^{th}$ year.

**Table I: Descriptive statistics**

| Characteristics | n = 190 (%) |
|---|---|
| **Age (years)** | |
| Mean ± SD | 21.2 ± 1.48 |
| Min – Max | 18 – 24 |
| **Academic years** | |
| First | 50 (26.3) |
| Second | 47 (24.7) |
| Third | 45 (23.7) |
| Final | 48 (25.8) |
| **Gender** | |
| Male | 26 (13.7) |
| Female | 164 (86.3) |

The internal consistency was measured using Cronbach's alpha; higher scores indicate interrelatedness, and scores ranging from 0.70 to 0.95 are considered acceptable. Internal consistency analysis revealed that most subscales demonstrated acceptable reliability (Cronbach's $\alpha \geq 0.70$), except for Subscale 4 (SS4), which showed poor internal consistency ($\alpha = 0.20$). Such a low alpha value indicates that items within SS4 may not reliably measure the intended construct. Given the theoretical importance of this subscale, it was retained in the analysis.

**Table II** reveals various insights into healthcare students' attitudes towards collaborative learning. The majority of the students believe that the benefits for patients would derive from healthcare students learning and working together to solve problems, and agree that an increase in understanding of clinical problems through shared learning (statements 1, 2, and 3). In statement 12, 81% disagree that clinical problem-solving skills may only be learned through their own department's students. In addition, most students would welcome the opportunity to work on small-group projects with other healthcare students, as stated in statement 14.

**Table II: Mean score among dental students for each subscale of the readiness for Inter-professional Learning Scale (RIPLS)**

| Q.No | Statements | Strongly Agree (N) | Agree (N) | Neutral (N) | Disagree (N) | Strongly Disagree(N) | Mean | SD |
|---|---|---|---|---|---|---|---|---|
| **1** | Learning with other students will help me become a more effective member of a health care team | 119 | 69 | 1 | 1 | 0 | 1.39 | 0.56 |
| **2** | Patients would ultimately benefit if healthcare students worked together to solve patient problems | 124 | 61 | 1 | 3 | 1 | 1.4 | 0.64 |
| **3** | Shared learning with other health care students will increase my ability to understand clinical problems | 124 | 61 | 3 | 1 | 1 | 1.39 | 0.6 |
| **4** | Learning with healthcare students before qualification would improve relationships after qualification | 112 | 70 | 7 | 1 | 0 | 1.46 | 0.62 |
| **5** | Communication skills should be learned with other healthcare students | 117 | 62 | 10 | 1 | 0 | 1.45 | 0.62 |
| **6** | Shared learning will help me to think positively about other professionals | 104 | 69 | 13 | 3 | 1 | 1.57 | 0.73 |
| **7** | For small-group learning to work, students need to trust and respect each other | 97 | 85 | 6 | 2 | 0 | 1.54 | 0.61 |
| **8** | Team-working skills are essential for all healthcare students to learn | 94 | 76 | 14 | 5 | 1 | 1.65 | 0.77 |
| **9** | Shared learning will help me to understand my own limitations | 119 | 61 | 4 | 2 | 4 | 1.48 | 0.78 |
| **10** | I don't want to waste my time learning with other healthcare students | 13 | 17 | 26 | 88 | 46 | 3.72 | 1.13 |
| **11** | It is not necessary for undergraduate health care students to learn together | 15 | 32 | 30 | 69 | 44 | 3.5 | 1.23 |
| **12** | Clinical problem-solving skills can only be learned from students from my own department | 41 | 41 | 26 | 53 | 29 | 2.94 | 1.4 |
| **13** | Shared learning with other health care students will help me to communicate better with patients and other professionals | 102 | 74 | 7 | 1 | 6 | 1.61 | 0.85 |
| **14** | I would welcome the opportunity to work on small-group projects with other health care students | 107 | 69 | 12 | 2 | 0 | 1.52 | 0.66 |
| **15** | I would welcome the opportunity to share some generic lectures, tutorials or workshops with other health care students | 97 | 78 | 13 | 1 | 1 | 1.58 | 0.69 |
| **16** | Shared learning will help to clarify the nature of patient problems | 108 | 67 | 13 | 1 | 1 | 1.53 | 0.69 |
| **17** | Shared learning before and after qualification will help me become a better team worker | 105 | 77 | 5 | 1 | 2 | 1.52 | 0.68 |
| **18** | I am not sure what my professional role will be | 13 | 17 | 67 | 60 | 33 | 3.44 | 1.09 |
| **19** | I have to acquire much more knowledge and skills than other healthcare students | 74 | 63 | 40 | 10 | 3 | 1.97 | 0.97 |

Pairwise comparison between genders showed no statistically significant differences across most subscales. However, an important difference was observed in the Negative Professional Identity subscale ($p = 0.02$, Cohen's $d = 0.35$), where female students reported higher scores than males. Although other gender differences were not significant, effect size estimates (Cohen's $d = 0.05–0.40$) suggest that some differences may still hold practical relevance (**Table III**).

