
ORIGINAL ARTICLE

Perceptions of chiropractic students regarding interprofessional health care teams

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Objective: To describe perceptions of knowledge of interprofessional teams and value of interprofessional education (IPE) among 3 distinct years of chiropractic students at 1 chiropractic college.

Methods: A 24-item cross-sectional survey was administered to 247 chiropractic students in years 1–3 within a single institution. Surveys included 5 demographic questions and the 19-item Readiness for Interprofessional Learning Scale (RIPLS). The RIPLS collected information on perceptions and value of interprofessional health care in a health care training program. Each question is scored on a 1–5 scale, with 5 indicating a stronger agreement. Multivariable analysis was used for comparison.

Results: Out of a total 321 eligible students, 247 (148 male) students completed the survey from year 1 ($n = 66$), year 2 ($n = 102$), and year 3 ($n = 79$), respectively. Most students (68%) were 18–25 years old. The mean compiled score of all 3 years ($n = 231$) was 77.2 ($SD = 9.1$). Each individual's year scores were as follows: year 1 ($n = 60$, mean = 79.7, $SD = 7.4$), year 2 ($n = 95$, mean = 76.9, $SD = 9.1$), and year 3 ($n = 76$, mean = 75.4, $SD = 9.9$). Of the 247 students who responded, 87% of participants agreed with “shared learning with other health care students will increase my ability to understand clinical problems.”

Conclusion: Most participants demonstrated a positive response to IPE and collaborating with health care teams. Participants in earlier years demonstrated a more positive response compared to later years. While positive perceptions to IPE were demonstrated, chiropractic students lacked knowledge and understanding of their role within an interprofessional health care team.

Key Indexing Terms: Interprofessional Education; Chiropractic; Students

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INTRODUCTION

The World Health Organization (WHO) recognizes the importance of interprofessional education (IPE) in health care education and clinical practice as an approach to ease the global health care worker crisis.¹ Collaborative practice supports and improves health outcomes for patients, families, and communities. The WHO reports that “there is sufficient evidence to indicate that effective interprofessional education enables effective collaborative practice.”¹

The use of collaboration has been shown to improve not only objective health care data but also overall satisfaction of providers. A recent study completed in 2017 looked at levels of satisfaction of patients being managed by an interprofessional health care team, resulting in overall improvement in satisfaction of patients managed by interprofessional health care teams compared to the control group. Specific areas of significant improve-

ment included (1) how well the clinic communicated with the patient, (2) friendliness and helpfulness of the clinic staff, (3) how easy it was to get care from the clinic, and (4) the quality of health care received from the clinic.²

Satisfaction levels are important when working with patients suffering from chronic pain. Patients with higher provider satisfaction are more likely to have better outcomes than those with lower satisfaction of their care.³ In addition to provider satisfaction, collaboration can positively influence biochemistry. Chisholm-Burns et al⁴ reported that collaboration with pharmacists impacts patient lab values. Patients whose pharmacists collaborated with interprofessional health care teams showed improvements in blood pressure, hemoglobin A1C, and low-density-lipoprotein regulation compared to those whose providers did not collaborate. Participation of various health care professions can provide patient-centered health goals and increase communication between professions. As with other health care professions, many

chiropractors working within an interprofessional integrative health care setting manage patients with chronic pain. This is especially true within the Veterans Affairs (VA) health care system, which is one of the largest health care systems in the United States. Chiropractors' working within an integrative medical facility is new in comparison to other medical professions. Since the recent inception of on-station chiropractic care within the VA health care system in October 2004–September 2015, the growth has been significant. The utilization of chiropractic resources in the VA has grown by 827%.⁵ One such study reported high satisfaction when chiropractic doctors implemented chiropractic care into the private sector medical facilities.⁶

West et al⁷ researched IPE integration at various educational institutions and determined gaps to assist with potential improvement. In many institutions, IPE is done internally, within the institution's own professional silo. The researchers noted that although health care professionals may share a fundamental education, there is a lack of the ability to work together and collaborate for patient care. IPE for health care graduate students is an important way to foster respect for collaborative patient-centered practice. O'Carroll et al⁸ found that students with interprofessional training placed a significant value on interprofessional health care for patients.

