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Healthcare Students' Abilities To Translate Interprofessional Education To Collaborative Practice

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By

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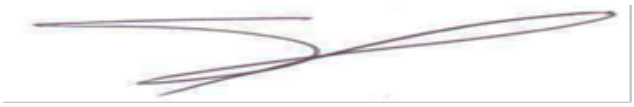

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Abstract

Interprofessional education is considered the first step to providing students with the knowledge and skill required to participate in interprofessional collaboration. The lingering question in research is if students can take these skills from the classroom to clinical practice. The answer to this question will help guide educators when developing effective IPE training. This quantitative, correlational study aimed to explore if healthcare students that participated in a two-part, case-based interprofessional educational session were able to transfer that skill to their clinical experience. Data was collected from healthcare students in the professions of physical therapy, occupational therapy, and nursing. The participants completed an electronic survey that consisted of the validated Interprofessional Collaborative Competency Attainment Survey (ICCAS) and basic demographic questions. The electronic survey assessed the participants' behaviors associated with the six interprofessional collaboration core competencies developed by the Canadian Interprofessional Health Collaborative. Participants completed it after their clinical experience coursework. The data from this survey were compared to the results of data collected with the ICCAS during a previous research study the same cohort of students had participated in. The data were analyzed using the repeated measures ANOVA testing. There were statistical significances found between the ex post facto and pre-clinical experience as well as the pre-clinical and post-clinical experience. However, the mean scores were higher with the ex post facto data than the other two points in time. This outcome suggests the participants felt more confident with their interprofessional collaborative skills after their classroom training than they did prior to and after their clinical experience.

Keywords: Interprofessional education, interprofessional collaborative practice, theory-practice gap, transfer of learning

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Chapter 1: Introduction

Background of the Study

One of the objectives of the Affordable Care Act (ACA) is to improve the quality of medical care a patient receives (Centers for Medicare & Medicaid Services [CMMS], n.d.). At the same time, the ACA strives to reduce the cost of healthcare (CMMS, n.d.). The Centers for Disease Control and Prevention ranked medical errors as the second leading cause of death in 2014 (Perez, 2016). Medical errors cost the United States (U.S.) over $19 billion dollars in 2008 (Andel, Davidow, Hollander, & Moreno, 2012). Ineffective interprofessional communication and collaboration contribute to medical errors and poor patient-centered care (Green and Johnson, 2015; Interprofessional Education Collaborative Expert Panel [IECEP], 2016; Titzer, Swenty, & Mustata Wilson, 2015). Educating future and current health care providers in effective cross-professional communication and teamwork could reduce the likelihood of medical errors when evaluating and treating patients.

The World Health Organization ([WHO], 2010) defined interprofessional education (IPE) as when students from two or more healthcare programs come together and learn about, from and with each other with the goal of working as a team to improve patient care and outcomes. Interprofessional education (IPE) is not a new concept; having been around for more than fifty years (Thistlethwaite, 2016). There has been strong support for educating healthcare students on how to work with their colleagues from other healthcare professions to facilitate a team approach to evaluate and treat patients (Canadian Interprofessional Health Collaborative [CIHC], 2007; IECEP, 2016; WHO, 2010). Team approaches have been found to improve patient outcomes (Green & Johnson, 2015; IECEP, 2016). When exposed to collaborative teamwork skills in the

classroom and pre-clinical situations, students are better able to translate and apply these skills in interprofessional and integrated clinical practice settings.

In 2011, an expert panel from six healthcare organizations identified the four interprofessional core competencies that students should demonstrate in collaborative practice (IECEP, 2016). These core competencies are understanding the roles and responsibilities of various healthcare professions, have a shared value for interprofessional practice, being able to engage in interprofessional communication, and being competent in effective interprofessional teamwork (IECEP, 2016). These competencies have been the basis for learning objectives in IPE activities and were used to develop assessment tools that determined if students truly gained knowledge in the classroom about how to practice interprofessionally and collaboratively in the clinical setting (Oates & Davidson, 2015). Researchers used these assessment tools to determine that students perceived that their knowledge of IPE improved as a result of various activities that were embedded in their curriculum. (Thistlethwaite, 2016; Illingworth & Chelvanayagam, 2017).

The goal of interprofessional education is for students to be able to transfer collaborative competencies and skills to the clinical setting where they then can practice collaboratively on interprofessional teams that provide optimal patient care (IECEP, 2016; WHO, 2010). Accreditation bodies of many healthcare professions have recognized the importance of IPE and added standards related to students being provided with IPE in their curriculum (Zorek & Raehl, 2013). Despite this rising trend of IPE in health professions education, there is inconclusive research to show that students take that knowledge from the classroom and apply it in the clinical setting.

Interprofessional collaborative practice (IPCP) occurs when healthcare providers from two or more professions work as a team to provide patient care (WHO, 2010). IPCP has been

shown to improve patient outcomes, reduce medical errors, and support teamwork that promotes holistic, patient-centered care (Green & Johnson, 2015; IECEP, 2016; WHO, 2010). In recent years, there has been an increase in the complexity of medical care needs for patients, a shortage of healthcare workers across the nation, and cutbacks on healthcare insurance reimbursement for care (Illingworth & Chelvanayagam, 2017; Thistlethwaite, 2016). Therefore, interprofessional collaborative practice is vital to combat these challenges through interprofessional teamwork and communication, understanding and valuing the roles and responsibilities of each member of the team, and developing conflict resolution skills (Canadian Interprofessional Health Collaborative [CIHC], 2010; IECEP, 2016; Illingworth & Chelvanayagam, 2017; Thistlethwaite, 2016). IPCP strengthens healthcare systems through teamwork and provides unique ways to offset staffing shortages (Thistlethwaite, 2016; WHO, 2010).

Statement of the Problem

When different healthcare professionals collaborate to provide high-quality care to patients, they can achieve more than they could as individual providers (Green & Johnson, 2015). Interprofessional collaborative practice (IPCP) can result in improved patient care and outcomes through increased efficiency of treatment services, the versatility of skill sets on the team, creativity in treatment planning and intervention, reduction in medical errors and more patient-centered approaches to care (Green & Johnson, 2015; IECEP, 2016). To foster interprofessional collaborative practice in healthcare students, they must be trained in how to work with colleagues from different healthcare professions (WHO, 2010). There is strong research to support embedding interprofessional education into curricula of health professional programs with the goals of improving students' knowledge of how to work collaboratively and

value interprofessional practice (Illingworth & Chelvanayagam, 2017; IECEP, 2016; WHO, 2010).

The problem is that there is little research to show the direct relationship between students learning about case-based, interprofessional education in their didactic coursework and then being able to demonstrate a change in behavior that allows them to engage in interprofessional collaborative practice in the clinical setting. Past researchers have indicated that there is not research to show the clear, direct link to students learning about the IPE core competencies in the classroom and then being able to demonstrate these skills in the clinical setting when providing patient care (Guraya & Barr, 2018; Illingworth & Chelvanayagam, 2017; Lapkin, Levett-Jones, & Gilligan, 2013; Ravet, 2012; Reeves, Perrier, Goldman, Freeth, & Zwarenstein, 2013). Botma, Van Rensburg, Heyens, and Coetzee's (2013) work is one of a handful of studies analyzing the transfer of learning in health science education programs. They found that the transfer of knowledge, skill, attitudes, and behavior from the classroom to practice could occur with the correct teaching and learning format.

Students were able to bridge the theory-practice gap of learning when there was support for the learning at the student (i.e., teaching design matched the student learning style, active learning opportunities, and clear demonstrations), professor (i.e. role models and mentoring), and system levels (i.e., learning environment conducive for teaching format) (Botma et al., 2013). This support consisted of teaching designs that matched student learning and provided active learning opportunities. However, this type of research has not been completed to determine conclusively that students can overcome the theory-practice gap related to interprofessional education (IPE) and interprofessional collaborative practice. It is vital to provide research to support the concept that there is a transfer of learning from interprofessional education (theory)

to interprofessional collaboration (practice) for healthcare students. Without this research, there is no evidence that the current teaching model is achieving the desired outcome of interprofessional collaborative practice.

Purpose of the Study

The purpose of this quantitative correlational study was to examine the direct relationship between students learning about case-based, interprofessional education in their didactic coursework and then demonstrating a change in behavior that allows them to engage in interprofessional collaborative practice in the clinical setting. Specifically, the study determined if healthcare students from physical therapy, occupational therapy, and nursing programs demonstrated the behaviors learned during case-based, IPE training to engage in interprofessional collaborative practice in the clinical setting. Interprofessional education has been utilized as the precursor to healthcare professionals being able to practice collaboratively (IECEP, 2016; Thistlethwaite, 2016; WHO, 2010). Interprofessional collaborative practice (IPCP) has resulted in improved patient-centered care, better patient outcomes, decreased medical errors and decreased stress on the health system related to workforce shortages (Green & Johnson, 2015; WHO, 2010).

During this study, one-hundred and forty-one healthcare students from a private college in the northeastern part of the U.S. that completed a case-based, IPE training in the summer semester and go on to participate in a clinical experience the next semester were asked to complete the Interprofessional Collaborative Competency Attainment Scale [ICCAS] (Archibald, Trumpower, & MacDonald, 2014; Schmitz et al., 2017). The ICCAS is a validated tool that requires an individual to assess their skills related to their participation in IPCP retrospective pre-activity and post-activity (Archibald et al., 2014; Schmitz et al., 2017). The

study compared the results of this assessment to ex post facto data collected during a previous study these same students participated in during the summer of 2018. This research study assessed the difference between the mean scores of the ex post facto (retrospective post-activity) and current data (retrospective pre-activity and post-activity) for participants. The study had two independent variables of interprofessional education and interprofessional collaboration from the same population. The dependent variable was a change in interprofessional collaborative practice behavior of the student as measured by the ICCAS. A repeated measures ANOVA was used to analyze the data to answer the research questions.

Research Questions

The following research questions, null hypotheses, and alternative hypotheses were used to guide this quantitative, correlational study.

RQ1. To what extent do healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester, demonstrate a behavioral change related to interprofessional communication while on their clinical experience (CIHC, 2010)?

H_{01}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester do not demonstrate a behavioral change related to interprofessional communication while on their clinical experience (CIHC, 2010).

H_1. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester will demonstrate a behavioral change related to interprofessional communication while on their clinical experience (CIHC, 2010).

RQ2. To what extent do healthcare students that have completed case-based, IPE coursework in the prior semester, demonstrate a behavioral change related to interprofessional collaboration while on their clinical experience (CIHC, 2010)?

H_{02}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester do not demonstrate a behavioral change related to interprofessional collaboration while on their clinical experience (CIHC, 2010).

H_{2}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester will demonstrate a behavioral change related to interprofessional collaboration while on their clinical experience (CIHC, 2010).

RQ3. To what extent do healthcare students that have completed case-based, IPE coursework in the prior semester, demonstrate a behavioral change related to understanding roles and responsibilities of the interprofessional team while on their clinical experience (CIHC, 2010)?

H_{03}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester do not demonstrate a behavioral change related to understanding roles and responsibilities of the interprofessional team while on their clinical experience (CIHC, 2010).

H_{3}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester will demonstrate a behavioral change related to understanding roles and responsibilities of the interprofessional team while on their clinical experience (CIHC, 2010).

RQ4. To what extent do healthcare students that have completed case-based, IPE coursework in the prior semester, demonstrate a behavioral change related to interprofessional collaborative patient and family-centered approach to care while on their clinical experience (CIHC, 2010)?

H_{04}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester do not demonstrate a behavioral change related to interprofessional collaborative patient and family-centered approach to care while on their clinical experience (CIHC, 2010).

H_{4}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester will demonstrate a behavioral change related to interprofessional collaborative patient and family-centered approach to care while on their clinical experience (CIHC, 2010).

RQ5. To what extent do healthcare students that have completed case-based, IPE coursework in the prior semester, demonstrate a behavioral change related to interprofessional conflict management/resolution while on their clinical experience (CIHC, 2010)?

H_{05}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester do not demonstrate a behavioral change related to interprofessional conflict management/resolution while on their clinical experience (CIHC, 2010).

H_{5}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester will demonstrate a behavioral change

related to interprofessional conflict management/resolution while on their clinical experience (CIHC, 2010).

RQ6. To what extent do healthcare students that have completed case-based, IPE coursework in the prior semester, demonstrate a behavioral change related to interprofessional teamwork while on their clinical experience (CIHC, 2010)?

H_{06}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester do not demonstrate a behavioral change related to interprofessional teamwork while on their clinical experience (CIHC, 2010).

H_{6}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester will demonstrate a behavioral change related to interprofessional teamwork while on their clinical experience (CIHC, 2010).

RQ7. To what extent do healthcare students that have completed case-based, IPE coursework in the prior semester, demonstrate a behavioral change related to all six IPCP core competencies while on their clinical experience (CIHC, 2010)?

H_{07}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester do not demonstrate a behavioral change related to the six IPCP core competencies while on their clinical experience (CIHC, 2010).

H_{7}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester will demonstrate a behavioral change

related to the six IPCP core competencies while on their clinical experience (CIHC, 2010).

Conceptual Framework

The competency framework for interprofessional education involves processing new information and being able to determine its relevance in a given situation (CIHC, 2010). During IPE, students develop skills identified by Bloom's taxonomy of remembering (process) and understanding (relevance) (Adams, 2015; Bloom, Engelhart, Furst, Hill, & Krathwohl, 1956; Dettmer, 2016). During an interprofessional activity, students are placed in a learning environment with their peers from their health profession and other health professions. With these new and old peers, they collaborate and learn from and with one another. This interprofessional environment fosters students to build from their prior knowledge and advance learning from these peer interactions, which follows along with the social constructivist theory of learning (Craddock, O'Halloran, McPherson, Hean, & Hammick, 2013; DeYoung, 2015; Powell & Kalina, 2009).

For a student to be able to demonstrate that they sufficiently learned new information to perform the skill associated with it, they must be given the opportunity to use the new information in a practical situation (Adams, 2015; CIHC, 2010). As students continue to strengthen their knowledge, they then can draw connections across different ideas and integrate the information into many different practical situations (Adams, 2015; CIHC, 2010). Interprofessional collaborative practice requires the student to understand concepts and benefits of working with other professions to provide the best outcomes in patient care and demonstrate these skills in a clinical setting (Anderson & Kinnair, 2016). To reach this benchmark, students first must gain cross-professional communication and teamwork knowledge and then

demonstrate their ability to be active and integral members of an interprofessional team during patient care (CIHC, 2010).

Assumptions

The assessment tool, the Interprofessional Collaborative Competency Attainment Scale (ICCAS), required participants to evaluate themselves (Archibald et al., 2014; Schmitz et al., 2017). It was assumed that the participant's self-assessment accurately reflects their ability to participate in interprofessional collaborative practice (IPCP). The results from the survey were collected anonymously. Therefore, it was assumed that they answered the survey for themselves and with an accurate and honest self-assessment. The survey used a 7-point Likert scale with no option to answer a question as not applicable (Archibald et al., 2014). This format assumed that each participant had an opinion on each question answered. Each question required an answer before moving onto the next question. A participant was not able to skip a question.

It was assumed that healthcare students in this study are a good representation of healthcare students from the same professions to have the results of this study transfer to other academic institutions. The participants of the study practiced clinical skills in different clinical settings. It was assumed that these different settings offer opportunities for students to engage in activities that would provide them with the opportunity to engage in IPCP. Also, it was assumed that a participant that demonstrated the knowledge and skill to be able to engage in IPCP were directly related to their prior interprofessional education (IPE), to include the IPE they participated in the previous summer semester, and not just something they could have engaged in without formal training.

Limitations and Delimitations

The sample population was limited to healthcare students that completed the case-based, IPE summer semester classes and have a clinical experience in the fall semester. The students that participated in the summer semester IPE classes that had a clinical experience in a future semester, other than the fall, could have been valid participants to demonstrate a transfer of learning from IPE to IPCP. However, the additional time between the summer IPE training and their clinical experience could have provided an opportunity for further IPE training, thus influencing the outcome of research. Therefore, these students were excluded from the study. The study participants were limited to healthcare students at only one academic institution. This academic institution was a private university in Maine, thus did not represent all academic institutions across the United States.

Definitions of Terms

The following definitions of terms were used to guide this quantitative, correlational study.

