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Knowledge and Attitude Towards Benefits and Challenges of Inter-Professional Education Among Undergraduate Healthcare Students: A Cross-Sectional Study

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Abstract **Background/Objectives:** Inter-Professional Education (IPE) boosts inter-professional communication and healthcare delivery. This study aims to navigate the attitudes and perceptions of undergraduate healthcare students toward the benefits and challenges of IPE. **Methods:** A cross-sectional study was conducted among 372 undergraduate healthcare students (i.e., Medical, Applied Medical Sciences, Nursing, Pharmacy and Dentistry) at Northern Border University, using a convenient sampling approach. Data were collected through structured electronic questionnaires assessing attitudes towards IPE, including teamwork, professional identity, roles and responsibilities and perceived benefits and challenges. Statistical analysis evaluated attitudes and their associations with demographic and academic factors. **Results:** Most students exhibited positive attitudes towards IPE, with 52.4% to 70.7% fully agreeing on the benefits of collaborative learning. However, notable negative attitudes were also observed, particularly concerning time wastage and perceived non-essentiality of IPE (21.8% to 31.2% disagreed or fully disagreed). Previous exposure to IPE significantly influenced attitudes, with higher mean scores among those with prior experience ($p = 0.000$). Discipline-specific variations were evident, with pharmacy students showing the highest mean attitude scores ($p = 0.030$). Challenges identified included logistical issues, resource limitations and faculty support discrepancies. **Conclusion:** While overall attitudes towards IPE were positive, significant barriers and discipline-specific differences exist. Addressing logistical and resource constraints, alongside early integration of IPE, could enhance its acceptance and effectiveness. Future research should explore longitudinal impacts and tailored strategies for different healthcare disciplines.

Key Words Inter-Professional Education (IPE), Collaborative Approach, Interprofessional Team, Communication Skills, Healthcare Students Attitudes, Benefits, Challenges

INTRODUCTION

In the current healthcare landscape, managing complex health issues for many patients has become increasingly challenging. A single healthcare provider may struggle to provide comprehensive care and treatment for such individuals. Recognizing the need for collaborative care across multiple professions, Inter-Professional Education (IPE) has emerged as a vital educational approach in the training of healthcare professionals [1,2].

IPE, as defined by the "Centre for the Promotion of Interprofessional Education," involves students from diverse professions learning about and with each other to enhance collaboration and improve the quality of care provided [3]. This collaborative learning strategy is essential in fostering a patient-centered approach to care, as advocated by the World Health Organization (WHO) [4].

IPE was first used in the US in the 1940s, Canada in the 1960s, Sweden and Australia in the 1970s and the UK in the

1980s as a training and learning technique [5]. The WHO was the first international agency to suggest IPE as a channel of promising teamwork amongst various healthcare providers in order to provide high-quality healthcare and address patients' concerns holistically [6]. IPE is being implemented in higher education programs for the health professions with the support of numerous other organizations, such as the National Academies of Practice and the American Public Health Association [7]. Two or more students from various health profession programs study with, about and from each other as part of interprofessional education [6,8].

The core skills emphasized in IPE, including values/ethics roles/responsibilities, interprofessional communication, teamwork and team-based practice, are critical for preparing healthcare students to engage in collaborative practice effectively [9,10]. Through various learning methods such as case-based learning, problem-based learning, team-based learning, simulation-based education and clinical rotations, students are exposed to interdisciplinary connections and team-based practices essential for providing high-quality healthcare [11,12].

While IPE has been shown to enhance patient care outcomes through teamwork, it is a relatively new concept in the Middle Eastern region, with limited publications addressing its implementation and effectiveness [13,14]. In this sense, this study aims to assess the knowledge and attitudes of undergraduate healthcare students towards IPE and their readiness for interprofessional practice. By examining the benefits and challenges of IPE, this research seeks to contribute to the ongoing development of healthcare education programs that promote collaborative practice and improve patient outcomes. Also, an important aspect of the uniqueness of IPE is its approach to cultural sensitivities. Respect for diversity is a cornerstone, fostering an appreciation for diverse backgrounds, beliefs and values among healthcare professionals. This approach prepares students to provide culturally competent care, attuned to patients' cultural needs and preferences. Furthermore, IPE helps break stereotypes by challenging students' biases and assumptions about other professions and cultures. These points underscore the importance of cultural sensitivities in IPE, equipping students to deliver high-quality, patient-centered care in diverse healthcare settings.