Makino et al⁹ compared attitudes of health science students from 2 universities: 1 university implemented a comprehensive IPE program, and the other did not have an IPE program. A significantly higher mean difference score for "patient-centered care" from the group of IPE students regarding the value of collaborative practice was noted when compared to the non-IPE group. The incorporation of IPE prior to credentialing may facilitate interactions among disciplines after credentialing. Reising et al¹⁰ found that simulations can help improve interprofessional communication and teamwork skills. Using simulated cases allows for students to engage in active learning and application of prior knowledge.^{11–13} The Reising et al¹⁰ study was set up to allow for multiple interactions between the disciplines, indicating with each interaction that participants' communication and teamwork skills improved. Recognizing perceptions held by students can influence the value placed on working with other health care professions and is beneficial to their educational experience.^{11–13}

Kadar et al¹⁴ studied the perception of IPE and practice among CAM institutions. The researchers found that students in these institutions lacked a familiarity with many health care fields. There is evidence supporting the use of interprofessional education among health care students and improvement in communication and collaborative skills.¹⁰ Graduate chiropractic students may benefit from increased exposure of IPE opportunities and working with graduate students in other health care professions to better identify how chiropractic physicians can work together in the management and coordination of patient care. There is limited research investigating chiropractic students' perceptions toward interprofessional teams and the value of IPE for chiropractic education to work in an integrative health care setting. This is important to identify

gaps in chiropractic education to model best practices in integrative health care training.¹⁵ This study seeks to describe differences in perceptions of knowledge of interprofessional teams and value of IPE among 3 distinct years of chiropractic students at 1 chiropractic college.

METHODS

Data Collection

This cross-sectional study was conducted within a private Midwest college focused primarily on a doctor of chiropractic (DC) program. The curriculum is designed to be completed within 3½ years, or 10 trimesters. Students were surveyed at 3 distinct points within the curriculum (years 1–3). Year 1 students were surveyed in the 1st trimester, year 2 students in the 5th trimester, and year 3 students in the 9th trimester. Anonymous paper surveys were administered during the class period along with a study information sheet. Along with the information sheets, students were provided with verbal survey instructions and elements of consent, including the voluntary nature of the survey. The trimesters were selected based on recent introduction to the chiropractic curriculum, basic sciences, and preclinical courses and finally students with clinical experience who were preparing for graduation.

Instrument

The survey included 5 demographic items gathering information on age, gender, class level of the chiropractic program, and previous education and degrees. Additionally, the 19-question "Readiness for Interprofessional Learning Scale (RIPLS) Questionnaire"¹⁶ was administered to measure and describe perceptions of IPE. The survey was a 1-time voluntary anonymous survey with no identifiers collected.

The RIPLS survey instrument uses a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5). Negative scored items are reverse scored for analysis. Each question was scored from 1 to 5, with a higher score indicating more readiness for learning IPE and the value of interprofessional collaboration. All 19 questions can be summed, giving a participant an overall RIPLS score from 19 (low readiness for interprofessional learning) to 95 (high readiness for interprofessional learning). Within the RIPLS, it can be further broken into subdomains such as teamwork and collaboration, negative professional identity, positive professional identity, and roles and responsibilities,¹⁷ which were also examined as part of this study. The National Center for Interprofessional Practice and Education¹⁸ has provided this instrument for public domain use.

The subdomain of teamwork and collaboration measures the belief that teamwork is beneficial in many ways. This subdomain concentrates on the measurement of students' belief that they and patients will benefit from learning with other health care providers. The scale concentrates on perceptions of effective teamwork and the benefits of positive relationships among health care providers. Negative and positive professional identity subdomains measure the importance that students place

Table 1 - Demographics (n = 247)

Variable	Category	n	%
Age	18–25 years	160	67.2
	26–35 years	65	26.3
	36–45 years	9	3.6
	46–55 years	3	1.3
	55+ years	1	0.4
Gender	Male	148	59.9
	Female	90	36.4
Class level	Year 1	66	26.7
	Year 2	102	41.3
	Year 3	79	32.0
Education/degree	Some college, no degree	17	6.9
	Associate degree	15	6.1
	Bachelor's degree	203	82.2
	Master's degree	4	1.6
	Professional /doctorate	3	1.2
	Not identified	5	2.0

on their professional identity and their readiness to share skills and knowledge with other providers. The roles and responsibilities domain seeks to examine the understanding of students about their perceived roles in the health care team and the academic training they have in these distinct roles.¹⁹

Ethical Considerations

Exemption was granted by the Palmer College of Chiropractic institutional review board (no. X2018-2-13-B).

Security

Paper surveys were collected and stored in a locked filing cabinet in the primary investigator's office. This investigator was the only individual to possess the key. Surveys were entered by the investigative team into Microsoft Excel (Microsoft Corp, Redmond, WA) and saved on a password-protected computer.

