

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 were found 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 plans¹. 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 care². IPC has been proven through research to not only enhance patient outcomes³ but also improve efficiency⁴ and reduce

healthcare costs⁵. 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 globally⁷. 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 education⁸. 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 professionals⁹.

Dental education, in particular, can significantly benefit from IPC, as dentists frequently collaborate closely

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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 illness⁹. 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 future¹⁰. 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 G 1999¹³ and subsequently revised by McFadyen AK 2006¹⁴, is most commonly utilized. 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 4th 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)

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

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 results 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.

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**).

Although mean scores varied across academic years,

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

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

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^{16,19,20}, 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 Nepal²¹ and Saudi Arabia²², 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 IPE²³. 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 interprofessional learning and their academic progress²⁴. 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 collaborations²². 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 skills²⁵. 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 practices²². 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 attitude¹⁹. 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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