METHODS

Study Design

This cross-sectional descriptive study used a convenient sampling approach to enroll undergraduate students from all healthcare professions-related colleges at NBU, Saudi Arabia, to assess the students' perspectives about the benefits and challenges associated with IPE using a prevalidated questionnaire.

Study Participants and Ethical Considerations

Undergraduate health professional students over 18 in the colleges of Medicine, Applied Medical Sciences, Nursing and Pharmacy at NBU, both genders at different academic levels and willing to participate in this study, were recruited from September to December 2023 after obtaining the ethical approval from the "Local Bioethics Committee (HAP-09-A-043)" NBU, Arar, Saudi Arabia (approval No. A/44/77). Students who passed out from the University or dropped their studies for more than one year were excluded. Before participation, all individuals were informed about the study's goals and provided consent with the assurance of confidentiality and anonymity in line with ethical guidelines.

Sample Size Calculation

For sample size calculation, the "Raosoft sample size calculator; http://www.raosoft.com/samplesize.html" was used to determine that 330 minimum participants were required to achieve a 95% confidence interval, considering a total population of 2300 for the specified health college students and a 5% margin of error. In order to account for recall bias, an extra 10% was added to the initial figure.

Study Tool

A modified "Readiness for Interprofessional Learning Scale (RIPLS)" questionnaire [15,16] was used to evaluate preparedness, perceptions and attitudes of different undergraduate healthcare professional students towards IPE. It is a 19-item self-reporting instrument consisting of four subscales: teamwork and collaboration (TC), negative professional identity (NPI), positive professional identity (PPI) and roles and responsibilities (RR). The items asking the participants to indicate their level of agreement on a 5-point Likert scale ranging from "strongly disagree" (score of 1) to "strongly agree" (score of 5); thus, the minimum score for all statements is 27 and the maximum score will be 135. The scoring is reversed for negative statements (statements 10, 11 and 12). The overall possible maximum score for the RIPLS is 95 and the minimum is 19. Before administering RIPLES, its internal consistency was validated using the reliability statistical "Cronbach calculation." Also, its face/content validity was assessed by two academics who were experienced in research questionnaire design. The questionnaire was distributed throughout Whats app groups for each class and during lecture attendance for the scheduled study timetable of the involved coauthors.

Data Analysis

The collected data were extracted into a "Microsoft Excel" document, underwent cleansing, coding and then transferred to the statistical analysis program. The "Statistical Package for Social Sciences (SPSS, IBM, Chicago, Illinois, USA)" version 24.0 was applied for data analysis by descriptive (i.e., mean, standard deviation) and inferential statistics, parametric (i.e., paired t-test). The level of significance was set at a p-value ≤0.05. The "Kaiser-Meyer-Olkin" test was used to measure the sampling adequacy. Furthermore, "Bartlett's test of Sphericity" was applied to measure whether the correlations between the variables in the questionnaire were sufficiently high for factor analysis to be meaningful. Meanwhile, "Cronbach's alpha coefficient" was calculated to assess the internal consistency and reliability of the questionnaire.

RESULTS

Basic Characteristics of Study Participants and Questionnaire Assessment

A total of 372 participants were included in this study. The majority of participants (n = 236, 63.4%) were aged ≤20 years and consisted of 55.6% females. The study group was predominantly composed of nursing students (n = 150, 40.3%), followed by medicine (n = 128, 34.4%), applied medical sciences (n = 80, 21.5%), dentistry (n = 9, 2.4%) and pharmacy (n = 5, 1.3%). Furthermore, the largest group was third-year students (n = 109, 29.3%), followed closely by first-year students (n = 102, 27.4%). Participation from the sixth and fifth years accounted for only 10.5% of respondents (Table 1).