Data Analysis

Once data entry was complete, files were exported into SPSS Statistics for Macintosh, version 25 (IBM Corp, Armonk, NY), for statistical analysis. Characteristics of the sample were assessed using cross-tabulation analysis of education level and individuals' responses to the questionnaire. Frequencies of answers were described for RIPLS questions.

Continuous data were assessed by means and standard deviation. Categorical data were presented as sum and percentage. Internal consistency and reliability of the overall RIPLS questionnaire and 4 distinct subdomains were measured using Cronbach's alpha. Cronbach's alpha is typically presented between 1 and 0; however, it may also be negative. Scores that are closer to 1 represent a higher internal consistency, a score of 0.7 indicates acceptable reliability, and a score of 0.95 indicates very high reliability. We modeled an analysis of variance (ANOVA) on overall and all subdomain scores of RIPLS to assess for statistical differences in mean scores of RIPLS

between the 3 class levels of DC students. Post hoc testing was completed on any significant ANOVA scores. Outliers were present in the sample population that were kept for analysis. The homogeneity of variances assumption was violated, and the more robust equality of means test (Welch) was run with post hoc Games-Howell to describe significant differences between class level and RIPLS scores. Statistical significance was set at .05.

RESULTS

A total of 321 students were enrolled in trimesters 1, 5, and 9 of the DC program. Out of these, 247 (77%) completed the survey. Of 89 students enrolled in year 1, 66 (74%) completed the survey. Of 118 students enrolled in year 2, 102 (86%) completed the survey. Of 114 students enrolled in year 3, 79 (69%) completed the survey. Most respondents were male (60%) and in the age range of 18–25 years (64%) with a majority holding a bachelor's degree (82%) (Table 1).

Table 2 demonstrates the mean and standard deviation with an overall score for each domain and for each question of the RIPLS survey. The questions that were the highest rated were Q7, "For small group learning to work, students need to respect and trust each other" (mean = 4.5, SD = 0.61); Q2, "Patients would ultimately benefit if health care students worked together to solve patient problems" (mean = 4.4, SD = 0.76); and Q5, "Communication skills should be learned with other health care students" (mean = 4.4, SD = 0.68), all being in the teamwork and collaboration domain. The lowest-rated questions were Q19, "I have to acquire much more knowledge and skills than other health care students" (mean = 2.7, SD = 0.97), and Q17, "The function of nurses and therapists is mainly to provide support for doctors" (mean = 3.6, SD = 1.10), these being in the roles and responsibilities domain. The other lowest-rating question Q12, "Clinical problem-solving skills can only be learned with students from my own school/department" (mean = 3.6, SD = 1.1), is found in negative professional identification domain. The result suggested that students' perceptions are positive toward learning with other health care students and professionals, as shown with Q3, "Shared learning with other health care students increases my ability to understand clinical problems" (mean = 4.3, SD = 0.83), and Q13, "Shared learning with other health care students will help me to communicate better with patients and other professionals" (mean = 4.3, SD = 0.74).

For those who completed all RIPLS items, Table 3 reflects the overall RIPLS scores and subdomain scores for years 1–3 as a whole and for each year separately. For the 19-question overall RIPLS, Cronbach's alpha was $\alpha = 0.869$. For the subdomains, the α values were as follows: teamwork and collaboration ($\alpha = 0.853$), negative professional identity ($\alpha = 0.663$), 4-item positive professional identity scale ($\alpha = 0.822$), and roles and responsibilities ($\alpha = 0.273$).

The overall readiness for interprofessional learning among students in years 1–3 demonstrated a statistically significant difference between the students (Table 3).

Table 2 - Readiness for Interprofessional Learning Scale (RIPLS) Item and Domain-Level Analysis