Interprofessional education (IPE): the andragogy when students from two or more professions or different backgrounds come together to learn about, from, and with each other in order to gain the knowledge and skills necessary to work with a team of professionals from two or more disciplines (CIHC, 2007; WHO, 2010).

Interprofessional collaborative practice (IPCP): the process when professionals from different backgrounds work together with all stakeholders involved (patient, family, community, etc.) to provide the highest quality, patient-centered care possible (CIHC, 2007; IECEP, 2016; WHO, 2010).

Competencies: the ability to integrate and apply knowledge, skill, attitude, and belief, related to a specific topic, in a given situation (CIHC, 2007; IECEP, 2016).

Interprofessional education competencies: the ability of the learner to understand the knowledge, skill, attitude, and belief associated with their profession's roles and responsibilities related to other professions within the team (IECEP, 2016).

Interprofessional collaborative practice competencies: the ability of the professional to understand and demonstrate one's roles and responsibilities related to other professions within the team and work with other professions within the team to facilitate patient-centered care in a clinical setting (Barr, 2013; CIHC, 2007).

Theory-practice gap: the space between what knowledge a learner gains in the classroom (theory) and what is demonstrated in the applied environment (practice) (Botma et al., 2013).

Transfer of learning: the learner's ability to take new knowledge and apply it to relevant a task or situation (Botma et al., 2013).

Organization of the Remainder of the Study

In Chapter 2 of this study, the researcher will outline the literature that demonstrates the value and benefits of IPE and IPCP. The literature will show the link between healthcare reform and how IPCP can address some of the concerns related to the cost of medical services and the quality of patient care. Chapter 3 will outline the methodology of the research. The methodology will clearly describe how the study was conducted, the validity of the assessment tool used, and the data analysis that was performed. In Chapter 4, the process and results of the data analysis will be described and explained. The findings will be discussed and shared. Finally, Chapter 5 will describe the findings of the entire study and relate it to the research questions and

hypotheses. The limitations, strengths, implications of the findings, and suggestions for future research will all be discussed.

Summary

When healthcare professionals work together as a team, communicate effectively within and across disciplines, and understand and value each profession's role in patient care, patients receive high-quality care that is cost effective (CIHC, 2007; IECEP, 2016; Institute of Medicine [IOM], 2010; WHO, 2010). To foster this interprofessional collaborative practice in students, interprofessional education is considered the key format to utilize (IECEP, 2016; WHO, 2010). As of yet, research has not sufficiently demonstrated the direct connection between students that have engaged in IPE and are then successful in practicing collaboratively with healthcare members from other professions (Guraya & Barr, 2018; Illingworth & Chelvanayagam, 2017; Lapkin et al., 2013; Ravet, 2012; Reeves et al., 2013). This study aimed to determine if healthcare students from physical therapy, occupational therapy, and nursing programs transferred knowledge, skills, and behaviors learned during case-based IPE training to interprofessional collaborative practice in the clinical setting.

Chapter 2: Literature Review

Introduction

Interprofessional education (IPE) occurs when students from two or more different healthcare professions come together in some teaching format to learn about each other's disciplines, from each other, and with each other on common topics (IECEP, 2016; WHO, 2010). There are proven benefits to providing healthcare students with the knowledge of how to work on a team with healthcare professionals from different disciplines (CIHC, 2007; Guraya & Barr, 2018; IECEP, 2016; Illingworth & Chelvanayagam, 2017; Lapkin et al., 2013; Ravet, 2012; Reeves et al., 2013; WHO, 2010). By providing students with IPE training, they have a better understanding of different professions' roles and responsibilities, develop effective communication skills across professions, and learn about the value of teamwork that can result in improved patient outcomes (Margalit et al., 2009). The goal of implementing interdisciplinary educational practices is to foster a learning environment that will eventually translate to healthcare professionals who know how to work with different disciplines (interprofessional collaborative practice) to provide the highest quality, patient-centered care possible (CIHC, 2007; IECEP, 2016; WHO, 2010).

The accreditation bodies of healthcare programs recognize the value in IPE and thus require it to be embedded within the curriculum at various breadths and depths (Thistlethwaite, 2012; Zorek & Raehl, 2013). Interprofessional collaborative practice (IPCP) is recognized as a way to provide care that improves health outcomes, reduces medical errors, addresses struggles within the healthcare system related to staffing, and provides holistic patient-centered care (Green & Johnson, 2015; IECEP, 2016; Illingworth & Chelvanayagam, 2017; Thistlethwaite, 2016; Titzer et al., 2015). This literature review provided a rationale for IPE and IPCP and their

benefits for healthcare programs; describes research that supports students' transfer of IPE learning from the classroom to the clinic; and explores the available research that demonstrates a connection between the transfer of classroom IPE learning to clinical practice.

Review of Pertinent Literature

Healthcare Education Taught in Professional Silos

The traditional format for teaching healthcare professionals is within their discipline-specific environment (Ryland, Akers, Gowland, & Malik, 2017). This teaching approach allowed students to learn about their profession and develop strong clinical skills (Margalit, 2009; Ryland et al., 2017). However, it also decreases the ability for students to learn and value the other associated healthcare professionals that play an integral part in a patient's care, contributes to stereotyping and misinformation about how each profession works with each other and the patient (Ryland et al., 2017; Tran, Kaila, & Salminen, 2018). The Institute of Medicine's (2003) report identified five core competencies that healthcare providers should possess to provide quality patient care. One of those core competencies was being able to work within an interdisciplinary team (Institute of Medicine [IOM], 2003). The IOM noted that quality of care and patient safety improved when healthcare professionals worked across disciplines when treating a patient (Craddock et al., 2013; IOM, 2003; Margalit, 2009). A student can learn about the other professions they would interact with from their professors. However providing students with a learning opportunity that is outside of their unidisciplinary curriculum can provide richer learning experiences (Margalit, 2009). Teaching a student only within their professional silo has the potential for creating interprofessional relationships that are viewed as hierarchical or competitive instead of collaborative (Margalit, 2009). Kumarasamy and

Sanfilippo (2015) stated it perfectly when they said: “educators and institutions should provide a means for students to learn and actively problem-solve with one another” (p.102).

In 2001, the Institute of Medicine published a report that outlined the need to bring healthcare professionals together in as a team to provide quality patient care that was also cost-effective (Kumarasamy & Sanfilippo, 2015). The need to work interprofessionally is not unique to the United States. The World Health Organization recognizes the importance of interprofessional education to create healthcare providers that are prepared to work in an interprofessional team in their clinical setting (Kumarasamy & Sanfilippo, 2015). They are encouraging academic institutions to end the training that encourages each profession to learn alone, and in their silo, and instead train them in a format that encourages teamwork and collaboration (Kumarasamy & Sanfilippo, 2015). The Institute of Medicine has also encouraged healthcare institutions to reorganize in a way that encourages and supports the interaction of interdisciplinary healthcare providers (Bultas, Ruebling, Breitbach, & Carlson, 2016).

When educating students about interprofessional collaboration, it would be vital to provide a learning environment that is comprised of students from multi-professions. This learning environment sets up an opportunity for students to educate their peers on what the roles and responsibilities are of their profession. Learning about the value of interprofessional collaboration and how to work as a team is unlikely to be accomplished when every learning opportunity happens with only one profession in the room. The social constructivist theory is the foundation for learning about interprofessional collaboration in a classroom filled with interdisciplinary students (DeYoung, 2015; Powell & Kalina, 2009). It seems only natural that if the goal is to teach students how to collaborate across professions for optimal patient care, they

would be provided with learning experiences that expose them to students from other professions (Adams, 2015; Powell & Kalina, 2009).

However, there are academic and administrative barriers that have impeded teaching students in an interdisciplinary environment (Craddock et al., 2013; Gilbert et al., 2010). Two of the most challenging administrative barriers for IPE are finding common times within each curriculum to bring students from different professions together and having a common geographic location for the training to occur (Craddock et al., 2013; Gilbert et al., 2010). There are even more academic barriers. The different programs must have faculty that see the value in teaching students about interprofessional collaboration, the programs must develop mutually agreed upon student learning objectives, the faculty must agree on the desired teaching format, and there must be support from each program to engage in IPE (Gilbert, Yan, & Hoffman, 2010).

Healthcare education must keep up with the changes in the healthcare system and delivery of healthcare. As interprofessional collaboration evolves to be the desired approach for best patient safety and care, interprofessional education must become an integral part of how healthcare students are trained (Meleis, 2016; Ryland et al., 2017). Graduates of all healthcare programs must learn how to work on interdisciplinary teams to be prepared to function in healthcare systems nationally and internationally. These healthcare students will find that patient problems they need to address are present across disciplines. Thus, providing students with educational opportunities to learn about and brainstorm on solutions to common patient problems across disciplines will strengthen their ability to be a strong team player (Meleis, 2016). The need for educating students on the benefits of collaborative practice has been discussed for over 50 years but has not yet been fully implemented into the educational curriculum (Bainbridge, 2014).

"Effective teamwork requires a transformation of how health professionals are educated" (Meleis, 2016, p.107). Historically, the curriculum was reformed based on three different thought processes: science, an identified problem, and on the healthcare system (Meleis, 2016). However, the goal of education should be to have graduates that can respond to the needs of the global population. The current status of the healthcare needs of the global population is too complex for one provider to be able to assess, diagnosis, and treat a patient with optimal results and minimal safety concerns (Bultas et al., 2016; Meleis, 2016). Patient needs have shifted from being more acute, which can be treated more easily uni-professionally, to chronic conditions that require a team of professionals to effectively provide treatment (Olson & Bialocerkowski, 2014; Ryland et al., 2017). Healthcare educational institutions must consider curricular changes to address the needs and benefits of healthcare outcomes when a patient is treated by a diverse, qualified team of professionals (Meleis, 2016).

Rationale for Interprofessional Education

Delivering safe, effective, and high-quality patient care is increasingly difficult to accomplish as the needs of healthcare populations become more complex (Bultas et al., 2016; Meleis, 2016). In the current healthcare landscape collaborative, cross-professional team-based care seems to be the most effective method to meet the needs of patients (Reeves et al., 2013). In some cases, optimal patient care is provided by healthcare providers who have been working together in coherent teams for years. For example, it is not uncommon for nurses and doctors to collaborate on a hospital floor (Illingworth & Chelvanayagam, 2017).

Interprofessional education provides formal, intentional education and training that prepares students for engaging in interprofessional, team-based collaborative practice (Illingworth & Chelvanayagam, 2017; Thistlethwaite, 2016). IPE offers students' knowledge

about what the roles and responsibilities are of different professions. This knowledge provides them with a foundation needed to develop the skills required to work in an interprofessional team in clinical practice (Ryland et al., 2017). IPE can be found in educational practices as far back as the 1960s (Thistlethwaite, 2016). In 1988, the World Health Organization drew attention to interprofessional collaborative training with two reports titled *Continuing Education for Physician*s and *Learning Together to Work Together for Health* (Thistlethwaite, 2016).

In 2009, concerns about patient safety, medical error, and quality of care were rising (Schmitt, Blue, Aschenbrener, & Viggiano, 2011). The use of team-based care, instead of the traditional format of working in professional silos, was identified as an approach to address the concerns about safety and quality of care (Schmitt et al., 2011; Thistlethwaite, 2016). This desire for team-based care began the collaborative effort of six health professional associations (Nursing, Osteopathic Medicine, Public Health, Pharmacy, Dental Medicine, and the Association of American Medical Colleges) to develop guidelines for interprofessional education (Schmitt et al., 2011). In 2011, an expert panel from six healthcare programs identified four interprofessional core competencies that students should demonstrate in collaborative practice (Interprofessional Education Collaborative Expert Panel [IECEP], 2011).

The panel felt these competencies could be the foundation to foster educating students beyond the discipline-specific format to foster teamwork (IECEP, 2011). They were made general and vague so they could be transferable over many disciplines and academic organizations. The core competencies are: (1) to be able to identify the roles and responsibilities of different health professions, (2) to be able to understand shared values across professions, (3) to communicate professionally across professions, and (4) to be able to effectively participate in interprofessional teamwork (IECEP, 2011). These core competencies have been the basis for

learning objectives for IPE activities with the goal of producing graduates that can be actively engaged in interprofessional collaborative practice (IECEP, 2011; IECEP, 2016; WHO, 2010).

In 2016, the Interprofessional Education Collaborative (IPEC) board of directors felt a revision to the original Core Competencies document was necessary. The goals of the revision were to reaffirm that the original core competencies were still relevant and impactful to healthcare education and practice, expand on the original core competencies to draw a direct relationship to the Triple Aim that healthcare is striving to focus on, incorporate population health concerns, and reorganize the core competencies in a way that placed them into one common domain of interprofessional collaborative practice versus interprofessional education, as the original document did (IECEP, 2016). The original report provided significant information for educators and researchers who created IPE activities, as noted by over 550 citations of the original document, translation into different languages and being reprinted in textbooks (IECEP, 2016). A significant increase in IPE experiences in the curriculum at dental and medical institutions were reported since the original Core Competencies was published (IEPEC, 2016). With the revised version, nine new disciplines joined the work [Podiatric Medicine, Physical Therapy, Occupational Therapy, Psychology, Veterinary Medicine, Optometry, Social Work, Physician Assistant, and the Association of Schools of Allied Health Professions] (IEPEC, 2016).

Benefit of Interprofessional Education

The definition of interprofessional education (IPE) is when students from two or more healthcare programs come together and learn about, from and with each other (IECEP, 2016; WHO, 2010). IPE has been embedded in curricular programs for over fifty years with a goal of providing students with the knowledge, skills, and attitudes required to engage in

interprofessional collaborative practice (IECEP, 2016; Thistlethwaite, 2016; WHO, 2010). There has been strong support to educate healthcare students on how to work with their colleagues from other healthcare professions to facilitate team-based, patient-centered treatment and evaluation (Dow & Thibault, 2017; Green & Johnson, 2015; Guraya & Barr, 2018; IECEP, 2016; Lapkin et al., 2013; Racine, Bilinski, & Spriggs, 2016; Reeves et al., 2013; WHO, 2010).

The traditional format for training healthcare students has been discipline-specific and in a silo within health disciplines (Bultas et al., 2016; Clark, 2018; Margalit et al., 2009; Reeves et al., 2013). However the team approach to patient care has increasingly been shown to improve overall patient care and aligns well with the Institute for HealthCare Improvement's Quadruple Aim: improving the health of populations, enhancing the experience of care for individuals, reducing the per capita cost of healthcare and attaining joy in work (Bodenheimer & Sinsky, 2014). This model is viewed as strengthening the healthcare system in a time of workforce shortage and stress (CIHC, 2007; IECEP, 2016; Guraya & Barr, 2018; Illingworth & Chelvanayagam, 2017; Lapkin et al., 2013; Ravet, 2012; Reeves et al., 2013; WHO, 2010). Therefore, teaching students cross-professional, team-based skills for patient care within healthcare teams encourages them to see the benefit of practicing in team structures (Bultas et al., 2016; Illingworth, & Chelvanayagam, 2017; Reeves et al., 2013). Healthcare professions recognize the value in IPE, and the accreditation bodies of their educational programs have outlined required standards in the different professional curriculum to ensure students receive various levels of education on interprofessional competencies (Thistlethwaite, 2016; Zorek, & Raehl, 2013).

Students are not always inherently able to work in teams or know how to best function in this type of environment. Just like with new clinical skills, healthcare students must be taught

how to effectively function in teams (Clark, 2018). IPE provides students the environment to obtain foundational knowledge of working in teams and advances collaborative skills with other clinicians (Barr, Gray, Helme, Low, & Reeves, 2016). Through lectures, discussions, active training activities, simulation experiences, and other experiential learning activities, students increase their appreciation for working collaboratively with other healthcare professionals and gaining confidence in their teamwork skills with the goal of providing the highest quality patient care (Barr et al., 2016; Illingworth & Chelvanayagam, 2017).

Illingworth and Chelvanayagam (2017) reported that students often do not necessarily understand the different roles and responsibilities of colleagues from other disciplines. Since teaching about other health professions is not typically embedded in the unidisciplinary curriculum, having formalized IPE training opportunities provides students with knowledge about the different roles and responsibilities of healthcare professionals and teaches skills for them to communicate and work together. IPE creates opportunities for students to develop mutual awareness and respect of each other's profession (Barr et al., 2016). A goal of interprofessional learning is to enhance students' comfort with working across disciplines in the classroom environment, which hopefully transfers to seamless collaboration in a clinical environment (Barr et al., 2016; Dow, Blue, Cohen Konrad, Earnest, & Reeves, 2013). Such learning aims to empower students for supportive teamwork (Barr et al., 2016). As more healthcare professionals specialize within their area of clinical practice, teamwork, understanding the roles and responsibilities of others, and interprofessional communication are all vital to ensure that patients receive the highest quality care possible (Thistlethwaite, 2016).