Concerning the distribution of study participants' previous experience with inter-professional teaching, the majority of respondents (n = 301, 81%) reported no previous experience with inter-professional teaching, while a smaller proportion (n = 71, 19%) indicated having previous exposure to this type of teaching (Figure 1).

Concerning study tool analysis, overall, the assessment of sampling adequacy and reliability of the interprofessional education questionnaire underscores the quality of the data collected for the study. The "Kaiser-Meyer-Olkin Measure of Sampling Adequacy" yielded a high value of 0.924, indicating that the data was suitable for conducting factor analysis. Also, "Bartlett's Test of Sphericity" produced an approximate chi-square value of 7789.7 with 406 degrees of freedom, resulting in a significant p-value of 0.000. The significant result indicates that the correlations between the variables in the questionnaire were sufficiently high for factor analysis to be meaningful. Finally, the "Cronbach's alpha coefficient" value was 0.902, which indicates a high level of reliability, suggesting that the items in the questionnaire are internally consistent and measure the intended constructs effectively. This confirms that the questionnaire yielded dependable and consistent results, enhancing the validity of the findings derived from the survey data (Table 2).

Attitudes toward Interprofessional Education among the Study Participants

Analysis of participant attitudes toward interprofessional education (Table 3) provides valuable insights into their perceptions, beliefs and expectations concerning collaborative learning experiences. A significant proportion of participants expressed positive attitudes, with the majority agreeing (30.9% to 70.4%) or fully agreeing (52.4% to 70.7%) with statements affirming the benefits of collaborative learning with students from other health professions.

In contrast, a notable portion of participants exhibited negative attitudes towards interprofessional education, particularly concerning wasting time learning with other health professional students and the perceived lack of essentiality in learning together. The responses indicated varying levels of disagreement, with a substantial proportion expressing disagreement (21.8% to 31.2%) or complete disagreement (16.7% to 21.8%) with statements associated with NPI. On the other hand, responses reflecting positive professional identity showed a predominantly favorable outlook towards shared learning and collaboration with students from other health professions. A majority agreed (26.3% to 58.9%) or fully agreed (50.3% to 58.9%), with

Table 1: Demographic characteristics of the study participants

Participant's characteristics (n = 372)		Frequency	Percent
Age	≤20 years	236	63.4%
	>20 years	136	36.6%
Sex	Female	207	55.6%
	Male	165	44.4%
Discipline	Medicine	128	34.4%
	Applied Medical Sciences	80	21.5%
	Nursing	150	40.3%
	Pharmacy	5	1.3%
	Dentistry	9	2.4%
Academic year	First-year	102	27.4%
	Second-year	67	18.0%
	Third-year	109	29.3%
	Fourth-year	55	14.8%
	Fifth-year	14	3.8%
	Sixth-year	25	6.7%

Data are presented as numbers (No) and percentages (%)

Table 2: Assessment of sampling adequacy and reliability of interprofessional education

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.924
Bartlett's Test of Sphericity	Approx. Chi-Square	7789.7
	DF	406
	Significant	0.000
Cronbach's alpha		0.902

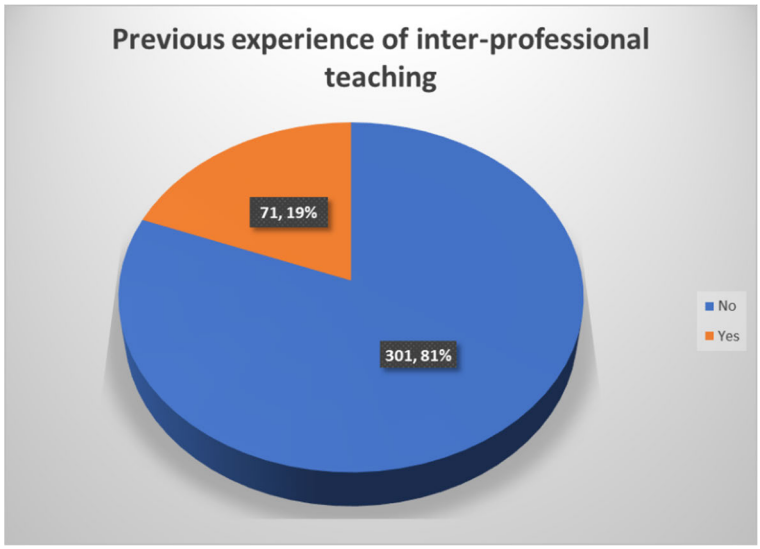

Figure 1: Previous experience in inter-professional teaching

Table 3: Assessment of the attitude of health professional students towards interprofessional education