**Table III: Subscale-wise scores by Gender**

| Subscales | Gender | N | Mean | SD | P-value* |
|---|---|---|---|---|---|
| Teamwork and collaboration | male | 26 | 13.84 | 3.67 | 0.40 |
| | female | 164 | 13.25 | 3.92 | |
| Negative professional identity | male | 26 | 8.92 | 3.47 | 0.02 |
| | female | 164 | 10.35 | 2.82 | |
| Positive professional identity | male | 26 | 6.26 | 2.35 | 0.90 |
| | female | 164 | 6.23 | 2.19 | |
| Roles and responsibilities | male | 26 | 6.73 | 1.56 | 0.50 |
| | female | 164 | 6.95 | 1.82 | |

**P*-value <.05—statistically significant

Although mean scores varied across academic years, none of the differences reached statistical significance ($p > 0.05$ for all). Dental students generally exhibit a moderate to high level of endorsement of teamwork-related values and practices, as indicated by their mean scores. Moderate levels are observed for the Negative Professional Identity, Positive Professional Identity, and Roles and Responsibilities subscales. (**Table IV**). The total mean score year-wise was high for subscale 1, with the lowest mean for subscale 2, i.e. the fourth year students scored the highest in subscale 1 and 2, the third year in subscale 3 and the first year in subscale 4. (**Table IV**)

**Table IV: Subscale-wise scores by year**

| Subscales | Year | Mean | SD | Min. | Max. | P-value* |
|---|---|---|---|---|---|---|
| Team work and collaboration | 1st | 12.74 | 3.15 | 9 | 22 | 0.356 |
| | 2nd | 13.404 | 3.47 | 9 | 21 | |
| | 3rd | 13.088 | 3.43 | 9 | 19 | |
| | 4th | 14.104 | 5.15 | 9 | 33 | |
| | Total | 13.331 | 3.88 | 9 | 33 | |
| Negative professional identity | 1st | 10.46 | 3.004 | 3 | 15 | 0.97 |
| | 2nd | 9.319 | 3.304 | 3 | 15 | |
| | 3rd | 10.066 | 3.129 | 3 | 15 | |
| | 4th | 10.75 | 2.148 | 3 | 15 | |
| | Total | 10.157 | 2.95 | 3 | 15 | |
| Positive professional identity | 1st | 5.74 | 2.03 | 4 | 11 | 0.313 |
| | 2nd | 6.34 | 2.02 | 4 | 11 | |
| | 3rd | 6.51 | 2.34 | 4 | 11 | |
| | 4th | 6.395 | 2.4 | 4 | 14 | |
| | Total | 6.236 | 2.2 | 4 | 14 | |
| Roles and responsibilities | 1st | 7.28 | 1.48 | 4 | 10 | 0.369 |
| | 2nd | 6.87 | 1.82 | 3 | 11 | |
| | 3rd | 6.644 | 2.04 | 3 | 12 | |
| | 4th | 6.87 | 1.77 | 3 | 10 | |
| | Total | 6.92 | 1.78 | 3 | 12 | |

**P*-value <.05—statistically significant

## DISCUSSION

This research provides comprehensive insights into the attitudes of Pakistani dental students towards interprofessional education (IPE). The findings demonstrate that students feel that IPE can significantly increase their knowledge and skills, while also enhancing their productivity as future dental professionals. Such findings align with allied health and medical studies in Pakistan[19,16,20], which also reported positive readiness for interprofessional learning. This uniformity reflects a greater acceptance of the importance of interprofessional working in enhancing healthcare provision.

Students in our study expressed readiness to participate in interprofessional learning, affirming similar positive attitudes among dental students in Nepal[21] and Saudi Arabia[22], where students also expressed preparedness to participate in interprofessional learning. These findings are in contrast to an Indian study, which revealed that more than half (50.3%) of dental students were not familiar with IPE[23]. The variation can be attributed to varying curricular exposure, institutional focus on interprofessional practice, and awareness of collaborative practice of health care.