The four core competencies developed by the Interprofessional Education Collaborative (2016) and the six core competencies developed by the Canadian Interprofessional Health

Collaborative (2007) are used to design assessment tools to measure whether students have gained knowledge and skills for interprofessional, collaborative clinical practice (CIHC, 2012; Oates & Davidson, 2015). These assessment tools, as well as subject reports, have helped researchers determine advancements in students' knowledge of IPE as a result of shared learning activities that were embedded in their curriculum. (Dow & Thibault, 2017; Guraya & Barr, 2018; Illingworth, & Chelvanayagam, 2017; Thistlethwaite, 2016). The goal of IPE is for students to acquire and/or improve their beliefs, behaviors, and attitudes related to the value of practice on an interprofessional team in order to provide optimal patient care (IECEP, 2016; Lapkin et al., 2013; Reeves et al., 2013; WHO, 2010). Evidence suggests that students' beliefs, attitudes, and behaviors related to the four competencies are strengthened after completing IPE activities in their curriculum (Andrews, 2016; Cox, Cuff, Brandt, Reeves, & Zierler, 2016; Guraya & Barr, 2018; Lapkin et al., 2013; National Center for Interprofessional Practice and Education, 2016; Reeves et al., 2013).

The stakeholders in the Canadian healthcare system (researchers, providers, students, organizations, and educators) created the Canadian Interprofessional Health Collaborative (CIHC) to address the need for interprofessional education competencies in curricula (CIHC, 2010). They recognize that patient health outcomes are improved when professionals approach patient evaluation and treatment as a team (CIHC, 2010). In 2010, CIHC created the *National Interprofessional Competency Framework* to provide a guideline for IPCP (CIHC, 2010). The framework outlined six core competencies: interprofessional communication, patient-centered care, understanding roles and responsibilities, teamwork, leadership as a collaborator, and conflict resolution across disciplines (CIHC, 2010). Achievement of these competency behaviors attests to students' acquisition of knowledge, attitude, and skills and ability to

participate in interprofessional collaborative practice (CIHC, 2010). The establishment of core competencies from the United States through IPEC and from Canada through CIHC show the importance of all professions weaving in IPE throughout their curricula to provide optimal patient care.

IPE Accreditation Standards

As IPE becomes more widely recognized, accrediting bodies for health professions programs are infusing IPE standards into requirements that academic programs must meet in their curriculum (CIHC, 2007; Thistlethwaite, 2016; Zorek & Raehl, 2013). In 2014, the accrediting bodies from the six organizations that sponsored the IPEC Core Competencies document established the Health Professions Accreditors Collaborative (HPAC), in response to the challenges of variably written IPE educational guidelines for individual disciplines that promoted different expectations and outcomes (IEPEC, 2016; Thistlethwaite, 2016; Zorek & Raehl, 2013). The benefits of a collective approach to identifying IPE learning objectives and standards across disciplines to eliminate this curricular barrier to IPE were viewed as advancing the core objectives of interprofessional education and practice (Gilbert et al., 2010; Lawlis, Anson, & Greenfield, 2014; Thistlethwaite, 2016; Zorek & Raehl, 2013).

In Physical Therapy accreditation standards, the expectation for IPE requires programs to provide students with didactic and clinical interprofessional educational learning activities that address the four core competencies outlined by Interprofessional Education Collaborative (2016) (Commission on Accreditation in Physical Therapy Education [CAPTE], 2017). Recognizing the importance of integrating IPE into the curriculum, the American Council on Academic Physical Therapy (ACAPT) created a task force in 2013 to explore how current IPE initiatives have occurred thus far, how future initiatives could occur, and how to foster physical therapist

collaboration in clinical practice (Wise, Frost, Resnik, Davis, & Iglarsh, 2015). Other health professions programs in the United States (US) have different IPE accreditation standards. In Canada, the Accreditation for Interprofessional Health Education (AIPHE) has created a guide that provides IPE language and standards that can be used by programs as suggestions to help standardize accreditation terminology and requirements (Zorek, & Raehl, 2013). The US is behind in IPE standardization, however they do have strong recognition from the accrediting bodies of all six health professions (nursing, occupational therapy, pharmacy, physical therapy, physician assistant, & social work) that are involved in the summer semester IPE experience and will be involved in this research study (Zorek, & Raehl, 2013). These accreditation requirements demonstrate recognition that IPE is important, students will graduate with training in how to practice interprofessionally, and thus should have greater readiness to practice in this manner in their professional careers than previous generations (Zorek & Raehl, 2013).

Benefits of and Rationale for Interprofessional Collaboration Practice

With an aging population, rise in the prevalence of obesity, rise in substance abuse, and complicated health disparities in the US, it is fair to acknowledge that one health profession does not have the expertise to meet all the healthcare needs of patients (Kanji, Lin, & Krekoski, 2010; Office of Disease Prevention and Health Promotion, 2018). Health professionals that are adept at collaborating with colleagues from other professions are going to be more successful at providing the highest quality care for their patients (Kanji et al., 2010). The increased treatment needs of patients in the US and a shortage of healthcare professionals put a great strain on the healthcare system (Kanji et al., 2010; WHO, 2010). Interprofessional collaborative practice (teamwork approach to treating patients) is one solution to address the workforce shortage and

improving patient care (Illingworth & Chelvanayagam, 2017; Kanji et al., 2010; Reeves et al., 2013; WHO, 2010).

Interprofessional collaborative practice has been defined as “the process of developing and maintaining effective interprofessional working relationships with learners, practitioners, patients/clients/families and communities to enable optimal health outcomes” (CIHC, 2010, p.8). Illingworth and Chelvanayagam (2017) noted that collaborative practice has been happening for many years with nurses and doctors working together for patient care in hospitals. However, the training was not formalized. The CIHC (2010) identified six core competencies of IPCP for students to be able to learn and apply during clinical practice. These competencies are interprofessional communication, patient-centered care, teamwork, understanding roles, collaborative leadership, and conflict resolution (CIHC, 2010). The competencies are intended to be used to guide academic programs when they are developing curricular content and learning outcomes for training future healthcare providers (CIHC, 2010).

IPCP provides valuable skills because they have been shown to reduce healthcare costs when professionals approach patient care holistically, reduce medical errors through improved interprofessional communication, and increase job satisfaction through approaching challenging patient care as a team (Andel et al., 2012; Guraya & Barr, 2018; Illingworth & Chelvanayagam, 2017; Kanji et al., 2010; Kumarasamy & Sanfilippo, 2015; Lapkin et al., 2013; Ravet, 2012; Reeves et al., 2013; Tilden, Eckstrom, & Dieckmann, 2016; Tran et al., 2018; WHO, 2010). Through IPCP, patients have also reported feeling more satisfied with the care they receive, more compliant with their home program, required less medical care visits, and felt an overall improvement in their general health (Kanji et al., 2010).

The Institute of Medicine has recognized the importance of healthcare providers working across disciplines to provide quality patient care and reduce the cost of healthcare services (Kumarasamy & Sanfilippo, 2015; Marjalit, 2009). Their 2001 report titled "Crossing the quality of chasm: A new healthcare system for the 21st century" stated that the delivery of healthcare must happen interprofessionally to be most effective (Kumarasamy & Sanfilippo, 2015). The IOM report from 2003 titled "Health professions education: A bridge to quality" outlined the need for students and medical professionals to work in interprofessional teams to provide top quality patient care (IOM, 2003; Margalit, 2009). The team approach to patient care has the potential for increasing the value of patient care by allowing individual team members and their skills to complement the other team members, thus making the entire team approach stronger than an individual healthcare providers (Kumarasamy & Sanfilippo, 2015).

IPCP and Healthcare Reform

In 2016, the US spent almost 18% of the gross domestic product on healthcare expenses, more than any other industrialized country (Clark, 2018). Despite this financial investment, health outcomes in the US are falling behind that of many other countries that spend significantly less on medical expenses (Clark, 2018). The Triple Aim that healthcare organizations strive to achieve consists of improved patient satisfaction, decreased medical costs, and improved overall health of communities or populations (Pimperl et al., 2017). The Patient Protection and Affordable Care Act (ACA) of 2010 strived to work toward the Triple Aim (Clark, 2018; Pimperl et al., 2017). The desire to improve the quality of medical care while decreasing associated healthcare costs was motivation for the creation of the Bundled Payments of Care Improvement program (Clark, 2018). This program rewards organizations that reduce the cost of medical care while focusing on the quality of care a patient receives (Clark, 2018). The Bundled

Payment program encourages healthcare providers to work together to reduce the length of stay for patients in hospitals, eliminates duplication and unnecessary services, decreases readmissions to hospitals or other facilities, and provides patients with the knowledge to take care of themselves more effectively at home (Clark, 2018).

One way for there to be a reduction in healthcare costs under the ACA was through the creation of an Accountable Care Organization [ACO] (Clark, 2018; Kumarasamy & Sanfilippo, 2015; Zorek, & Raehl, 2013). Accountable Care Organizations (ACO) focus on coordination of medical providers to achieve optimal patient care (Pimperl et al., 2017). ACOs are incentivized to provide high-quality patient care and reduce healthcare costs for patients by providing them with a share of the cost savings (Pimperl et al., 2017). IPCP has been propelled forward under the ACA by highlighting the benefits of a team approach to healthcare to achieve better patient and health system outcomes and lowering overall costs (Clark, 2018; Golden, Gammonley, Hunt, Olsen, & Issenberg, 2014; Konstam et al., 2017; Pimperl et al., 2017; Zorek, & Raehl, 2013).

Transfer of Learning from Classroom to Clinical Practice

Transfer of learning is when a student can take content they learned relevant to one situation and apply it to a new situation that is similar or appropriate (DeYoung, 2015). This concept is the foundation of teaching in many content areas, but especially relevant in healthcare. We do not teach a student about how to assess vital signs in a healthy individual without the expectation that they could also assess vital signs in a client with an impairment. There is an ongoing debate about how much a student learns in the classroom that transfers to a new situation or setting (DeYoung, 2015). Research finds that the following factors contribute to students' successful learning transfer: (1) how well the material was learned; (2) how well the learned material can be retrieved; (3) how the material was taught (i.e. lecture, paper case,

simulation) to foster the transferring of knowledge; (4) the setting in which the material was taught (i.e. classroom, simulation center, clinical setting); and (5) the similarity between the new and old situation where the learning is being transferred (DeYoung, 2015).

Thus far research on transferability of interprofessional education to collaborative practice is ambiguous (Illingworth & Chelvanayagam, 2017; Lapkin et al., 2013; Ravet, 2012; Reeves et al., 2013). Botma et al. (2013) found that health science students can transfer learning from the classroom to a practical setting (theory-practice gap). Ketcherside and colleagues' (2017) study yielded similar findings. They surveyed community/public health professionals and registered nurses ten years after graduation to assess their ability to integrate IPE into their professional practice (Ketcherside, Rhodes, Powelson, Cox, & Parker, 2017). The authors found that community/public health professionals were able to transfer their IPE knowledge from the classroom to their clinical practice whereas registered nurses did not report similar experiences (Ketcherside et al., 2017). Ketcherside et al. (2017), noted that it was not possible to generalize the findings for these two professions to other healthcare professions. Knowledge gained about healthcare students' ability to demonstrate behaviors required to practice collaboratively after receiving interprofessional education would be useful to support the accreditation requirement of IPE and demonstrate students' ability to bridge the theory-practice gap (Andrews, 2016; Illingworth & Chelvanayagam, 2017; Lapkin et al., 2013).

Both behaviorism and constructivism theories support the concept that students can transfer learning from the original learning environment to a new learning environment (DeYoung, 2015). This study aimed to determine if healthcare students can bridge the theory-practice gap of interprofessional education and interprofessional collaborative practice.

Lack of Research Supporting That IPE Leads to IPCP

Strong research has been presented in this paper to support the benefits of IPE in health professions curriculum to prepare students with knowledge and skills for future collaborative team-based practice. While studies suggest that students increase their attitudes and beliefs toward IPE, evidence is thus far inconclusive as to whether they can transfer their learning from the classroom to clinical practice (Cox et al., 2016; Illingworth, & Chelvanayagam, 2017; Lefevbre, Wellmon, & Ferry, 2015; Mészáros, Lopes, Goldsmith, & Knapp, 2011; Reeves et al., 2013; Thistlethwaite, 2012). Riskiyana, Claramita, and Rahayu (2018) conducted a systematic literature review to assess the current literature on the effectiveness of IPE in achieving their intended learning outcomes. They found sixteen articles that showed a link between IPE and IPCP (Riskiyana, Claramita, & Rahayu, 2018). However, when looking closely at the assessment tools utilized and the settings where the students were assessed, there was considerable variability. The authors were thus unable to establish clear linkages between IPE and IPCP (Riskiyana et al., 2018).

Most studies related to IPE and IPCP are self-assessments of students' perceived skills and their satisfaction with the training (Thistlethwaite, 2012). Although these are important findings, the IPE field needs to advance beyond knowing what students perceive towards validating the efficacy of IPE methodologies to improve patient care and practice. More research is needed to assess the transfer of knowledge from the classroom to clinical practice to show behavior changes in the students (Thistlethwaite, 2012). Extant research on knowledge transfer was conducted by Mészáros et al. (2011). The researchers assessed students from pharmacy, osteopathic medicine, and physician assistant programs to see if their IPE training resulted in long-term changes in their IPCP. The study found that students were more competent in their

knowledge and skills after the IPE training (Mészáros et al., 2011). However, at the six-month follow-up assessment, only 38% of participants responded, thus they were unable to determine if there was a lasting behavior change related to IPCP (Mészáros et al., 2011).

Challenges to securing evidence for IPE/IPCP transferability include the wide variety of learning outcomes, teaching formats, length of the training provided, and different professions involved for each IPE experience studied (Thistlethwaite, 2012). The Best Evidence Medical Education review from 2007 found mixed results related to students' acquisition of knowledge and skills necessary to engage in IPCP after they participated in an IPE experience (Thistlethwaite, 2012). Many studies only assessed short-term results of IPE experiences, and there is a great need for assessment of the long-term benefits on professional practice (Thistlethwaite, 2012).

In their systematic review, Reeves et al. (2013) evaluated 15 studies of IPE transferability. Of those 15, four studies showed mixed reviews related to the ability of students to transfer IPE learning into IPCP and four other studies showed no impact at all on the ability of students to transition their IPE training to IPCP and workplace environments (Illingworth, & Chelvanayagam, 2017; Reeves et al., 2013). There were seven studies that found improved patient outcomes, patient-centered communication, patient safety, and collaborative teamwork (Reeves et al., 2013). However, even with these positive results, the effectiveness of IPE is still not certain because the studies had such diverse interventions that the results cannot be transferred across many academic settings (Reeves et al., 2013). This systematic review noted that there had been an increase in studies that demonstrated the benefits of IPE since their first systematic review in 1999. However, the current studies lack rigor and homogeneity to provide strong support for IPE (Reeves et al., 2013).

The Institute of Medicine committee 2015 report offered two recommendations for improving IPE and IPCP (Cox et al., 2016). The first is to have resources committed to developing studies that are focused on demonstrating the association between students receiving IPE training and their ability to then practice collaboratively with other healthcare professionals (Cox et al., 2016). The second recommendation is to continue to emphasize that the academic institutions educate students early in the learning cycle for IPCP and the clinical facilities should take on the responsibility of providing training later in the learning cycle when the students enter clinical practice (Cox et al., 2016).

Olson and Bialocerkowski (2014) used the analogy of an incomplete recipe to describe the lack of inconclusive research to support IPE and IPCP. We may know various types of formats for teaching IPE that could result in student learning (know the ingredients), but we don't know the best recipe to provide that will end up with the result of students being more skilled at interprofessional collaborative practice [know the recipe] (Olson & Bialocerkowski, 2014). Given all of this information, IPE and IPCP are valuable, but there needs to be more research to prove that there is a direct connection for students learning the skill in the classroom and then being able to practice interprofessional collaboration in the clinical setting.