Attitude toward interprofessional education (n = 372)	Fully disagree	Disagree	Indifferent	Agree	Fully agree
Teamwork and collaboration (TC)					
I will become a more valuable member of a health professional team by learning with students of other professions	4 (1.1%)	6 (1.6%)	52 (14.0%)	115 (30.9%)	195 (52.4%)
Collaboration between health professional students would hugely benefit patients	2 (0.5%)	3 (0.8%)	32 (8.6%)	73 (19.6%)	262 (70.4%)
My capacity to comprehend clinical problems will increase due to the shared learning with other health professions students	3 (0.8%)	6 (1.6%)	37 (9.9%)	88 (23.7%)	238 (64.0%)
Better development of communication skills will happen by working with other health professional students	2 (0.5%)	6 (1.6%)	32 (8.6%)	99 (26.6%)	233 (62.6%)
Teamwork abilities are essential to develop to be able to communicate effectively with other students pursuing health professional courses	0 (0.0%)	6 (1.6%)	37 (9.9%)	107 (28.8%)	222 (59.7%)
Shared learning with other health professional students will help me to understand my own professional limitations	0 (0.0%)	12 (3.2%)	45 (12.1%)	105 (28.2%)	210 (56.5%)
Learning together among health professional students would improve working relationships and, after graduating, will promote collaborative practice	3 (0.8%)	5 (1.3%)	35 (9.4%)	95 (25.5%)	234 (62.9%)
Shared learning with other health professional students will help me think holistically about other healthcare professions	3 (0.8%)	5 (1.3%)	36 (9.7%)	111 (29.8%)	217 (58.3%)
For collaborative inter-professional learning students, students need to respect and trust each other	0 (0.0%)	3 (0.8%)	29 (7.8%)	77 (20.7%)	263 (70.7%)
Negative professional identity (NPI)					
I don't want to waste time learning with other health professional students	81 (21.8%)	116 (31.2%)	81 (21.8%)	32 (8.6%)	62 (16.7%)
It is not essential for undergraduate health professional students to learn together	63 (16.9%)	103 (27.7%)	103 (27.7%)	39 (10.5%)	64 (17.2%)
Clinical problem-solving can only be learned effectively with students from my own college and course	57 (15.3%)	100 (26.9%)	110 (29.6%)	42 (11.3%)	63 (16.9%)
Positive professional identity (PPI)					
Shared learning with other health professional students will help me to communicate better with patients and other professionals	1 (0.3%)	5 (1.3%)	49 (13.2%)	98 (26.3%)	219 (58.9%)
I would be opportune to work on research projects with other health professional students	5 (1.3%)	9 (2.4%)	59 (15.9%)	105 (28.2%)	194 (52.2%)
I would applaud the opportunity to share lectures, tutorials and resource material with other health professional students	6 (1.6%)	13 (3.5%)	69 (18.5%)	97 (26.1%)	187 (50.3%)
Shared learning and practice will help me to become confident in handling the patients' problems in a better way	1 (0.3%)	15 (4.0%)	58 (15.6%)	97 (26.1%)	201 (54.0%)
Roles and responsibilities (RR)					
Shared learning with other health professional students before and after graduation will help me to become a better team worker	0 (0.0%)	5 (1.3%)	49 (13.2%)	97 (26.1%)	221 (59.4%)
I am not sure of what my professional role will be in working as a team with other health professional students	16 (4.3%)	63 (16.9%)	124 (33.3%)	71 (19.1%)	98 (26.3%)
I have to acquire much more knowledge and skills than other students in my own course to work efficiently with other health professional students	9 (2.4%)	15 (4.0%)	69 (18.5%)	110 (29.6%)	169 (45.4%)