Our results revealed no year-wise significant differences, in contrast to a study that found a positive correlation between students' preparedness for inter-professional learning and their academic progress[24]. This could be an indication of the unstructured nature of IPE in the Pakistani dental curriculum. The lack of significant differences across academic years indicates that existing dental training does not increasingly incorporate interprofessional attitudes. Research conducted in other settings also reported that senior students performed better due to increased exposure to clinical collaborations[22]. This indicates the imperative of curricular reform that brings and consolidates IPE at various levels of dental education. Therefore, the educational curriculum must emphasize the importance of collaboration among healthcare professionals to improve patient care.

In our research, no significant gender differences were found in most RIPLS subscales, except for Negative Professional Identity, on which females reported more positive attitudes compared to males. Such results are in line with research that shows female students tend to be more open to teamwork and collaborative learning, possibly due to their better interpersonal and communication skills[25]. In Pakistani culture, where patriarchal gender roles tend to prioritize empathy and relationship-building in women, such tendencies could likely be a product of larger socio-cultural forces. This highlights the need to develop interprofessional education approaches that not only capitalize on the strengths of female students but also actively encourage male students to contribute to promoting positive interprofessional identities.

Regarding attitudes towards collaborative learning, the majority of students in our research hold a favourable opinion about how collaborative work can enhance their comprehension of clinical problems and make them better healthcare team members. Researchers in Saudi Arabia also found that students of healthcare expressed a strong tendency towards collaborative learning, as indicated by their high rate of endorsement of teamwork-related values and practices[22]. On the issue of time wasted resulting from learning with students of other professions, the respondents to the study disagreed. These findings align with Pakistani research, which concluded that over two-thirds of students did not share the negative attitude[19]. They also felt that learning should be done interactively among undergraduate and graduate health care professionals as well as students, with its contribution towards improving problem-solving and clinical effectiveness.

### Strengths, Limitations, and Implications

The strength of the study lies in its ability to focus on dental students, which is an underrepresented group within inter-professional education studies in Pakistan. A 95% response rate increases confidence in the results. Nonetheless, several limitations need to be recognized. Firstly, the study was conducted at a single institution, which limits its generalizability. Further, the cross-sectional design limits what is possible in terms of measuring change in perceptions over time. Furthermore, the low reliability of the Roles and Responsibilities subscale raises doubts about the reliability of outcomes based on this domain, necessitating future work to revise and improve SS4 items to achieve better psychometric properties. Even with these constraints, the results have significant implications: organized IPE activities need to be integrated into the dental curriculum to develop collaborative competence, define professional roles, and support equitable attitudes toward interprofessional identity, particularly in relation to gender.

## CONCLUSION

There were generally positive attitudes among dental students toward interprofessional education, especially teamwork and a positive professional identity, with females displaying more favourable attitudes regarding the Negative Professional Identity subscale. The findings of this study serve as baseline data for implementing IPE into Pakistani dental curricula. Embedding structured IPE modules from early training years can enhance collaborative competencies, clarify professional roles, and foster a culture of teamwork in the practice of future healthcare.

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### List of Abbreviations

ANOVA: Analysis of Variance
IPC: Inter-professional Collaboration
IPE: Inter-professional Education
M: Means
P-value: probability value
RIPLS: Readiness for Inter-Professional Learning Scale
SD: standard deviations

**Ethical permission:** Dow University of Health Sciences IRB letter No. IRB3060/DUHS/Approval/ 2023/229. Informed consent to participate was taken from all participants.
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**Data Sharing Statement:** The corresponding author can provide the data proving the findings of this study on request. Privacy or ethical restrictions bound us from sharing the data publicly.

## AUTHOR CONTRIBUTION

**Nasir S**: Principal Investigator; conceived and designed the study, conducted data collection and sample processing, performed statistical analysis, interpreted the results, drafted the initial manuscript, coordinated between co-authors, and finalized the submission.
**Siddiqui SU**: Provided expert supervision throughout the project, critically reviewed the study design and methodology, and contributed to the intellectual content and final proofreading of the manuscript.
**Qureshi S**: Assisted in sample collection and management, contributed to statistical analysis and data interpretation, and participated actively in writing the discussion and reviewing the results.
**Saeed A**: Reviewed and edited the entire manuscript for clarity, structure, and language; contributed to the refinement of the discussion and conclusion sections.
**Syed H**: Participated in data analysis and interpretation, assisted in reviewing literature, and contributed to formatting tables and referencing.
**Wakar M**: Contributed to data processing and interpretation, organized data presentation (tables/figures), and helped ensure compliance with journal guidelines.
**Abrar K**: Provided supervision and academic oversight, reviewed the research framework.

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