Theoretical and Conceptual Framework

The conceptual framework for this study was based on Bloom's taxonomy which outlines the progression of learning for a student in the cognitive domain and Vygotsky's theory of social constructivism which describes the role of social interactions (Adams, 2015; Bloom et al., 1956; DeYoung, 2015). Bloom's taxonomy outlined the learning process an individual goes through when acquiring new information until they achieve mastery of the content (Adams, 2015; Bloom et al., 1956). Each healthcare profession has a strong, single discipline focus on working with a

patient based on their educational training (D'Amour, Ferrada-Videla, San Martin Rodriguez, & Beaulieu, 2005). The need to educate students on how to collaborate with other members of the team is the concept for interprofessional education and is often a new way of thinking for the student (D'Amour et al., 2005). When a student is first provided with the foundational knowledge around interprofessional collaboration for patient care they are learning on the lower end of Bloom's taxonomy in the realm of remembering or understanding (Adams, 2015; Bloom et al., 1956). As the student engages in experiential learning and team building activities, they advance their knowledge up the taxonomy to the level of applying (Adams, 2015; Bloom et al., 1956). The ultimate level reached by the student is demonstrated when they are in the clinical setting and able to make judgments about the value of interprofessional collaboration for optimal patient care, which shows they have reached the level of evaluating (Adams, 2015; Bloom et al., 1956).

The social constructivist theory asserts that an individual learns through social interactions with their peers, professors, and colleagues (Craddock et al., 2013; DeYoung, 2015; Hean, Craddock, & O'Halloran, 2009; Thistlethwaite, 2012). Interprofessional collaboration happens when students learn to interact with colleagues from other healthcare disciplines (D'Amour et al., 2005). When students take that knowledge of collaboration and apply it through teamwork, they are then able to demonstrate one of the foundational skills needed to be successful at interprofessional collaboration (D'Amour et al., 2005). This study was grounded in the social constructivist theory when students are involved in experiential IPE teaching activities that prioritize learning about the core competencies of IPE through group activities with their peers, interactions with their faculty, and the collaborative culture created in the classroom (Crampsey et al., 2018; Silberman & Auerbach, 2006). For the purpose of this study, classroom

culture included routines and small group work and other scaffolding activities that are available to the students throughout their learning process.

Healthcare professionals working together as a team to improve patient outcomes, decrease medical errors, and strengthen healthcare systems supports the premise of providing students with interprofessional education that leads to them being involved in interprofessional collaborative practice (Gilbert et al., 2010; WHO, 2010). The Interprofessional Education Collaborative Expert Panel (2016) described the core competencies of interprofessional education as teaching students about the importance of teamwork and team-based practice, how to engage in interprofessional communication, understanding and respecting the values and ethics for interprofessional practice, and recognizing the roles and responsibilities of different healthcare providers. In order to develop skills to meet these competencies, healthcare students must be provided with the foundational knowledge around IPCP, given the opportunity to engage in experiential learning activities with their peers and professors to apply this knowledge, and be able to assess their own abilities in order to determine their strengths and weakness and continue to advance their knowledge along Bloom's taxonomy (Adams, 2015; Barr, 2013).

The purpose of this study was framed by the concept that instructional practices for IPCP should include elements of social interaction. A healthcare provider should be able to work on an interprofessional team, and thus the IPE would consist of learning activities that expose the learner to social interaction, as described by the social constructivist theory. The research questions were designed to explore the advancement that a participant may have made in the cognitive domain of learning on Bloom's taxonomy from remembering to evaluating (Adams, 2015). The methodology of the study was constructed to include the relevant constructs of the conceptual framework. The questions in the survey to be used (ICCAS) were constructed around

the core competencies of interprofessional collaborative practice and through the lens of social interaction (Archibald et al., 2014). Data analysis was grounded in the conceptual framework by using *a priori* code that included relevant constructs of the social constructivist theory and Bloom's taxonomy.

This study examined the participants' ability to take the attitudes and beliefs learned through social interactions with their peers, professors and the learning environment in the IPE experience, analyzed their strengths and weakness related to it as part of their continued learning along Bloom's taxonomy, and then used this information to practice collaboratively during their clinical experience (Adams, 2015; Barr, 2013; Hean et al., 2009).

Summary

The goal of healthcare is to provide patients with the highest quality of care at the lowest cost (Pimperl et al., 2017). The US has an increasingly aging population, patients suffering from multiple co-morbidities and chronic health conditions, a significant rise in substance use and opioid disorders, and prevalence of obesity, and complicated health disparities that are too challenging to assume one healthcare provider can evaluate and treat patients effectively by themselves (Kanji et al., 2010; Office of Disease Prevention and Health Promotion, 2018). Effective and efficient treatment of patients requires an interprofessional team approach to provide high-quality care (Reeves et al., 2013). The ACA has recognized interprofessional collaborative practice as an approach to patient care to improve patient outcomes and decrease medical expenses (Clark, 2018; Pimperl et al., 2017).

To have healthcare professionals that can work with professionals outside of their discipline, they must be trained for this type of practice (IECEP, 2016; WHO, 2010). Training students how to work with each other is the foundation of IPE (IECEP, 2016; WHO, 2010).

Academic institutions realize they need to move beyond only training their students within their professional boundaries (Bultas, et al., 2016; Clark, 2018; Reeves et al., 2013). Thus, accreditation bodies have added standards around IPE in their accreditation guidelines, requiring students to receive training in how to practice interprofessionally in clinical practice (Zorek, & Raehl, 2013).

Research has demonstrated that healthcare students who receive IPE feel more confident and competent to practice with healthcare professionals and students from disciplines outside of their profession (Dow & Thibault, 2017; Green & Johnson, 2015; Guraya & Barr, 2018; IECEP, 2016; Lapkin et al., 2013; Racine et al., 2016; Reeves et al., 2013; WHO, 2010). When healthcare students and professionals work together as a team, it has been shown to decrease medical errors, provide high quality patient care, improve how the healthcare system functions, and decrease medical care costs (CIHC, 2007; Guraya & Barr, 2018; IECEP, 2016; Illingworth & Chelvanayagam, 2017; Lapkin et al., 2013; Ravet, 2012; Reeves et al., 2013; WHO, 2010).

The challenge to advance IPE and IPCP is lack of sufficient evidence as of yet to confirm that healthcare students participating in IPE at their academic institutions are then able to demonstrate competencies and associated behaviors in collaborative practice settings (Reeves et al., 2013). Botma et al. (2013) have shown that undergraduate students transfer the knowledge they obtained in the classroom to a practical setting. However, there is ambiguous evidence to substantiate that the IPE/IPCP theory-practice gap is bridged (Illingworth & Chelvanayagam, 2017; Lapkin et al., 2013; Ravet, 2012; Reeves et al., 2013). This research study aimed to evaluate if healthcare students from five professions that have engaged in IPE could bridge that theory-practice gap by being able to participate in IPCP.

Chapter 3: Methodology

Introduction

The goal of interprofessional education is to give students the knowledge and skills they need to practice in an interprofessional team during their professional career (IECEP, 2016; WHO, 2010). With every educational intervention, it is necessary to evaluate if the learning objectives were achieved. There is not as yet sufficient evidence that providing IPE to healthcare students in their curriculum results in the desired outcome of them being competent in IPCP during their profession (Cox et al., 2016; Illingworth, & Chelvanayagam, 2017; Lefevbre et al., 2015; Mészáros et al., 2011; Reeves et al, 2013; Thistlethwaite, 2012). This research study was a quantitative, correlational design that strived to assess if healthcare students that have participated in IPE during their summer semester can actively engage in IPCP during their clinical experience during the fall semester. This chapter will outline the methodology of the research study, including the aim of the study, the participant description, and the intended plan for the data analysis.

Review of the Purpose of the Study

The purpose of this quantitative correlational study was to examine the direct relationship between students learning about case-based, interprofessional education in their didactic coursework and then demonstrating a change in behavior that allows them to engage in interprofessional collaborative practice in the clinical setting. Specifically, the study determined if healthcare students from physical therapy, occupational therapy, and nursing programs demonstrated the behaviors learned during case-based, IPE training to engage in interprofessional collaborative practice in the clinical setting. During the traditional training for healthcare students, they acquired the knowledge and skills related to their field of practice.

Research showed that training to educate students about the roles and responsibilities of their healthcare colleagues and how they collaborate to provide holistic patient care could result in improved patient outcomes (Andrews, 2016; Green, & Johnson, 2015; IECEP, 2016; Kanji et al., 2010; Mészáros et al., 2011; WHO 2010). Interprofessional education has been embedded in the curriculum of some healthcare programs for over fifty years and is thought to be the precursor to students' ability to participate in interprofessional collaboration in clinical practice (Thistlethwaite, 2016). The delivery method for IPE has various formats such as merging classes across disciplines, electronic learning formats, simulation activities, and other techniques (Illingworth & Chelvanayagam, 2017). The World Health Organization (2010) report suggests that there is sufficient evidence that IPE provides the foundation needed to enable students to practice collaboratively.

However, Illingworth and Chelvanayagam (2017) question whether there is a reliable link between IPE, collaborative practice, and improved patient outcomes. One of the challenges to making the connection between IPE and IPCP is the ability to evaluate if students can transfer the learning from the classroom to the clinic (Illingworth & Chelvanayagam, 2017). While there tend to be positive student evaluations after engaging in IPE activities, feedback is related to their acquiring the knowledge of why and how to practice interprofessionally (Illingworth & Chelvanayagam, 2017; Lapkin et al., 2013; Reeves et al., 2013). This acquired IPE knowledge does not always translate to students' abilities to be engaged in interprofessional collaborative practice (Illingworth & Chelvanayagam, 2017; Lapkin et al., 2013; Reeves et al., 2013).

It is vital to draw the link between interprofessional education and students' demonstrable transfer of interprofessional knowledge and skills to collaborative practice (Green & Johnson, 2015; Illingworth & Chelvanayagam, 2017; IECEP, 2016; WHO, 2010). Students'

demonstration of capacity to bridge the theory-practice (knowledge from didactic training transfers to behavior change in clinical practice) gap will support the specific IPE format provided as a mechanism to promote this transfer of learning. The purpose of this study was to determine if healthcare students from physical therapy, occupational therapy, social work, nursing, and pharmacy programs transferred knowledge, skills, and behaviors learned during case-based IPE training to interprofessional collaborative practice in the clinical setting.

Research Questions

The following research questions, null hypotheses, and alternative hypotheses were used to guide this quantitative, correlational study.

RQ1. To what extent do healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester, demonstrate a behavioral change related to interprofessional communication while on their clinical experience (CIHC, 2010)?

H_{01}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester do not demonstrate a behavioral change related to interprofessional communication while on their clinical experience (CIHC, 2010).

H_1. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester will demonstrate a behavioral change related to interprofessional communication while on their clinical experience (CIHC, 2010).

RQ2. To what extent do healthcare students that have completed case-based, IPE coursework in the prior semester, demonstrate a behavioral change related to interprofessional collaboration while on their clinical experience (CIHC, 2010)?

H_{02}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester do not demonstrate a behavioral change related to interprofessional collaboration while on their clinical experience (CIHC, 2010).

H_{2}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester will demonstrate a behavioral change related to interprofessional collaboration while on their clinical experience (CIHC, 2010).

RQ3. To what extent do healthcare students that have completed case-based, IPE coursework in the prior semester, demonstrate a behavioral change related to understanding roles and responsibilities of the interprofessional team while on their clinical experience (CIHC, 2010)?

H_{03}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester do not demonstrate a behavioral change related to understanding roles and responsibilities of the interprofessional team while on their clinical experience (CIHC, 2010).

H_{3}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester will demonstrate a behavioral change related to understanding roles and responsibilities of the interprofessional team while on their clinical experience (CIHC, 2010).

RQ4. To what extent do healthcare students that have completed case-based, IPE coursework in the prior semester, demonstrate a behavioral change related to interprofessional collaborative patient and family-centered approach to care while on their clinical experience (CIHC, 2010)?

H_{04}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester do not demonstrate a behavioral change related to interprofessional collaborative patient and family-centered approach to care while on their clinical experience (CIHC, 2010).

H_{4}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester will demonstrate a behavioral change related to interprofessional collaborative patient and family-centered approach to care while on their clinical experience (CIHC, 2010).

RQ5. To what extent do healthcare students that have completed case-based, IPE coursework in the prior semester, demonstrate a behavioral change related to interprofessional conflict management/resolution while on their clinical experience (CIHC, 2010)?

H_{05}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester do not demonstrate a behavioral change related to interprofessional conflict management/resolution while on their clinical experience (CIHC, 2010).

H_{5}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester will demonstrate a behavioral change

related to interprofessional conflict management/resolution while on their clinical experience (CIHC, 2010).

RQ6. To what extent do healthcare students that have completed case-based, IPE coursework in the prior semester, demonstrate a behavioral change related to interprofessional teamwork while on their clinical experience (CIHC, 2010)?

H_{06}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester do not demonstrate a behavioral change related to interprofessional teamwork while on their clinical experience (CIHC, 2010).

H_{6}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester will demonstrate a behavioral change related to interprofessional teamwork while on their clinical experience (CIHC, 2010).

RQ7. To what extent do healthcare students that have completed case-based, IPE coursework in the prior semester, demonstrate a behavioral change related to all six IPCP core competencies while on their clinical experience (CIHC, 2010)?

H_{07}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester do not demonstrate a behavioral change related to the six IPCP core competencies while on their clinical experience (CIHC, 2010).

H_{7}. Healthcare students that have completed case-based, interprofessional education (IPE) coursework in the prior semester will demonstrate a behavioral change

related to the six IPCP core competencies while on their clinical experience (CIHC, 2010).

Specific Description of the Methodology

This quantitative, correlational study used a validated survey as the methodology to assess if healthcare students were able to demonstrate the behaviors required to engage in interprofessional collaborative practice during their clinical experience after receiving formal training in IPE. Survey Monkey was used to create a link to the electronic survey. The electronic survey (see Appendix A) gathered demographic information and quantitative data through the validated assessment tool, Interprofessional Collaborative Competency Attainment Scale [ICCAS] (Archibald et al., 2014; Rudestam & Newton, 2015). This survey was available for open access, thus does not require author permission to be utilized (National Center for Interprofessional Practice and Education, 2016). The demographic questions collected the following information from participants: 1) health profession program; the, 2) type of clinical setting experience; and the, 3) the number of weeks participating in their clinical experience. The ICCAS (see Appendix B) gathered data that evaluated the participant's change in behavior around participation in IPCP, specifically the six core competencies outlined by the CIHC (2010).

A standardized email (see Appendix C) was distributed to the designated faculty member for each discipline involved in the study. They were asked to share this email with the student in their program that participated in the IPE training during the summer semester of 2018. The student voluntarily participated in the study by clicking on the link in the email that takes them to the survey. The faculty member that sent the email had no direct knowledge of whether the student did or did not participate in the study. This survey was distributed to participants after

their clinical experience in the fall semester of 2018. Participants were given four weeks to complete the survey. After the second week and fourth, a reminder email was delivered to the participants asking them to complete the survey, if they have not done so already. Study participants were students from physical therapy, occupational therapy, nursing, social work, and pharmacy programs that had participated in two sessions of case-based, interprofessional education during their summer semester and then completed a clinical experience during the fall semester.

The results from this electronic survey were compared to ex post facto data that had been collected during a research project that occurred during the summer of 2018. This ex post facto data was collected from the same cohort that will be solicited to be participants in this research study. The research study from the summer of 2018 asked their participants to complete the ICCAS (see Appendix B) at the end of their case-based IPE experience and utilized the retrospective pre-activity and post-activity format for responses. The ex post facto data and the data collected in this study were analyzed to determine if the participants felt they were able to demonstrate the behaviors necessary to achieve the six core competencies of interprofessional collaborative care as described by the CIHC (2010) and their overall behavior related to participation in IPCP on their clinical experience (research questions 1-7 for this study).

Research Design of the Study

This study was a quantitative, correlational study with convenience sampling. This study was developed to assess the ability of healthcare students to integrate and transfer knowledge gained about the core competencies of IPE by demonstrating IPCP behaviors in clinical experiences. The survey used, the ICCAS, is a valid and reliable tool to assess the students' self-reported abilities to participate in interprofessional collaborative practice (Archibald et al., 2014).