Data are presented as numbers (No) and percentages (%)

Table 4: Assessment of benefits and challenges of interprofessional education

Benefits and challenges of interprofessional education (n = 372)	Fully disagree	Disagree	Indifferent	Agree	Fully agree
IPE and its benefits					
IPE provides students with insights into the knowledge and skills of different health disciplines	3 (0.8%)	2 (0.5%)	47 (12.6%)	110 (29.6%)	210 (56.5%)
IPE provides students support in improving patient care through teamwork by reducing error rates	2 (0.5%)	5 (1.3%)	55 (14.8%)	107 (28.8%)	203 (54.6%)
IPE provides students an encouraging environment to learn and share their insights and inculcate respect for individual discipline's knowledge and skills	4 (1.1%)	2 (0.5%)	63 (16.9%)	101 (27.2%)	202 (54.3%)
IPE provides students to improve communication between health team members, which benefits patient care	3 (0.8%)	4 (1.1%)	53 (14.2%)	96 (25.8%)	216 (58.1%)
IPE provides students to learn how to critique and reflect upon their practice	7 (1.9%)	8 (2.2%)	65 (17.5%)	96 (25.8%)	196 (52.7%)
IPE and its Challenges					
It may not be easy to arrange/schedule the IPE sessions	5 (1.3%)	17 (4.6%)	129 (34.7%)	103 (27.7%)	118 (31.7%)
There may be inadequate resources in terms of infrastructure, resources, and faculty	11 (3.0%)	31 (8.3%)	109 (29.3%)	101 (27.2%)	120 (32.3%)
There can be a lack of attention and support from authorities towards IPE	13 (3.5%)	36 (9.7%)	124 (33.3%)	90 (24.2%)	109 (29.3%)
Faculty perceptions and practices may differ from each other when adopting IPE	5 (1.3%)	19 (5.1%)	126 (33.9%)	116 (31.2%)	106 (28.5%)
The curriculum may become inflexible	14 (3.8%)	52 (14.0%)	121 (32.5%)	82 (22.0%)	103 (27.7%)

Data are presented as frequencies and proportions (%)

statements highlighting the potential benefits of interprofessional education for improving patient communication, research collaboration and confidence in handling clinical problems.

Participants' attitudes towards roles and responsibilities in interprofessional learning revealed a mix of perspectives, with some expressing uncertainty about their professional role in team-based settings and the perceived need for additional knowledge and skills. Responses ranged from a higher agreement (13.2% to 26.1%) or complete agreement (26.1% to 59.4%), with statements emphasizing the importance of shared learning for enhancing teamwork abilities and acquiring necessary competencies.

Benefits and Challenges of Interprofessional Education

Participants' attitudes towards IPE were assessed based on their responses to statements about the advantages and obstacles encountered in collaborative learning environments (Table 4). Participants' attitudes towards the benefits of IPE demonstrated a generally positive outlook towards collaborative learning experiences. A majority of participants agreed (29.6% to 56.5%) or fully agreed (54.6% to 58.1%) with statements highlighting the advantages of IPE in providing insights into diverse health disciplines, improving patient care through teamwork, creating an inclusive learning environment, enhancing communication among health team members and fostering critical reflection on practice. Conversely, participants also acknowledged several challenges associated with IPE. While a significant portion agreed (27.2% to 34.7%) or fully agreed (31.2% to 33.9%), with statements indicating potential difficulties in arranging IPE sessions, lack of resources and faculty support, discrepancies in faculty perceptions and practices and concerns about curriculum flexibility, there was also a notable percentage expressing disagreement (22.0% to 32.3%) towards these challenges.

The Mean Scores of the Participants' Attitudes toward Interprofessional Education

The mean scores of the attitude domains related to IPE were calculated to assess the participants' attitudes towards teamwork, professional identity, roles, benefits and challenges of IPE. Participants exhibited a positive attitude towards teamwork and collaboration, with a mean score of 31.4±4.4. However, the negative professional identity mean score was 8.4±3.6, suggesting a low level of agreement with statements reflecting skepticism or reluctance towards IPE and collaboration.