RIPLS subdomain	Question (all RIPLS questions based on a 1–5 Likert scale)	Mean (SD)
Teamwork and collaboration (9 questions × 5 points = 45 max subdomain score, 47% of total score)		
Overall score		38.6 (4.87)
Q1	Learning with health care students before qualifications will help me to become a better team worker (<i>n</i> = 246)	4.3 (0.78)
Q2	Patients would ultimately benefit if health care students worked together to solve patient problems (<i>n</i> = 247)	4.4 (0.76)
Q3	Shared learning with other health care students increases my ability to understand clinical problems (<i>n</i> = 247)	4.3 (0.85)
Q4	Learning with health care students before qualifications would improve relationships after qualifications (<i>n</i> = 247).	4.1 (0.83)
Q5	Communication skills should be learned with other health care students (<i>n</i> = 245)	4.4 (0.68)
Q6	Shared learning will help me think positively about other professionals (<i>n</i> = 246)	4.1 (0.9)
Q7	For small group learning to work, students need to respect and trust each other (<i>n</i> = 244)	4.5 (0.61)
Q8	Team-working skills are essential for all health care students to learn (<i>n</i> = 247)	4.3 (0.8)
Q9	Share learning will help me understand my own limitations (<i>n</i> = 247)	4.0 (0.97)
Negative professional identification (reverse scored) (3 questions × 5 points = 15 max subdomain score, 16 % of total score)		
Overall score		11.5 (2.30)
Q10	I don't want to waste my time learning with other health care students (<i>n</i> = 247)	3.9 (0.955)
Q11	It is not necessary for undergraduate health care students to learn together (<i>n</i> = 246)	3.7 (1.02)
Q12	Clinical problem-solving skills can only be learned with students from my own school/department (<i>n</i> = 247)	3.6 (1.1)
Positive professional identification (4 questions × 5 points = 20 max subdomain score, 21% of total score)		
Overall score		16.3 (4.87)
Q13	Shared learning with other health care students will help me to communicate better with patients and other professionals (<i>n</i> = 247)	4.3 (0.74)
Q14	I would welcome the opportunity to work on small group projects with other health care students (<i>n</i> = 247)	3.9 (0.93)
Q15	Shared learning will help me to clarify the nature of patient problems (<i>n</i> = 247)	4.1 (0.78)
Q16	Share learning before qualification will help me to become a better team worker (<i>n</i> = 247)	4.0 (0.88)
Roles and responsibilities (reverse scored; 3 questions × 5 points = 15 max subdomain score, 16% of total score)		
Overall score		10.3 (1.96)
Q17	The function of nurses and therapists is mainly to provide support for doctors (<i>n</i> = 247)	3.6 (1.10)
Q18	I'm not sure what my professional role will be (<i>n</i> = 245)	4.0 (0.98)
Q19	I have to acquire much more knowledge and skills than other health care students (<i>n</i> = 245)	2.7 (0.97)

Teamwork and collaboration and positive professional identity demonstrated a statistically significant difference between the years. Negative professional identity and roles and responsibility subdomains were not statistically significant between the years.

Post hoc tests showed a higher mean score for year 1 (40.3) over year 2 (38.4) and year 3 (37.5) in teamwork and collaboration. Positive professional identity indicated a higher mean score for year 1 (17.4) than year 2 (16.3) and year 3 (15.5).

Table 3 - Analysis of Variance (ANOVA) Comparison of Overall Readiness for Interprofessional Learning Scale (RIPLS) Score and Subdomain Scores with Doctor of Chiropractic Student Class Level

Variable	Year 1 Mean (SD)	Year 2 Mean (SD)	Year 3 Mean (SD)	All Mean (SD)	ANOVA	
					<i>F(df1,df2)</i>	<i>p</i>
<i>n</i>	60	95	76	231		
Overall RIPLS	79.1 (7.49)	76.3 (9.04)	75.0 (9.16)	76.6 (8.81)	<i>F</i> (2, 146) = 4.3	.016
Teamwork and collaboration	40.3 (3.88)	38.4 (4.81)	37.5 (5.34)	38.6 (4.87)	<i>F</i> (2, 152) = 7.5	.001
Negative professional ID	—	—	—	11.5 (2.30)	<i>F</i> (2, 149) = 0.1	.867
Positive professional ID	17.4 (2.22)	16.3 (2.69)	15.5 (2.91)	11.5 (2.30)	<i>F</i> (2, 154) = 10.1	.001
Roles and responsibilities	—	—	—	10.3 (1.96)	<i>F</i> (2, 150) = 2.1	.132

DISCUSSION

Overall, we found the internal consistency of the survey to be high. Subdomain analysis in our population appeared consistent with other previous studies reporting poor internal consistency in the roles and responsibilities^{20–25} and in the negative professional identity subdomains.¹⁹

Research has shown that students' positive perceptions toward IPE placed value on learning with other health care students and fostered knowledge for patient-centered care with interprofessional teams.^{1,9,14,20} This study evaluated students' perceptions of knowledge and learning with other health care teams and assessed the differences in perceptions among 3 distinct years of DC students at 1 chiropractic educational institution. Results showed that students in the 3 distinct years were positive toward teamwork and collaboration as demonstrated by a mean score of 76.6 (SD = 8.81). The results were consistent with other studies showing that most health care students have positive perceptions toward shared learning and collaborations with other health care teams.^{20,26} These studies looked at students enrolled in undergraduate curricula pursuing respiratory care, physical therapy, cardiac technology, clinical nutrition, and clinical science programs,²⁶ while another study was composed of 594 students from dietetics, nursing occupational therapy, physical therapy, and speech-language pathology.²⁰ These previous studies have a positive response to IPE similar to the chiropractic students surveyed.