The survey used a 7-point Likert scale and required the participant to assess their competence using a retrospective pre-activity and post-activity assessment design. The questions in the survey were categorized to address the CIHC's (2010) six core competencies of IPCP. The data analysis evaluated the dependent variable (transfer of learning) as compared to the two independent variables (interprofessional education and interprofessional collaborative practice).

There were different methodologies that this research study could have utilized to answer the research questions. The use of simulated experiences in a classroom with direct observation as the evaluation method is one common format that has been utilized in previous research studies (Jackson Behan & Van Der Like, 2017; Tullmann, Shilling, Goeke, Wright, & Littlewood, 2013). While direct observation and evaluation of a student's behaviors provide strong evidence for assessment, observed behavior in a simulated setting does not guarantee that a student can demonstrate IPCP in a real clinical setting with other healthcare professionals. The author selected to utilize a validated survey tool to collect data to assess the transfer of IPE learning from the classroom training to demonstrated IPCP behaviors in the clinical setting.

Since the students had clinical experiences all over the United States, direct observation and evaluation were not feasible. The use of the survey gathered information to answer the determined research questions. This format allowed the author to collect data from a setting that replicates the type of clinical setting where a student might practice when they begin their professional career. This information provided foundational knowledge about the ability of healthcare students to learn about IPE and then practice IPCP. A future research study could then assess the students with direct observation in their clinical settings.

Population, Sample, and Source of Data

Population

The participants were selected through a convenience sample. This sampling method was chosen because of the ease for acquiring participants that would meet the inclusion and exclusion criteria. The participants were students from five different healthcare programs at the University of New England. They all participated in case-based IPE training that occurred throughout 2-classes during their summer semester. These students completed a clinical experience during the fall semester when the data will be collected. One-hundred and thirty-nine healthcare students participated in the summer IPE training. Therefore, the desired minimum response rate to the survey was one hundred and three participants (103) (Krejcie & Morgan, 1970; National Statistical Service, n.d.).

Inclusion Criteria

To be included in this study, participants had to be a student in one of the following healthcare programs at the University of New England: nursing, occupational therapy, physical therapy, pharmacy, or social work. They also had to have participated in both classes of IPE training that occurred during the summer semester on July 12th and July 26, 2018. Finally, they must have completed a clinical experience during the fall semester of 2018. The length of training could have been as short as 1-week and as long as the entire semester (sixteen weeks).

Exclusion Criteria

Participants were excluded from the study if they were not still enrolled in one of the five healthcare programs at UNE that were mentioned above, did not participate in both IPE sessions (July 12th and July 26th), or did not have a clinical experience that was one week in length or longer during the fall semester of 2018.

Recruitment

Participants for this research study were recruited through email. The email contained information that explained the purpose and plan of the study, outlined the commitment for any students that decided to participate, and informed them of the process, procedures, and time commitment for participation. Due to a low response rate to the first recruitment email request, follow-up emails were sent out multiple times to assist with the recruitment of participants.

The researcher followed the suggested ethical considerations outlined by Goldenberg, Owens, and Pickar (2007) to avoid coercion related to involvement in the study by not offering compensation to the participants. The recruitment of participants did not occur until the completion of all fall courses to ensure there was no perception that the participant's course grade for training was not impacted by participation or lack of participation in the study.

Setting

The research study occurred at a private, academic institution in the northeast region of the United States. The academic institution was situated in an urban area.

Informed Consent Process

Each participant was provided with information related to informed consent in the introductory email they receive and again at the beginning of the survey (see Appendix C). They were asked to provide informed consent to voluntarily participate in the study. They demonstrated consent by completing the survey. No participant was asked to provide their personal information that could be used for identification. An anonymous identifier was used to match current data and ex post facto data provided from the same participant. The anonymous identifier was constructed using the last two letters of their first names and the last four digits of their cell phone numbers. This same anonymous identifier was used when the ex-post facto data

was collected. The principal investigator kept all data secured on a password-protected computer and will continue to do so for five years.

Since there were no questions asked that are sensitive, there was no anticipated risk to the participants. The informed consent and data collection phase did not begin until the student has completed their coursework and the final grade has been entered. Thus, there was no risk of coercion to the students related to their grade and coursework. The potential benefits to the participants were their contribution to future changes and improvements to any IPE curriculum.

Instrumentation

The Interprofessional Collaborative Competency Attainment Scale (ICCAS) is a 20-question, validated assessment tool that was developed by educators and researchers with expertise in interprofessional education and collaborative practice (Archibald et al., 2014; Schmitz et al., 2017). This assessment tool was built to evaluate an individual's behaviors centered around the Canadian Interprofessional Health Collaborative Competencies (2010) and the 6 domains (interprofessional communication, collaborative leadership, roles and responsibilities, collaborative patient and family-centered approach to care, interprofessional conflict management/resolution, and teamwork) that outline competencies in interprofessional collaborative practice (Archibald et al., 2014). There are five questions related to interprofessional communication, three questions related to collaborative leadership, four questions related to roles and responsibilities, three questions related to collaborative patient and family-centered approach to care, three questions related to interprofessional conflict management and resolution, and two questions related to teamwork (Archibald et al., 2014). The survey required the participant to self-report their perceived ability to participate in interprofessional collaborative practice retrospectively pre-activity and post-activity (Archibald

et al., 2014). Each question is answered with a 7-point Likert scale [1= strongly disagree, 2 = moderately disagree, 3 = slightly disagree, 4 = neutral, 5 = slightly agree, 6 = moderately agree, and 7 = strongly agree] (Archibald et al., 2014).

The ICCAS is a valid and reliable tool for assessing healthcare student's self-reported competencies based on the IPCP core competencies described by the Canadian Interprofessional Health Collaborative (Archibald et al., 2014; CIHC, 2010; Canadian Interprofessional Health Collaborative, 2012; Schwindt et al., 2017). The validation of the ICCAS and its direct link to the CIHC 6 domains of IPCP support the use of this tool to assess the research questions that directly relate to the same competencies of IPCP. Schwindt et al. (2017) found ICCAS to be an internally reliable instrument for the cohort of students involved in their research study (nursing, social work, and pharmacy students). Another study used the ICCAS to evaluate medical and pharmacy students' achievement of their IPE core competencies after their interprofessional learning activity and found significant changes with the students' abilities to be engaged in collaborative practice (Nagge, Lee-Poy, & Richard, 2017). In the research study by Baker and Durham (2013) the ICCAS was used to assess the change in the CIHC core competencies after completion of an IPE activity. The participants in this study were undergraduate students from nursing, medical, and pharmacy programs. The results showed a significant improvement in the students' interprofessional collaboration skills (Baker & Durham, 2013).

King et al. (2016) used the ICCAS to determine if students in nursing, physical therapy, and respiratory therapy programs improved their IPCP core competencies after participation in an IPE simulation activity. The study found that participants increased their self-reported competencies around collaborative care (King et al., 2016). These research studies utilized ICCAS and involved similar cohorts of healthcare students participating in the current research

study plan. The results of these studies provided the support for the use of the ICCAS with students from the nursing, social work, pharmacy, physical therapy, and occupational therapy programs (Baker & Durham, 2013; King et al., 2016; Nagge et al., 2017; Schwindt et al., 2017).

Data Collection Procedures

This research study met the requirements for exemption status and was approved by the University of New England's IRB on July 23, 2018 (see Appendix D). This study was approved by the University of St. Augustine IRB on October 5, 2018 (see Appendix E). The recruitment of participants occurred through an email that was sent to all healthcare students in the nursing, occupational therapy, physical therapy, pharmacy, and social work programs that participated in the case-based IPE event during the summer semester of 2018. The email outlined the purpose of the study, the requirements of participants, and asked for voluntary participation and provision of informed consent to participate in the research study. The participants received no compensation for participation in this research study. Participants were given four weeks to complete the survey, with two email reminders after the second and fourth week, asking them to complete the survey, if they have not done so already.

The researcher requested access to the ex post facto data that was collected during the research project that occurred during the summer of 2018. The results of the ex post facto data and current data were compared to analyze the healthcare students' self-reported behavior related to participation in IPCP on their clinical experience.

Method of Data Analysis

This research study assessed the difference between the mean scores of the ex post facto (retrospective post-activity) and current data (retrospective pre-activity and post-activity) for participants. The study had two independent variables of interprofessional education and

interprofessional collaboration from the same population. The dependent variable was a change in interprofessional collaborative practice behavior of the student as measured by the ICCAS survey 7-point Likert scale (Archibald et al., 2014). Results were organized as ordinal data when entered into IBM SPSS statistical software.

The research study analyzed the difference between the mean scores of the ex-post facto survey results and the newly collected survey data to assess the participants' behavior change for each of the six CIHC (2010) core competencies. Also, this study analyzed total IPCP behavior change based on the results of survey questions. The data were compared for each of these groupings: (1) ex post facto retrospective post-activity data (Summer semester post IPE course activity data) compared to the current retrospective pre-activity data (Fall semester preclinical activity data); (2) ex post facto retrospective post-activity data compared to the current retrospective post-activity data (fall semester post clinical activity data); and (3) current retrospective pre-activity data compared to the current retrospective post-activity data. The results were organized as ordinal data when entered into IBM SPSS statistical software, and the researcher used an ANOVA to perform the data analysis.

Summary

The purpose of this quantitative correlational study was to assess if healthcare students were able to demonstrate changes in their interprofessional collaborative practice (IPCP) behaviors after receiving education on the IPCP core competencies. Specifically, the study determined if healthcare students from physical therapy, occupational therapy, and nursing programs demonstrated the behaviors learned during case-based, IPE training to engage in interprofessional collaborative practice in the clinical setting. The ex post facto data was compared to the data that was collected during this research study to answer the research

questions related to the change in IPCP behaviors of students when they are on their clinical experience.

Chapter 4: Analysis of Data

Interprofessional education provides students with the knowledge and skills necessary to practice on an interprofessional team and provide patients with optimal care (IECEP, 2016; WHO, 2010). This research study aimed to evaluate whether healthcare students that had completed case-based, semester-long IPE coursework, demonstrate behavioral changes related to IPCP core competencies while on clinical experiences in the following semester. This chapter outlines the data preparation from this study, describes the data analysis and presents the detailed results from this analysis as related to the seven research questions.

Data Preparation

One-hundred and thirty-nine healthcare students who completed the case-based, IPE coursework and had a clinical experience in the fall semester were recruited to participate in this study. The faculty that were the identified core instructors for a given profession during this IPE coursework agreed to send out the email to the students that invited them to voluntarily participate in the research study. Quantitative data for this study was collected from December 2018 thru January 2019. The first email was sent in the second week of December, after the fall semester clinical coursework was completed. Three additional emails were sent to invite the students to participate if they so desired. If a student chose to participate, the email directed them to the electronic survey that was utilized to collect data for this research study. The electronic survey consisted of a few questions that provided demographic information about the students and the ICCAS survey, used to assess a participant's behaviors centered around the Canadian Interprofessional Health Collaborative Competencies (2010) and the six domains (interprofessional communication, collaborative leadership, roles and responsibilities, collaborative patient and family-centered approach to care, interprofessional conflict

management/resolution, and teamwork) outlined in the interprofessional collaborative practice competencies (Archibald et al., 2014).

The researcher requested and received the ex post facto data that had been collected during a research project that occurred during the summer of 2018. This ex post facto data had been collected from the same cohort of healthcare students that were invited to participate in this research study. The ex post facto data included results from the ICCAS survey collected immediately after the students completed the case-based, IPE coursework.

Eighty-four students participated in both summer IPE sessions and completed the ex post facto survey. Twenty-seven students completed the electronic survey for the current research study. Only 21 students met the inclusion criteria to qualify as participants of this study. One student completed both surveys but was excluded because the ex post facto data was not complete. Five students that completed the electronic survey for the current research did not complete the ex post facto survey or the results of the two data sets could not be linked inconclusively and thus were excluded from the study.

The ex post facto data and the data collected in this study were analyzed in SPSS versions 24 using a one-way ANOVA with repeated measures to determine if the participants felt they were able to demonstrate the behaviors necessary to achieve the six core competencies of interprofessional collaborative care as described by the CIHC (2010) and their overall behavior related to participation in IPCP on their clinical experience (research questions 1-7).

Validity and Reliability of the Data

Based on the research study having three different points of data collection (ex post facto, retrospective pre-activity, and post-activity), the repeated measures ANOVA was selected as the appropriate statistical test to use when analyzing the data. The three assumptions for this test

that were considered were 1.) data represented independent observations, 2.) variances of the populations were equal, and 3.) the data had a normal distribution (Kim & Cribbie, 2018; SPSS Tutorial, n.d.). Since the data was collected from different participants across three points in time, the data met the first assumption of having variables that are independent of one another. The sphericity, or variances, of the populations was assessed using Mauchly's test. The testing for six of the seven research questions (RQ1, RQ2, RQ3, RQ4, RQ5, & RQ7) indicated that sphericity was not violated (see Table 1). The Mauchly's test for RQ6 indicated that it violated the assumption of sphericity $X^2(2) = 9.267$, $p = .010$. Therefore, the Greenhouse-Geisser estimates of sphericity (€ = .713) were used and the results demonstrated equal variance $F(1.426, 27.097) = 25.582$, $p = .000$ (see Table 1). The Multivariate test, Wilks' Lambda, results for all seven research questions showed that data followed a normal distribution (see Table 1).

The survey used in this research was the Interprofessional Collaborative Competency Attainment Survey (ICCAS). This survey demonstrated its validity and reliability with regards to a learner's self-reported abilities to demonstrate the six Canadian interprofessional collaborative practice (Archibald et al., 2014; Schmitz et al., 2017). Archibald et al. (2014) validated the survey by utilizing 584 students from 15 different healthcare programs as subjects for their research. The Cronbach's alpha coefficients that were used in this research to demonstrate internal consistency were α = .94, .96, and .98 (Archibald et al., 2014). The ICCAS was developed to collect responses from the learner as a retrospective, pre-post design. This research study collected the data in the same format to be consistent with the validated delivery format for the survey. The internal consistency of each research question for this study was assessed with Cronbach's alpha (see Table 2). The acceptable level for Cronbach's alpha to represent internal consistency is not absolute but has been given the range of .70 to .95 (Tavakol

& Dennick, 2011). With this range being considered, research questions 3, 4, and 7 demonstrate internal consistency. Therefore, research questions 1, 2, 5, and 6 were not able to demonstrate internal consistency.

Descriptive Statistics

A total of 27 students completed the electronic survey for this study. Of these students, 21 had also completed the ex post facto ICCAS survey. Therefore, the data for those 21 students were used in this research study. The participants of the study were comprised of students from three different healthcare professions: seven from occupational therapy, thirteen from physical therapy, and one from nursing (see Table 3; Figure 1). Students from social work and pharmacy programs were invited to participate but did not complete the electronic survey. All participants engaged in clinical rotations for 30 or more hours a week (see Table 1). The number of weeks they spent at clinical rotation varied within the categories of 1-5 weeks, 6-10 weeks, or 11-16 weeks (see Table 3; Figure 2). The participants were engaged in clinical rotations in different types of facilities to include acute care hospitals, an acute rehabilitation facility, outpatient clinics, and skilled nursing facilities (see Table 3; Figure 3).

Results

The purpose of this research study was to assess if healthcare students were able to demonstrate changes in their interprofessional collaborative practice (IPCP) behaviors after receiving education on the IPCP core competencies. Specifically, the study determined if healthcare students from physical therapy, occupational therapy, and nursing programs demonstrated the behaviors learned during case-based, IPE training to engage in interprofessional collaborative practice in the clinical setting. The first six research questions analyzed the core competencies around interprofessional collaborative care that have been

described by the Canadian Interprofessional Health Collaborative (2007). The ICCAS survey was created to specifically assess these six core competencies (Archibald et al., 2014). The final research question analyzed the participants overall IPC of the participant using the total score on the ICCAS.

Research Question 1: Interprofessional Communication

Research question one explored the participant's behavioral change related to interprofessional communication when going from the classroom to clinical practice. It was hypothesized that healthcare students were able to transfer the learning they acquired during their summer IPE coursework into their clinical experience to report a demonstrated change in behavior around interprofessional communication. Participants reported their perceived level of competency with interprofessional communication by answering questions 1-5 on the ICCAS (Archibald et al., 2014).