Participants demonstrated a positive professional identity with a mean score of 17.2±2.9 and the roles/responsibilities mean score was 12.0±2.2. Also, participants acknowledged the benefits of interprofessional education with a mean score of 21.7±3.6, indicating a high level of agreement with statements highlighting the advantages and positive outcomes of collaborative learning experiences. Meanwhile, a moderate level of agreement with statements relating to the obstacles and difficulties faced in engaging in IPE initiatives was evident, with a mean score of 18.6±4.4 (Figure 2).

Relation of the Participants' Attitude with the Previous Experience of Inter-Professional Education

Participants were categorized based on their experience of IPE, with a significant proportion reporting no prior exposure. The mean attitude score for participants with no previous experience was 103.7±13.2, while those with previous experience had a mean score of 110.7±12.6. There was a significant difference in attitude scores between the two groups (p-value = 0.000).

Relation of the Participants' Attitude about IPE with their Characteristics

The impact of demographic and academic factors on attitudes towards IPE and collaborative learning was

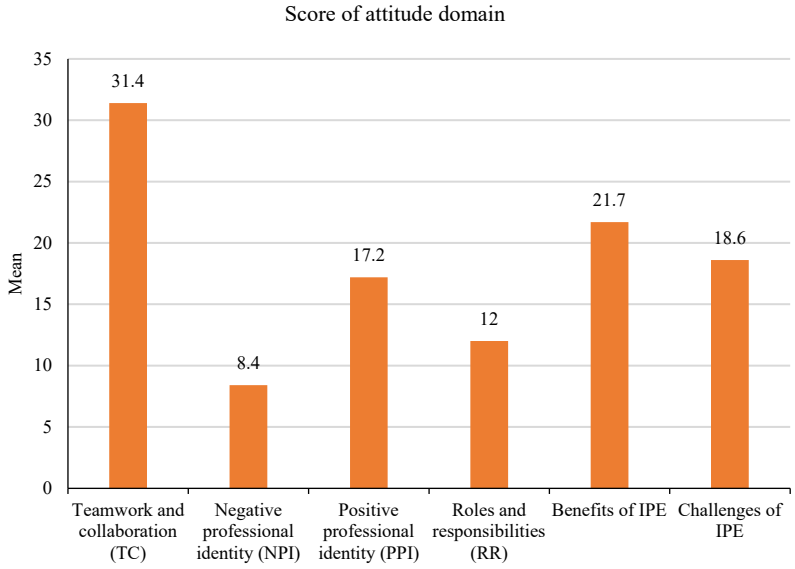

Figure 2: The score of the participants' attitudes towards interprofessional education domains

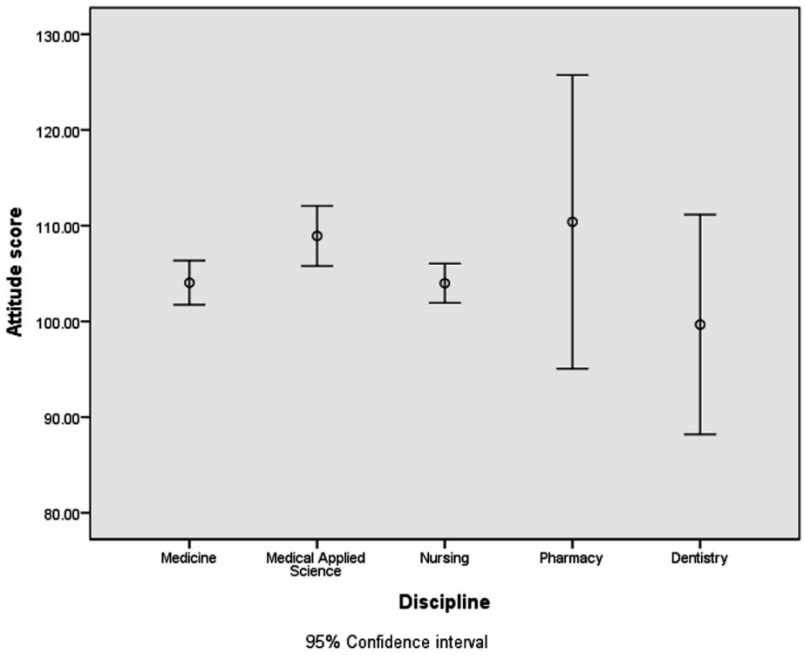

Figure 3: Attitude scores of healthcare students among different disciplines towards interprofessional education