Year 3 participants had an overall lower mean score on the RIPLS survey than year 1 participants. This indicates that year 3 students had less readiness for IPE learning and felt that there was less value for interprofessional collaboration. A comparison of the mean scores of the 4 subdomains suggested that year 3 scores were lower for the 4 subdomains than were year 1 mean scores. The design of this study did not identify any contributing factors that may explain a lower readiness for IPE. Similar results were demonstrated by Kempner et al²⁷ and Visser et al²⁸ when evaluating perceptions toward collaboration between physicians and nurses of those currently enrolled in medical school and those in postgraduate residency. According to Visser et al,²⁸ medical students had a high readiness for IPE in the beginning year of schooling, but there was a significant decrease by the end of their schooling. Some of the barriers to readiness to IPE were miscommunication between professions, having stereotypical views of other professions without interactions within the groups, and social perceptions of status in society.²⁸ Overall, the scores were positive in collaboration between nurses and physicians; however, individuals further along in their programs were significantly less favorable. Although there is a difference in readiness for interprofessional learning, it is of note that in our study, the overall scores for interprofessional education remain relatively high among all trimesters. This domain was the lowest reliable, as it scored low for internal consistency, consistent with the findings of McFadyen et al.¹⁷ The decline of IPE within health care training may be associated with the current curriculum structure. Most of the education of health care students occurs within one's own institutional

silos, limiting the communication and collaboration with other health care professional students.²⁹

Lairamore et al.²⁶ reported on IPE collaboration within the various disciplines of dietetics, nursing, physical therapy, and speech-language pathology students. With the collaboration of these disciplines, students' values in the domains of teamwork, professional identity, and competency were positively impacted. Yet with numerous studies in other disciplines, there is limited evidence on how chiropractic students may benefit from these collaborative efforts. Chiropractic students are provided limited opportunities to participate in integrative and collaborative opportunities. Chiropractic colleges are creating academic affiliations with some large integrative health care institutions, but research on these IPE collaborations is sparse.

A majority of chiropractic students surveyed in this study indicated that they would welcome the opportunity to work with other disciplines of health care. This may demonstrate that participants note the value in collaborative opportunities with other health care professionals and the impact it may have on clinical practice and communication skills.

It is imperative that DCs have the skills to effectively communicate and collaborate on evidence-informed care with physicians of various disciplines for the benefit of shared patients.³ Although opportunities for chiropractic students to train within integrative health care settings are limited, interprofessional education opportunities for chiropractic students are an important part of their academic and clinical experience.³⁰ Understanding the overall perceptions of chiropractic students' interests and perceptions toward IPE may provide for an increased demand for collaborative educational opportunities with students from other health care disciplines. This poses another question: how can chiropractic institutions create more opportunities for IPE within their current curricula?

Limitations

This is a cross-sectional study, which limits the ability to determine if the students' perceptions of readiness for interprofessional learning change across the years in chiropractic college. Another limitation to this study is limited generalizability, as all participants surveyed were students within 1 chiropractic college. Collaboration with additional chiropractic colleges may improve the generalizability of IPE among chiropractic students. Additionally, a limitation to this study is that the investigators did not identify or investigate curriculum design within the institution's efforts to meet the Council of Chiropractic Education's Metacompetency 8, which is focused on collaboration.³¹ The RIPLS instrument to measure student readiness for IPE is validated,³² and Cronbach's alpha scores for 3 of the 4 domains confirmed reliability. A concern with the validity of the items of roles and responsibilities with low Cronbach alpha scores is a limitation to the use of the survey. A future longitudinal study may be beneficial to assess if IPE of chiropractic students changes through the years. Future research may warrant modification of the RIPLS to reflect the chiropractic student population more appropriately. This also

poses the question of what benefit, if any, interprofessional education experiences have on chiropractic students and if they help to provide a distinction of the chiropractor's role within a health care team.

CONCLUSION

Study participants had an overall positive readiness for IPE. Participants in earlier years of training demonstrated a more positive response compared to later years. While positive perceptions to IPE were demonstrated, chiropractic students lacked knowledge and understanding of their role within an interprofessional health care team. These findings are similar to those reported in other studies among health discipline learners.

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The authors have no conflicts to disclose.

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