Each participant's total score for these questions was analyzed from the ex post facto data, retrospective pre-clinical experience, and post-clinical experience to analyze research question 1 (see Figure 4). The mean score for the ex post facto activity was 31.000, the retrospective pre-clinical experience was 25.950, and the post-clinical experience was 29.850 (see Table 4). It is of importance to note that the mean score for the ex post facto data was higher than both the pre-clinical and the post-clinical experience mean scores. A repeated measures ANOVA determined that interprofessional communication differed statistically significantly between the three points in time ($F(2, 38) = 22.648$, $p < 0.000$) (see Table 4). Therefore, the Bonferroni post hoc test comparison was performed and found that the mean score for ex post facto (M = 31.000, SD = 3.244) was statistically significantly ($p = .000$) higher than the mean score pre-clinical experience (M = 25.950, SD = 3.531). The mean score for post-

clinical experience (M = 29.850; SD = 2.540) was statistically significantly (p = .000) higher than the pre-clinical experience. There was not a statistically significant (p = .514) difference between the mean score for ex post facto and post-clinical experience ratings. See Table 4 for all results from the Bonferroni post hoc test.

Research Question 2: Collaboration

Research question two explored the participant's behavioral change related to collaboration with other healthcare providers when going from the classroom to clinical practice. It was hypothesized that healthcare students were able to transfer the learning they acquired during their summer IPE coursework into their clinical experience to report a demonstrated change in behavior around interprofessional collaboration. Participants reported their perceived level of competency with this topic by answering questions 6-8 on the ICCAS (Archibald et al., 2014).

Each participant's total score for these questions was analyzed from the ex post facto data, retrospective pre-clinical experience, and post-clinical experience to analyze research question 2 (see Figure 5). The mean score for the ex post facto activity was 18.762, the retrospective pre-clinical experience was 14.619, and the post-clinical experience was 18.190 (see Table 5). It is of importance to note that the mean score for the ex post facto data was higher than both the pre-clinical and post-clinical experience mean scores. A repeated measures ANOVA determined that collaboration differed statistically significantly between the three points in time ($F(2, 40) = 34.816$, $p < 0.000$) (see Table 5). Therefore, the Bonferroni post hoc test comparison was performed and found that the mean score for ex post facto (M = 18.762, SD = 1.786) was statistically significantly (p = .000) higher than the mean score pre-clinical experience (M = 14.619, SD = 2.334). The mean score for post-clinical experience (M = 18.190;

SD = 2.112) was statistically significantly (p = .000) higher than the pre-clinical experience. There was not a statistically significant (p = .625) difference between the mean score for ex post facto and post-clinical experience ratings. See Table 5 for all results from the Bonferroni post hoc test.

Research Question 3: Roles and Responsibilities

Research question three explored the participant's behavioral change related to knowing their role and responsibilities as well as understanding the roles and responsibilities of the other members of the healthcare team. It was hypothesized that healthcare students were able to transfer the learning they acquired during their summer IPE coursework into their clinical experience to report a demonstrated change in behavior around understanding roles and responsibilities. Participants reported their perceived level of competency with roles and responsibilities by answering questions 9-12 on the ICCAS (Archibald et al., 2014).

Each participant's total score for these questions was analyzed from the ex post facto data, retrospective pre-clinical experience, and post-clinical experience to analyze research question 3 (see Figure 6). The mean score for the ex post facto activity was 25.450, the retrospective pre-clinical experience was 20.300, and the post-clinical experience was 24.000 (see Table 6). It is of importance to note that the mean score for the ex post facto data was again higher than both the pre-clinical and post-clinical experience mean scores. A repeated measures ANOVA determined that understanding roles and responsibilities differed statistically significantly between the three points in time ($F(2, 40) = 43.190$, $p < 0.000$) (see Table 6). Therefore, the Bonferroni post hoc test comparison was performed and found that the mean score for ex post facto (M = 25.333, SD = 1.958) was statistically significantly (p = .000) higher than the mean score pre-clinical experience (M = 20.000, SD = 3.178). The mean score for post-

clinical experience (M = 23.857; SD = 2.816) was statistically significantly (p = .000) higher than the pre-clinical experience. There was not a statistically significant (p = .077) difference between the mean score for ex post facto and post-clinical experience ratings. See Table 6 for all results from the Bonferroni post hoc test.

Research Question 4: Collaborative Patient and Family-Centered Care

Research question four explored the participant's behavioral change related to their ability to demonstrate a collaborative patient and family-centered approach to care. It was hypothesized that healthcare students were able to transfer the learning they acquired during their summer IPE coursework into their clinical experience to report a demonstrated change in behavior around collaborative-centered care. Participants reported their perceived level of competency with this topic by answering questions 13-15 on the ICCAS (Archibald et al., 2014).

Each participant's total score for these questions was analyzed from the ex post facto data, retrospective pre-clinical experience, and post-clinical experience to analyze research question 4 (see Figure 7). The mean score for the ex post facto activity was 19.143, the retrospective pre-clinical experience was 14.286, and the post-clinical experience was 17.857 (see Table 7). It is of importance to note that the mean score for the ex post facto data was again higher than both the pre-clinical and post-clinical experience mean scores. A repeated measures ANOVA determined that understanding roles and responsibilities differed statistically significantly between the three points in time (F (2, 40) = 32.308, p < 0.000) (see Table 7). Therefore, the Bonferroni post hoc test comparison was performed and found that the mean score for ex post facto (M = 19.143, SD = 2.080) was statistically significantly (p = .000) higher than the mean score pre-clinical experience (M = 14.286, SD = 3.085). The mean score for post-clinical experience (M = 17.857; SD = 3.038) was statistically significantly (p = .000) higher

than the pre-clinical experience. There was not a statistically significant (p = .208) difference between the mean score for ex post facto and post-clinical experience ratings. See Table 7 for all results from the Bonferroni post hoc test.

Research Question 5: Interprofessional Conflict Management/Resolution

Research question five explored the participant's behavioral change related to their ability to demonstrate interprofessional conflict management/resolution while on their clinical experience. It was hypothesized that healthcare students were able to transfer the learning they acquired during their summer IPE coursework into their clinical experience to report a demonstrated change in behavior around interprofessional conflict management. Participants reported their perceived level of competency with this topic by answering questions 16-18 on the ICCAS (Archibald et al., 2014).

Each participant's total score for these questions was analyzed from the ex post facto data, retrospective pre-clinical experience, and post-clinical experience to analyze research question 5 (see Figure 8). The mean score for the ex post facto activity was 19.550, the retrospective pre-clinical experience was 16.750, and the post-clinical experience was 18.700 (see Table 8). It is of importance to note that the mean score for the ex post facto data was higher than both the pre-clinical and post-clinical experience mean scores. A repeated measures ANOVA determined that conflict management and resolution differed statistically significantly between the three points in time (F (2, 38) = 16.275, $p < 0.000$) (see Table 8). Therefore, the Bonferroni post hoc test comparison was performed and found that the mean score for ex post facto (M = 19.550, SD = 1.468) was statistically significantly (p = .001) higher than the mean score pre-clinical experience (M = 16.750, SD = 2.673). The mean score for post-clinical experience (M = 18.700; SD = 1.838) was statistically significantly (p = .001) higher than the

pre-clinical experience. There was not a statistically significant (p = .210) difference between the mean score for ex post facto and post-clinical experience ratings. See Table 8 for all results from the Bonferroni post hoc test.

Research Question 6: Teamwork

Research question six explored the participant's behavioral change related to their ability to demonstrate teamwork while on their clinical experience. It was hypothesized that healthcare students were able to transfer the learning they acquired during their summer IPE coursework into their clinical experience to report a demonstrated change in behavior around their teamwork skills. Participants reported their perceived level of competency with this topic by answering questions 19 and 20 on the ICCAS (Archibald et al., 2014).

Each participant's total score for these questions was analyzed from the ex post facto data, retrospective pre-clinical experience, and post-clinical experience to analyze research question 6 (see Figure 9). The mean score for the ex post facto activity was 12.400, the retrospective pre-clinical experience was 9.050, and the post-clinical experience was 11.000 (see Table 9). It is of importance to note that the mean score for the ex post facto data was again higher than both the pre-clinical and post-clinical experience mean scores. A repeated measures ANOVA with a Greenhouse-Geisser correction determined that skills around teamwork differed statistically significantly between the three points in time (F (1.426, 27.097) = 25.582, p < 0.000) (see Table 9). Therefore, the Bonferroni post hoc test comparison was performed and found that the mean score for ex post facto (M = 12.400, SD = 1.536) was statistically significantly (p = .001) higher than the mean score pre-clinical experience (M = 9.050, SD = 1.761). The mean score for post-clinical experience (M = 11.000; SD = 2.052) was statistically significantly (p = .001) higher than the pre-clinical experience. There was not a statistically significant (p = .071)

difference between the mean score for ex post facto and post-clinical experience ratings. See Table 9 for all results from the Bonferroni post hoc test.

Research Question 7: Interprofessional Collaborative Practice

Research question seven explored the participant's behavioral change related to their ability to demonstrate all six IPCP core competencies while on their clinical experience. It was hypothesized that healthcare students were able to transfer the learning they acquired during their summer IPE coursework into their clinical experience to report a demonstrated change in behavior around all six of the IPCP core competencies. Participants reported their perceived level of competency with this topic by answering all 20 questions on the ICCAS (Archibald et al., 2014).

Each participant's total score for these questions was analyzed from the ex post facto data, retrospective pre-clinical experience, and post-clinical experience to analyze research question 7 (see Figure 10). The mean score for the ex post facto activity was 126.263, the retrospective pre-clinical experience was 99.579, and the post-clinical experience was 119.000 (see Table 10). It is of importance to note that the mean score for the ex post facto data was again higher than both the pre-clinical and post-clinical experience mean scores. A repeated measures ANOVA determined that overall skills around IPCP differed statistically significantly between the three points in time (F (2, 36) = 42.505, $p < 0.000$) (see Table 10). Therefore, the Bonferroni post hoc test comparison was performed and found that the mean score for ex post facto (M = 126.263, SD = 10.770) was statistically significantly (p = .000) higher than the mean score pre-clinical experience (M = 99.579, SD = 14.296). The mean score for post-clinical experience (M = 119.000; SD = 12.763) was statistically significantly (p = .000) higher than the pre-clinical experience. There was not a statistically significant (p = .078) difference between

the mean score for ex post facto and post-clinical experience ratings. See Table 10 for all results from the Bonferroni post hoc test.

Evaluation of the Findings

Providing students with interprofessional education in the classroom is the first step to equipping them with the skills to participate in interprofessional collaborative practice when they begin their professional career (Brashers et al., 2016). However, it is no longer sufficient to provide introductory knowledge and expect students to be able to demonstrate these skills in the clinical environment (Brashers et al., 2016). It is vital to provide students with higher level training in the classroom, simulation settings, and during clinical experiences (Brashers et al., 2016; IECEP, 2016; Reeves et al., 2013). There is no clear research to show the best way to provide IPE that results in a student being competent in IPCP (Illingworth & Chelvanayagam, 2017; Lapkin et al., 2013; Reeves et al., 2013). This research study evaluated the participants' assessment of their IPCP skills.

Shrader, Farland, Danielson, Sicat, and Umland (2017) identified the ICCAS survey as a reliable and valid tool to allow a student to assess their ability to transfer IP learning to the clinical setting. No research study has been completed that matched this research study's methodology to utilize the ICCAS to evaluate a student's transfer of learning from the classroom to the clinical environment. Schwindt et al. (2017) performed a study that analyzed the ICCAS scores between students from the nurse practitioner, nursing, and social work program. The participants were involved in IP training that focused on tobacco dependence training. When comparing scores between subjects, it was found that collaborative care and teamwork were the two areas the participants demonstrated improvement. However, neither were found to be statistically significant [collaborative care $p = .27$; teamwork $p = .09$] (Schwindt et al., 2017).

This article did not provide specific information to identify which questions they analyzed on the ICCAS to determine these topics. However, if they followed the guidelines established by the authors of the tool, these results would correlate to research questions 4 and 6. The results of this study showed a statistically significant increase in interprofessional competence mean scores for these areas from retrospective pre-clinical experience compared to post-clinical experience (p = .000). However, there was a decline in the mean scores from the ex post facto scores to both the retrospective pre-clinical and post-clinical experience.

Another research study utilized the ICCAS to analyze pharmacy and medical students' changes in interprofessional core competencies after participating in an interprofessional education day (Nagge et al., 2017). The study reported meaningful changes for collaboration, roles and responsibilities, and collaborative patient/family-centered approach to care after the IPE activity. However, the mean score for each question was provided but not the total mean score for each section. The lack of data made it difficult to compare the results to this current research study. This study found a statistically significant change in these three categories when comparing the ex post facto scores to the retrospective pre-clinical score (collaboration p = .000; roles and responsibilities p = .000; collaborative-centered care p = .000) and when comparing the retrospective pre-clinical scores to the post-clinical scores (collaboration p = .000; roles and responsibilities p = .000; collaborative-centered care p = .000).

Baker & Durham (2013) assessed the interprofessional collaborative competencies of undergraduate students in nursing, medical, and pharmacy students after participating in IPE that utilized the Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS) as a teaching method. They reported that all six core competencies significantly improved (p < .001) but did not provide specific data results to allow this to be compared to it.

In this study, mean scores for all six core competencies improved from retrospective pre-clinical experience to post-clinical experience. However, both of these scores were lower than the ex post facto mean scores.

The final research study that was found to utilize the ICCAS tool for assessing students' behaviors related to interprofessional collaboration was by King et al. (2016). It assessed changes in interprofessional competencies of nursing, physical therapy, and respiratory therapy students after completing either IPE and simulation training in the years of 2013 and 2014. They looked at the two cohorts and compared their scores pre and post-training. It was noted that the study had the students complete the ICCAS before the training and then again at the end of the training (King et al., 2016). This method does not match the method used when the tool was validated (Archibald et al., 2014). The results found conflict management as the only category with statistically significant changes ($p = .001$). The scores in all six core competencies did improve over both years the data was collected. However no mean score was provided in the article. The only information provided was the difference in the pre and post scores for each competency (King et al., 2016). This study found a statistically significant difference for conflict management between the ex post facto and retrospective pre-clinical scores ($p = .001$) and the retrospective pre-clinical and post-clinical scores ($p = .001$). The only increase in scores was between the retrospective pre-clinical and post-clinical scores. There was a decrease in participants' mean scores from ex post facto to both retrospective pre-clinical and post-clinical (see Table 11).

Summary

This study was unique in its methodology to assess the same cohort of students at three points in time (post-IPE training, pre-clinical experience, and post-clinical experience) when

comparing it to other research studies. The mean scores were higher for interprofessional communication, collaboration, roles and responsibilities, collaborative-centered care, conflict management, teamwork, and the total of all six interprofessional collaboration core competencies when the participant was assessed immediately after the IPE training. The mean scores post-clinical experience were higher than at pre-clinical experience but lower than at the ex post facto point. The ratings were found to be statistically significant for all seven research questions when comparing the ex post facto data to the pre-clinical data as well as when comparing the pre-clinical data to the post-clinical data. They were all not significant when comparing the ex post facto data to the post-clinical data.

Chapter 5: Conclusions, Implications, and Recommendations

Interprofessional education has been utilized for over fifty years with the goal of training healthcare students how to participate in interprofessional collaborative practice (IPCP) in the professional career (IECEP, 2011; Thistlethwaite, 2016; WHO, 2010). There is a lack of evidence to substantiate that students who participate in IPE are well prepared to engage in IPCP in their professional career (Cox et al., 2016; Illingworth & Chelvanayagam, 2017; Lapkin et al., 2013; Lefevbre et al., 2015; Mészáros et al., 2011; Reeves et al., 2013; Thistlethwaite, 2012). The purpose of this study was to assess if healthcare students demonstrated changes in their IPCP behaviors after receiving education on the IPCP core competencies. Specifically, the study determined if healthcare students demonstrated the behaviors learned during case-based, IPE training to engage in interprofessional collaborative practice in the clinical setting.

Data collection for this quantitative, correlational study occurred through an invitation to healthcare students to complete an electronic survey. Healthcare students from physical therapy, occupational therapy, and nursing programs completed the electronic survey which included the ICCAS survey and demographic questions. This data were compared to ex post facto data from a research study completed in the summer of 2018. The data were analyzed with a repeated measures ANOVA. There was a statistically significant difference between the ex post facto data and the pre-clinical experience data as well as the pre- and post-clinical experience data. There was not a statistically significant difference between the ex post facto and post-clinical experience data.