assessed (Table 5). Although there were no significant differences identified concerning the participants' attitude about IPE and the age, sex, as well as academic years (all p-values >0.05), there was a significant difference regarding the attitude based on participants' discipline (Table 5 and Figure 3). Pharmacy students exhibited the highest mean value (110.4±12.4), followed by the Medical Applied Sciences discipline (108.9±14.1) (p-value of 0.030).

DISCUSSION

IPE is a teaching philosophy proven to be a successful method for enhancing patient care through teamwork [17]. With cooperation, a decrease in errors and an increase in competencies, patient care has improved [18]. IPE fosters interdisciplinary connections between team members by providing a supportive atmosphere for students to acquire, share and respect the knowledge and abilities of each unique subject [19]. The concept of IPE and collaboration is new to the Middle Eastern region. Some publications could be retrieved in this regard [20-22]. Considering all the associated benefits of IPE, this study looked into how well-prepared health professional students are for IPE. It explored the essential challenges they face with this educational method.

It was observed that most of the included participants were young individuals, with a significant proportion aged ≤20 years. The gender distribution was balanced and the study cohort predominantly comprised nursing and medical

Table 5: Assessment of the attitude about IPE versus the participant's characteristics

Participant's characteristics		(n = 372)	
		Mean±SD	p-value
Age	≤20 years	105.9±13.2	0.127[a]
	>20 years	103.7±13.6	
Sex	Male	104.4±13.8	0.404[a]
	Female	105.6±13.0	
Discipline	Medicine	104.0±13.2	0.030[b*]
	Medical Applied Science	108.9±14.1	
	Nursing	103.9±12.7	
	Pharmacy	110.4±12.4	
	Dentistry	99.7±14.9	
Academic year	First year	107.0±13.1	0.261[b]
	Second year	104.5±13.7	
	Third year	105.8±13.6	
	Fourth year	102.2±12.8	
	Fifth year	101.9±16.0	
	Sixth year	103.1±11.8	

Data are presented as Mean±standard deviation (SD), [a]T-test or b analysis of variance was applied, *Significance was set at p-value ≤0.05

students, highlighting the interest and involvement of these cohorts in interprofessional education, as evident previously [23,24]. Notably, the survey involved representations from various academic years, with third-year students being the largest group. This diverse participation across academic levels provides a comprehensive insight into the perceptions and attitudes toward IPE among undergraduate healthcare students [25].

IPE's primary goal is to prepare students for teamwork with specialists from various health professions to provide the highest possible standard of healthcare. The term "readiness" covers knowledge, skills, attitude and effective communication strategies [26-28]. IPE has the following qualities as a teaching and learning method: (a) Students comprehend knowledge and abilities associated with their profession; (b) they are familiar with the terminology and logic of each profession involved; (c) they comprehend the fundamental ideas, principles and contributions within each profession; (d) and they have mastered the concepts of teamwork [3,29,30]. Greater awareness of professional duties in providing care for patients and their caregivers, as well as increased knowledge exchange to collaborate throughout their daily practical work, are all outcomes of IPE [31].

The assessment of included participant attitudes revealed a mixed landscape, with a significant portion demonstrating positive outlooks toward the benefits of IPE. These positive views were reflected in the participants' agreement with statements emphasizing the value of collaborative learning in enhancing teamwork abilities, communication skills and professional identity. Notably, a substantial proportion expressed disagreement or uncertainty regarding the necessity and efficacy of interprofessional education, suggesting a need for further exploration and awareness-building regarding the benefits of collaborative learning among healthcare professionals. These findings are consistent with previous reports, which underscore the enthusiasm and reservations that students from different universities in Saudi Arabia hold towards collaborative learning experiences with peers from different health professions. Also, they feel that collaborating with other students would enhance their effectiveness as healthcare team members [32-34].