The participants rated their IPCP skills higher after their IPE classroom training than before or even after their clinical experience. This suggests they felt they had strong IPCP skills after their classroom training but felt their skills were weaker after practicing in the clinical

setting. The greatest limitation of this study was the small sample size of 21 participants. This chapter will outline the results of this study and how it could impact interprofessional education and collaborative practice, challenges and limitations to the research, and suggestions for future research that could enhance the body of knowledge on IPE and IPCP.

Conclusions

Interprofessional education has been shown to provide healthcare students with valuable knowledge and skills regarding the benefits of engaging in interprofessional collaborative practice (Guraya & Barr, 2018; IECEP, 2016; Racine et al., 2016; Thistlethwaite, 2016; WHO, 2010). Interprofessional collaborative practice has been shown to result in decreased medical errors, improved patient outcomes, increased job satisfaction, and decreased healthcare costs (CIHC, 2007; Guraya & Barr, 2018; IECEP, 2016; Illingworth & Chelvanayagam, 2017; Lapkin et al., 2013; Ravet, 2012; Reeves et al., 2013; WHO, 2010). This study assessed the behavioral change of healthcare students who had completed valuable IPE training in one semester and then practiced in the clinical setting the following semester. The Kirkpatrick model of evaluation describes the third level of evaluation as the one that assesses the behavior and interactions of the individual (Dewi & Kartowagiran, 2018; Shrader et al., 2017; Thistlethwaite, Kumar, Moran, Saunders, & Carr, 2015). The ICCAS evaluation tool was selected as the assessment survey because it is reliable and valid at assessing a student's change in behavior after an IPE activity or clinical experience (Archibald et al., 2014; Shrader et al., 2017).

The research questions in this study looked at the six Canadian core competencies of interprofessional collaborative practice to assess if there was a behavior change report by students after participating in an IPE activity and then going on their clinical experience. The ICCAS asked twenty questions linked to the six Canadian core competencies. The participants

in this study first completed the ICCAS survey after participating in a case-based, IPE activity during the summer of 2018 for a different research study. The participants then completed the ICCAS survey again after finishing their clinical experience as a part of this research study. The ex post facto data was compared to the data collected in this study. This study hypothesized that healthcare students would be able to transfer the learning they acquired in the IPE training to their clinical experience. However, the results of the research study did not support that hypothesis. There were statistical significances between the mean scores of the ex post facto data to the pre-clinical data and the pre-clinical data to the post-clinical data (see Tables 4-10). However, the participants' mean scores of the ex post facto rating for all six core competencies and the total IPCP score were higher than the means scores at the pre-clinical experience and the post-clinical experience points in time (see Table 11). This result was unexpected as it was hypothesized that participants would rate themselves higher rather than lower in IPCP competencies after completing their clinical experience.

The constructivist theory was used to look at how an individual gathered new information, worked with others to learn and grow, and used this knowledge in a future experience (Meyers & Feeney, 2016). The hypotheses in this study suggested that students worked off of this theory to take the information used in their IPE training and would be able to demonstrate stronger behaviors and skills when engaging in IPCP during their clinical experience. However, the lower mean scores (see Table 11) after the clinical experience as compared to after the IPE training (ex post facto data) suggested that the participants felt they were more adept at IPCP after the summer IPE training, but once in the clinical environment, they realized they did not have a fully developed level of knowledge and skill for workplace IPCP after all. Since the ICCAS is a tool that asked the participant to rate themselves pre-

activity and post-activity retrospectively, the participants' metacognitive processes could have been at work and allowed them to realize they didn't know what they initially thought they knew. This recognition did not occur until they were actually in the clinical setting attempting to engage in IPCP.

There were statistical significances found for all seven research questions when comparing the ICCAS survey scores pre-clinical and post-clinical experiences (see Table 12). These findings support the premise that the participants felt they either learned more about how to engage in IPCP while on their clinical experience or were able to practice the skills learned in the summer IPE and became competent by the end of the clinical experience. To decipher which of these conclusions are correct would take further discussions with the participants to learn their perspectives on why scores increased from the start to the end of their clinical experience. Future research could investigate these concepts with a different cohort.

With all seven research questions, the mean scores were higher immediately after the case-based, IPE training in the summer semester as compared to the ratings immediately before the clinical experience (see Table 11). There was little time lapse between these two data collection points and no other formal IPE or IPCP training in the health professions programs. It is intriguing to see that the participants rated themselves this way. It would have been more typical to see that the scores were similar in value. However, the ICCAS is set up as a tool that asks the participant to evaluation themselves retrospective to a given activity. Thus, it is possible that the students realized, after being on their clinical experience, which they did not have the level of knowledge and skill related to IPCP as they thought they did before being in the clinical environment.

Most research surrounding the effectiveness of IPE has looked at a specific IPE activity and completed a pre and post assessment of what the participants learned (Guraya & Barr, 2018). This study aimed to examine what IPCP knowledge and skill a student was able to apply in the clinical environment after having completed training in a case-based format. There are many variables that impact a healthcare student's ability to engage in IPCP (Thistlethwaite, 2016). In this study, the different weeks on the clinical experience could have been one factor. The participants time in the clinical setting ranged from as little as 1-5 weeks or as much as 11–16 weeks (see Figure 2). It is plausible that if the participants had more time to engage in IPCP through a longer clinical experience, the mean scores on the post-clinical experience could have been higher.

The type of clinical setting was another factor that could have impacted the mean scores. Some clinical settings have the structure for more opportunity to and an ease with which a provider could engage in IPCP. Gilbert et al. (2010) described the institutional support, the culture of the employees within the facility, and the environmental structures as things that support or impede IPCP. The participants in this study were in four different clinical environments (see Figure 3). If a participant in this study was in this clinical setting that had institutional, cultural, and environmental support for IPCP they might be able to advance their skills more effectively than another participant that was in a setting that had none or only some of these supportive mechanisms.

The role of the clinical field instructor/preceptor and their knowledge and support of IPCP was a final impacting variable. Since all of the participants are students, they work with a healthcare provider that guides their continued learning and acts as the role-model for the participant (Thistlethwaite, 2012). If the clinical instructor does not demonstrate strong

collaboration across disciplines or value teamwork, the participant's improvement in this area could be impacted negatively. Since the participants in this study were in different clinical settings, they did not have a common clinical instructor. Therefore, their growth and learning could have been enhanced or impeded by the role-model they had during their clinical experience.

Implications for Practice

Bloom's taxonomy outlines the steps a learner takes on their pathway to mastery of knowledge, skill, or attitude (Bloom et al., 1956). Interprofessional education often takes place in the early stages of learning, significantly before immersion in the clinical environment on the taxonomy (IECEP, 2016; WHO, 2010). The body of evidence supporting the benefits of IPE activities to gain the knowledge associated with the interprofessional collaboration core competencies has grown over the past fifty years (Thistlethwaite, 2016). However, the evidence to demonstrate and assess whether students take this knowledge from the classroom to the clinical environment is limited (Cox et al., 2016; Illingworth, & Chelvanayagam, 2017; Lapkin et al., 2013; Lefevbre et al., 2015; Mészáros et al., 2011; Reeves et al, 2013; Thistlethwaite, 2012).

This study aimed to assess if healthcare students that completed a case-based, IPE training session could take that acquired knowledge and skill into their clinical experience to demonstrate interprofessional collaboration. While there were some statistically significant findings (see Tables 4-10), they did not support any of the seven hypotheses in this study because the mean scores on the ICCAS survey where higher immediately after the IPE training than at the start or end of the clinical experience (see Table 11). These results do not add to a body of evidence to show the transfer of IPE learning from the classroom to the clinical

environment. However, they do provide evidence to suggest that students feel confident in their IPCP skills after classroom training but not enough to effectively transfer these skills without additional exposure to what it entails to demonstrate IPCP in the workplace. In effect, the follow-up survey revealed that students realized they still have more to learn. Such knowledge advances understanding, particularly for educators, of the need for developmental and longitudinal IPE threaded throughout the curriculum. Ongoing and frequent IPE curricular, co-curricular, and other activities provide students with multiple opportunities to move their learning up the steps of the ladder on Bloom's taxonomy (Bloom et al., 1956). This threading should consist of providing the learning with foundational training in the classroom that utilizes lecture and active learning skills to educate the students. From that point, the student could advance their knowledge and skills through role-playing and training in a simulation center. The final component of the training that would bring them to the top of the Bloom's taxonomy would be structured IPCP training in the clinical environment, with clinical instructors that are proficient in being a role-model around teamwork and collaboration.

There are many challenges (e.g., scheduling conflicts, finding common learning objectives, finding faculty interested and skills at teaching IPE) that make it slightly difficult to develop IPE activities in a classroom, moderately difficult in a simulation center, and extremely difficult in the clinical environment (Gilbert et al., 2010; Lapkin et al., 2013). However, this type of training progression would strengthen the learning outcomes and skill acquisition within the graduate programs that could achieve this scaffolding type of education. While the clinical education component could be the most challenging, it makes up a significant portion of their overall curriculum (CAPTE, 2017; Lapkin et al., 2013). IPCP learning within clinical settings

would allow students to integrate their knowledge and skills and enhance critical thinking and collaboration (Lapkin et al., 2013).

Accreditation standards across professions provide basic IPE information necessary to meet the standard requirements for healthcare curriculum (Chappell, Regnier, & Travlos, 2018; Zorek & Raehl, 2013). It is the faculty and academic institutions that must determine what format and to what extent IPE and IPCP training will be incorporated into the curriculum. The results of this research study provide introductory evidence to suggest that a strong IPE and IPCP curriculum would include more than just classroom training with the assumption that this would result in graduates that are ready to practice collaboratively in their clinical profession. The curricula that include training in the classroom, simulation lab, and clinical environment could rise to a level higher than their academic colleagues. With the need for higher education institutions to show their value over their academic colleagues due to the rising costs of this industry, this could be one way to bring in more students and show a unique strength of a given academic institution and their graduates.

Recommendations for Future Research

This research study just began to touch the surface on what evidence is needed to demonstrate the effectiveness of IPE in graduating healthcare students that have strong skills in interprofessional collaboration. While the seven hypotheses were not proven to be true, the results of this study provided an opportunity to examine what future research could be considered that would advance IPE and IPCP training. One logical next step for future research could be a study that looks at two groups of healthcare students that have received different levels of IPE training and see how they assess their IPCP skills on their clinical practice. One group could have one basic IPE training session, and the other could have that same basic IPE

training session as well as some advanced IPE training. Both groups would then move on to their clinical experience and complete an assessment tool (e.g., ICCAS) at the completion. The results between the two cohorts could be compared to see if there was any difference in knowledge and skill due to the additional IPE training. This type of research could continue to add on layers of training (e.g., training in the simulation lab) to determine if there was a point where the student was provided with enough training to maximize the skills for a healthcare student or new graduate.

One of the limitations of this study was the various clinical settings that the participants were in during their clinical experience (see Figure 3). Since different settings can provide different supports and hurdles to practicing interprofessional collaboration, a future study could do a similar methodology that included only students that had clinical experiences in the same clinical setting. Another limitation to this study was the variety of weeks a student was on their clinical experience (see Figure 2). In a future study, the researchers could control for this variable and only include students that had completed the same number of weeks on their clinical experience. Both of these types of inclusion criteria could be challenging to filter for because of the variety of clinical experience across programs (Lapkin et al., 2013). However, if it was possible to do that with a sample size large enough to show strength in the result the outcomes of these studies would be stronger than the current research study.

The final suggestion for a future study is based on the format this study used to assess the students' skill with interprofessional collaboration. The ICCAS tool is a self-assessment tool. It would be ideal to have the students assessed through observation in the clinical setting. Guraya (2015) described using observation of clinical performance, discussions of clinical cases, and feedback from peers and patients to assess an employee's skill. This type of research study

would be challenging to accomplish and require a significant amount of workforce. However, the results would give strength to the results found.

Summary

The purpose of this research study was to assess if healthcare students were able to demonstrate changes in their interprofessional collaborative practice (IPCP) behaviors after receiving education on the IPCP core competencies. Specifically, the study determined if healthcare students from physical therapy, occupational therapy, and nursing programs demonstrated the behaviors learned during case-based, IPE training to engage in interprofessional collaborative practice in the clinical setting. The research questions assessed the participants' behaviors associated with the interprofessional collaborative core competencies that have been described by the Canadian Interprofessional Health Collaborative (2007). The study evaluated the participants' self-assessment of their IPCP behaviors after their IPE training, at the start of their clinical experience, and the end of their clinical experience. The hypotheses of the study were not found to be true. The mean scores for all six core competencies and the total IPCP score were higher after the IPE training than the pre and post-clinical experience point in time. These results could suggest that the participants did not realize how much more they needed to learn about IPCP until they were in the clinical setting working with a team and collaborating with colleagues from other professions. The small sample size, varied length of clinical experiences, and varied clinical settings where students were assigned for the clinical experience are limitations to the study. Future studies could look at two groups that have different levels of IPE training to assess if that impacts their IPCP skills. Other future studies could standardize the weeks on clinical or the clinical setting the students are placed in to eliminate that variable. While the hypotheses were not supported, finding that students rated

their IPCP skills higher after their classroom training as compared to the other points in time suggests that IPE training should be scaffolded throughout the curriculum and include training in a simulation lab and on clinical experience to more adequately prepare students for IPCP in their professional career.

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Appendix A

Electronic Survey

Purpose: You are invited to be a participant in the research study to be conducted by a doctoral candidate student at the University of St. Augustine. The purpose of this study is to determine if students from physical therapy, occupational therapy, social work, nursing, and pharmacy programs are able to transfer knowledge, skills, and behaviors learned during IPE training to be able to participate in interprofessional teamwork during their clinical experience/field work/internship. If you agree to participate, the investigator will use your responses to the survey questions to determine your self-reported ability to be involved in interprofessional teamwork on your clinical experience/field work/internship.

Information to participants: No personal information that identifies you will be collected or included in the research study. Your participation in this research study is voluntary and will have no impact on any other aspect of your status as a student at the University of New England. You may refuse to participate, or may withdraw your permission at any time. There is no penalty if you do not participate. Your participation in this research study will occur until you complete the survey or until you withdraw from the study.

Benefits and/or Risks: There are no risks associated with being a subject of this research study. There is no compensation or cost to you in any way. If you agree to participate, you will be helping this researcher gain important information about interprofessional education.

Questions or Concerns: If you have any concerns about your participation in the study, you should discuss them with Sally McCormack Tutt, PT, DPT, MPH at (207) 221-4593. If you continue to have concerns, you may contact the Faculty Research Advisor, Dr. Meredith Parry EdD, LAT, ATC, CSCS at (305) 613-3534. If these resources are not able to address your

concerns, you may the co-chairs of St. Augustine campus IRB, Lisa A. Chase, PhD, PT, or Jeffrey A. Rot, PT, DHSc, at the University of St. Augustine for Health Sciences – St. Augustine FL campus: 1-904-826-0084 x1234 or 800-241-1027 x1234.

Consent to Participate: If you have read all of the information above and voluntarily agree to participate in the research study, please check yes to the question below. Thank you!