Interestingly, our findings also highlighted the influence of previous exposure to IPE on students' attitudes. Those with prior experience exhibited significantly higher mean attitude scores, indicating that familiarity with IPE protocols can substantially enhance positive perceptions. This is consistent with others [35-37] and suggests that integrating IPE elements early in healthcare education can foster more favorable attitudes among students, potentially paving the way for better collaborative practices in their professional lives.

Demographic and academic characteristics appeared to have varied impacts on attitudes towards IPE. The discipline-specific differences were notable, with "Pharmacy" students showing the highest mean attitude scores, followed by those from "Medical Applied Sciences." This disciplinary variation implies that specific fields might be more inherently supportive or benefit from IPE initiatives, which could inform targeted strategies for promoting IPE within specific disciplines [38].

Another critical aspect explored in this study was the perceived challenges of IPE. Participants recognized multiple obstacles, including logistical issues, limited resources and variability in faculty support and attitudes. Despite these identified challenges, there remained a moderate consensus on the potential benefits of IPE, suggesting that while practical barriers exist, the theoretical value of IPE is well-appreciated among students [39-41].

In summary, this study illustrates a predominantly positive attitude among healthcare students towards IPE, tempered by some reservations and perceived challenges that must be addressed. These findings emphasize the importance of addressing logistical and resource-related challenges to realize IPE's benefits fully. Educational institutions should consider these insights when designing IPE curricula,

ensuring that they provide adequate support and resources to facilitate successful implementation. More specifically, there is a need for phased integration of interprofessional modules throughout the educational timeline to acculturate students to collaborative practices gradually. Furthermore, there is a need for tailored IPE strategies that recognize and leverage the unique strengths and challenges within each healthcare discipline. Pharmacy students' particularly positive attitude towards IPE, for example, could provide a model for other disciplines to simulate.

Future research should delve deeper into the factors driving negative perceptions of IPE to develop interventions that can effectively address these issues [42]. Longitudinal studies could also help ascertain the long-term impact of IPE on professional practice and patient care outcomes post-graduation [43,44]. Meanwhile, incorporating student feedback regarding the logistical and structural barriers to IPE can inform more practical and effective approaches [45]. By fostering a supportive and resource-rich environment, educational institutions can enhance the interprofessional learning experience, leading to better collaborative practices and improved healthcare delivery [46].

CONCLUSIONS

In conclusion, while the participants in this study generally recognized the benefits of IPE, the identified challenges underscore the need for concerted efforts to optimize the structure, support and implementation of IPE programs. By addressing these challenges, healthcare education can better prepare students to work effectively in interprofessional teams, thereby improving patient care outcomes and fostering a more collaborative healthcare system.

Study Limitations

While this study provides valuable insights into the attitudes/perceptions of undergraduate healthcare students towards IPE, several limitations should be acknowledged. First, the cross-sectional design and convenient sampling approach capture data at a single point, limiting the ability to draw causal inferences or observe attitude changes over time. The reliance on self-reported data introduces the possibility of response bias, where participants may overestimate positive attitudes or underreport negative ones due to social desirability. Additionally, the sample may not fully represent the broader population of healthcare students, which could affect the generalizability of the findings to other contexts or regions. The observed discipline-specific variations suggest that unique cultural and educational factors might influence attitudes, warranting further exploration.

Moreover, negative attitudes toward IPE were not explored in depth, which could provide critical insights into barriers to its implementation. Future studies should investigate factors contributing to resistance or skepticism among students, as these may delay the successful adoption of IPE programs.

Differences in prior exposure to IPE among participants could also skew the results, as those with previous experience might have more informed opinions. Also, potential confounding factors, such as individual personality traits or previous collaborative experiences, were not controlled for in the study.

Additionally, this study does not assess how attitudes toward IPE translate into long-term professional behaviors or patient outcomes. Longitudinal research is needed to evaluate whether positive attitudes foster sustained inter-professional collaboration and improved healthcare delivery after graduation. Such studies could also examine whether negative attitudes persist over time and their impact on team dynamics in clinical practice. Despite these limitations, the study offers a foundational understanding that can inform future research and improvements in IPE programs.

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