1. I have read all of the information above and voluntarily agree to participate in this research study. ___ Yes ___ No

2. In order for the researcher to be able to link the survey information from the interprofessional education (IPE) during the summer semester 2018 and the results of this current survey, you are asked to enter a Personal ID code that will be consistent for both surveys you completed. The ID code was created during the IPE survey by using the last 2 letters of your (legal) first name + last 4 digits of your (primary) cell phone number. For example: John Doe, 207-555-4362 = HN4362. Please provide the last 2 letters of your * (legal) first name: _____

3. What are the last 4 digits of your (primary) cell phone number (e.g. (555)-555X- XXX)?

_____

4. The health professional program I am enrolled in is: social work/occupational therapy/nursing/physical therapy/pharmacy

5. What type of clinical setting did you practice in during your fall 2018 clinical rotation/fieldwork/field practicum course? Acute care – hospital/ Acute Rehabilitation unit/facility/ Sub-acute rehabilitation/ Skilled Nursing Facility/ Outpatient clinical practice/ School-system/ Community mental health and substance use disorder centers/ Inpatient and/or

residential mental health and/or substance use disorder programs/ Community social service agencies (such as Sexual Assault Response Services, Caring Unlimited (DV), Portland Public Library, Preble St. Resource Center, homeless shelters, Shalom House, etc.)/ Federally Qualified Health Center/ Other

6. How many weeks did you participate in during your clinical rotation/fieldwork? 1-5 weeks/ 6-10 weeks/ 11 – 16 weeks

7. How many hours per week did you participate in during your clinical rotation/fieldwork? 0-10 hours/week on average/ 11-20 hours/week on average/ 20 – 30 hours/week on average/ 30 or more hours/week on average/ Variable from one week to the next

8. Please rate your ability "Before" participating in your clinical rotation/fieldwork, and "After" using the following rating scale. 1= strongly disagree; 2= moderately disagree; 3=slightly disagree; 4= neutral; 5=slightly agree; 6=moderately agree; 7= strongly agree.

a. Before participating in the clinical rotation/fieldwork I was able to:

- Promote effective communication among members of an interprofessional (IP) team
- Actively listen to IP team members' ideas and concerns
- Express my ideas and concerns without being judgmental
- Provide constructive feedback to IP team members
- Express my ideas and concerns in a clear, concise manner
- Seek out IP team members to address issues
- Work effectively with IP team members to enhance care
- Learn with, from and about IP team members to enhance care
- Identify and describe my abilities and contributions to the IP team

- Be accountable for my contributions to the IP team
- Understand the abilities and contributions of IP team members
- Recognize how others' skills and knowledge complement and overlap with my own
- Use an IP team approach with the patient to assess the health situation
- Use an IP team approach with the patient to provide whole person care
- Include the patient/family in decision-making
- Actively listen to the perspectives of IP team members
- Take into account the ideas of IP team members
- Address team conflict in a respectful manner
- Develop an effective care plan with IP team members
- Negotiate responsibilities within overlapping scopes of practice

b. After participating in the clinical rotation/fieldwork I am able to:

- Promote effective communication among members of an interprofessional (IP) team
- Actively listen to IP team members' ideas and concerns
- Express my ideas and concerns without being judgmental
- Provide constructive feedback to IP team members
- Express my ideas and concerns in a clear, concise manner
- Seek out IP team members to address issues
- Work effectively with IP team members to enhance care
- Learn with, from and about IP team members to enhance care
- Identify and describe my abilities and contributions to the IP team
- Be accountable for my contributions to the IP team
- Understand the abilities and contributions of IP team members

- Recognize how others' skills and knowledge complement and overlap with my own
- Use an IP team approach with the patient to assess the health situation
- Use an IP team approach with the patient to provide whole person care
- Include the patient/family in decision-making
- Actively listen to the perspectives of IP team members
- Take into account the ideas of IP team members
- Address team conflict in a respectful manner
- Develop an effective care plan with IP team members
- Negotiate responsibilities within overlapping scopes of practice

9. Thank you for helping with this research study. Please provide any additional comments below:

Appendix B

Interprofessional Collaborative Competency Attainment Scale (ICCAS)

ICCAS – Interprofessional Collaborative Competencies Attainment Survey

For your unique anonymous participant code, please provide your mother's first name initial, the day and month of her birthday: __ - __ __ __ __
Please indicate your profession: _____
Please indicate if you are: a student _____ year of program _____ or practitioner _____

Please answer the following questions by filling in the circle that most accurately reflects your opinion about the following interprofessional collaboration statements:
1= strongly disagree; 2= moderately disagree; 3=slightly disagree; 4= neutral; 5=slightly agree; 6=moderately agree; 7= strongly agree; na= not applicable

Please rate your ability for each of the following statements:

	Before participating in the learning activities I was able to:								**After** participating in the learning activities I am able to:							
Communication	1	2	3	4	5	6	7	na	1	2	3	4	5	6	7	na
1. Promote effective communication among members of an interprofessional (IP) team*	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
2. Actively listen to IP team members' ideas and concerns	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
3. Express my ideas and concerns without being judgmental	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
4. Provide constructive feedback to IP team members	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
5. Express my ideas and concerns in a clear, concise manner	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Collaboration																
6. Seek out IP team members to address issues	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
7. Work effectively with IP team members to enhance care	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
8. Learn with, from and about IP team members to enhance care	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Roles and Responsibilities																
9. Identify and describe my abilities and contributions to the IP team	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
10. Be accountable for my contributions to the IP team	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
11. Understand the abilities and contributions of IP team members	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
12. Recognize how others' skills and knowledge complement and overlap with my own	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Collaborative Patient/Family-Centred Approach																
13. Use an IP team approach with the patient** to assess the health situation	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
14. Use an IP team approach with the patient to provide whole person care	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
15. Include the patient/family in decision-making	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Conflict Management/Resolution																
16. Actively listen to the perspectives of IP team members	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
17. Take into account the ideas of IP team members	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
18. Address team conflict in a respectful manner	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Team Functioning																
19. Develop an effective care*** plan with IP team members	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
20. Negotiate responsibilities within overlapping scopes of practice	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○

*The patient's family or significant other, when appropriate, are part of the IP team.
**The word "patient" has been employed to represent client, resident, and service users.
***The term "care" includes intervention, treatment, therapy, evaluation, etc.

Appendix C

Informed Consent Introductory Email

Hello _____,

I am a doctoral candidate at the University of St. Augustine for Health Sciences in Florida in the doctor of education program. I am requesting your participation in survey research I am completing as part of my degree requirements. The title of the research study is "Healthcare students' abilities to translate interprofessional education to collaborative practice". You have been selected to participate in this research study because you participated in the UNE case-based, interprofessional education (IPE) module during your summer semester and have completed clinical education/field work during your fall semester at the University of New England.

The purpose of this study is to determine if students from physical therapy, occupational therapy, social work, nursing, and pharmacy programs are able to transfer knowledge, skills, and behaviors learned during IPE training to be able to participate in interprofessional teamwork during their clinical experience/field work/internship.

If you agree to participate, the investigator will use your responses to the survey questions to determine your self-reported ability to be involved in interprofessional teamwork on your clinical experience/field work/internship. An electronic survey will be used to collect information about you such as your health profession program, type of clinical setting experience, and the number of weeks of your clinical experience/field work/internship. It should only take about 10-15 minutes to complete the survey.

There are no risks related to your participation in this research study. If you agree to participate, you will be helping this researcher gain important information about IPE. There is no compensation or cost to you in any way. The University of St. Augustine is not liable for any cost or compensations incurred because of participating in this study.

This is a completely anonymous survey. All responses will be kept confidential and anonymous. No personal information that identifies you will be collected or included in the research study. Your participation in this research study is voluntary and will have no impact on any other aspect of your status as a student at UNE. You may refuse to participate, or may withdraw your permission at any time. There is no penalty if you do not participate. Your participation in this research study will occur until you complete the survey or until you withdraw from the study. If you withdraw from the study, all of your data that was collected will be destroyed.

By completing this survey, you are giving your informed consent for the use of your responses in this research study. If you have any concerns about your participation in the study, you should discuss them with Sally McCormack Tutt, PT, DPT, MPH at (207) 400-6046. If you continue to have concerns, you may contact the Faculty Research Advisor, Dr. Meredith Parry EdD, LAT, ATC, CSCS at (305) 613-3534. If these resources are not able to address your concerns, you may the Chair of St. Augustine campus IRB, Jeffrey A. Rot, PT, DHSc, at the University of St. Augustine for Health Sciences – St. Augustine FL campus: 1-904-770-3534 or 800-241-1027 x1234.

Your input is important to us – please take a few minutes to answer the following questions by clicking on the link below:

https://www.surveymonkey.com/r/Preview/?sm=hPoe2hYICylVVp_2FEpptOBsSq3PXtJ5VLwooN4UPAU1swYyaoamc5kG0zuNHzZfnB

Thank you for your time and consideration.

Sincerely,

Sally McCormack Tutt

Appendix D

UNE IRB Approval letter

UNIVERSITY OF NEW ENGLAND

Institutional Review Board
Olgun Guvench, Chair

Biddeford Campus
11 Hills Beach Road
Biddeford, ME 04005
(207)602-2244 T
(207)602-5905 F

Portland Campus
716 Stevens Avenue
Portland, ME 04103

To: Sall McCormack-Tutt, DPT

From: Lliam Harrison

Date: July 23, 2018

Project # & Title: 18.07.12-008 Healthcare Students' Abilities to Translate Interprofessional Education to Collaborative Practice

The Institutional Review Board (IRB) for the Protection of Human Subjects has reviewed the above captioned project and has determined that the proposed work is not human subject research as defined by 45 CFR 46.102(f)(1) & (f)(2).

Additional IRB review and approval is not required for this protocol as submitted. If you wish to change your protocol at any time, you must first submit the changes for review.

Please contact Lliam Harrison at (207) 602-2244 or wharrison@une.edu with any questions.

Sincerely,

William R. Harrison, M.A., J.D.
Director of Research Integrity

IRB#: 18.07.12-008
Submission Date: July 11, 2018
Status: Not Human Subject Research, 46 CFR 46.102(f)(1) & (f)(2)
Status Date: July 23, 2018

Appendix E

USA IRB Approval letter

UNIVERSITY OF ST. AUGUSTINE
FOR HEALTH SCIENCES

October 5, 2018

Sally McCormack Tutt PT, DPT, MPH
University of New England
716 Stevens Ave
Portland ME 04103

RE: IRB #EDD-1011-302 *"Healthcare Students' Abilities to Translate Interprofessional Education to Collaborative Practice"*

Dear Dr. Tutt:

A member of the Institutional Review Board (IRB), responsible for the review of research involving human subjects, has reviewed and expedited your research proposal. Approval for your project will be for one year, starting October 5, 2018.

This approval is granted with the understanding that no changes may be made in the procedures to be followed until after an addendum request has been approved by the IRB.

Any unanticipated problems involving risks to human subjects or serious adverse effects must be promptly reported to the IRB. **Please include the IRB number assigned above on all documents related to this research.**

Prior to the expiration of this approval, you will receive notification of the need for updated information if you plan to continue your research.

If you graduate from the university or complete your research prior to October 5, 2019, please notify the IRB.

Sincerely,

Jeffrey A. Rot, PT, DHSc, OCS, MTC, FAAOMPT
Chair, IRB

JR/ck

Table 1

Data Demonstrating Assumption of Sphericity

Research Question	df	Chi-square	p-value
1	2	4.885	.087
2	2	2.377	.305
3	2	4.427	.109
4	2	.591	.744
5	2	4.436	.109
6	2	9.267	.010
7	2	1.096	.578

Data Demonstrating Assumption of Normal Distribution for Repeated Measures ANOVA

Research Question	Value	F	Hypothesis df	Error df	Sig.
1	.274	23.824	2.000	18.000	.000
2	.278	24.630	2.000	19.000	.000
3	.181	40.683	2.000	18.000	.000
4	.204	37.177	2.000	19.000	.000
5	.439	11.494	2.000	18.000	.001
6	.186	39.357	2.000	18.000	.000
7	.185	37.370	2.000	17.000	.000

Table 2

Internal Consistency for Research Questions

Research Question	Cronbach's alpha
1	.638
2	.567
3	.745
4	.723
5	.667
6	.578
7	.728

Table 3

Demographics of Participants

Health Profession	# of Completed Ex post Facto Survey	# of Completed Current Survey	% Response Rate
Occupational Therapy	40	7	18
Physical Therapy	33	13	39
Social Work	5	0	0
Pharmacy	4	0	0
Nursing	2	1	50
Total	84	21	25

# of Participants	# of Weeks of Clinical Rotation	Percentage
21	30 or more hours/week	100

# of Participants	# of Hours/Week of Clinical Rotation	Percentage
7	1 – 5	33.33
1	6- 10	4.77
13	11 – 16	61.90
Total		100

# of Participants	Facility Type for Clinical Rotation	Percentage
8	Acute Care Hospital	38.10
1	Acute Rehabilitation Facility	4.76
10	Outpatient Clinic	47.62
2	Skilled Nursing Facility	9.52

Table 4

Repeated Measures ANOVA for Interprofessional Communication (Research Question 1)

Descriptive Statistics

Time	Mean	SD	N
Ex post facto	31.000	3.244	20
Pre-Clinical	25.950	3.531	20
Post-Clinical	29.850	2.540	20

Within-Subjects Results

	SS	df	MS	F	p
Time	280.233	2	140.117	22.648	.000
Error	235.100	38	6.187		

Bonferroni Results

	Mean Difference	SD	p	95% CI
Ex post facto/Pre-Clinical	5.050	.928	.000	2.615 – 7.485
Pre-Clinical/Post-Clinical	-3.900	.584	.000	-5.434 - -2.366
Post-Clinical/Ex post facto	-1.150	.809	.514	-3.273 - .973

Note: significance at $p < .05$ level

Table 5

Repeated Measures ANOVA Results for Collaboration (Research Question 2)

Descriptive Statistics

Time	Mean	SD	N
Ex post facto	18.762	1.786	21
Pre-Clinical	14.619	2.334	21
Post-Clinical	18.190	2.112	21

Within-Subjects Results

	SS	df	MS	F	p
Time	211.714	2	105.857	33.816	.000
Error	121.619	40	3.040		

Bonferroni Results

	Mean Difference	SD	p	95% CI
Ex post facto/Pre-Clinical	4.143	.599	.000	2.579 – 5.707
Pre-Clinical/Post-Clinical	-3.571	.563	.000	-5.042 - -2.100
Post-Clinical/Ex post facto	-.571	.440	.625	-1.720 - .577

Note: significance at $p < .05$ level

Table 6

Repeated *Measures ANOVA Results for Roles & Responsibilities (Research Question 3)*

Descriptive Statistics

Time	Mean	SD	N
Ex post facto	25.333	1.958	21
Pre-Clinical	20.000	3.178	21
Post-Clinical	23.857	2.816	21

Within-Subjects Results

	SS	df	MS	F	p
Time	318.508	2	159.254	43.190	.000
Error	147.492	40	3.687		

Bonferroni Results

	Mean Difference	SD	p	95% CI
Ex post facto/Pre-Clinical	5.333	.688	.000	3.536 – 7.130
Pre-Clinical/Post-Clinical	-3.857	.454	.000	-5.043 - -2.671
Post-Clinical/Ex post facto	-1.476	.612	.077	-3.075 - .122

Note: significance at $p < .05$ level

Table 7

Repeated *Measures ANOVA Results for Collaborative-Centered Care (Research Question 4)*

Descriptive Statistics

Time	Mean	SD	N
Ex post facto	19.143	2.080	21
Pre-Clinical	14.286	3.085	21
Post-Clinical	17.857	3.038	21

Within-Subjects Results

	SS	df	MS	F	p
Time	266.000	2	133.000	32.308	.000
Error	164.667	40	4.117		

Bonferroni Results

	Mean Difference	SD	p	95% CI
Ex post facto/Pre-Clinical	4.857	.574	.000	3.356 – 6.358
Pre-Clinical/Post-Clinical	-3.571	.631	.000	-5.220 - -1.923
Post-Clinical/Ex post facto	-1.286	.670	.208	-3.035 - .464

Note: significance at $p < .05$ level

Table 8

Repeated *Measures ANOVA Results for Interprofessional Conflict Management/Resolution (Research Question 5)*

Descriptive Statistics

Time	Mean	SD	N
Ex post facto	19.550	1.468	20
Pre-Clinical	16.750	2.673	20
Post-Clinical	18.700	1.838	20

Within-Subjects Results

	SS	df	MS	F	p
Time	82.433	2	41.217	16.275	.000
Error	96.233	38	2.532		

Bonferroni Results

	Mean Difference	SD	p	95% CI
Ex post facto/Pre-Clinical	2.800	.610	.001	1.200 – 4.400
Pre-Clinical/Post-Clinical	-1.950	.438	.001	-3.100 - -.800
Post-Clinical/Ex post facto	-.850	.443	.210	-2.013 - .313

Note: significance at $p < .05$ level

Table 9

R*epeated Measures ANOVA with a Greenhouse-Geisser correction Results for Teamwork (Research Question 6)*

Descriptive Statistics

Time	Mean	SD	N
Ex post facto	12.400	1.536	20
Pre-Clinical	9.050	1.761	20
Post-Clinical	11.000	2.052	20

Within-Subjects Results

	SS	df	MS	F	p
Time	113.233	1.426	79.399	25.582	.000
Error	84.100	27.097	3.104		

Bonferroni Results

	Mean Difference	SD	p	95% CI
Ex post facto/Pre-Clinical	3.350	.504	.000	2.027 – 4.673
Pre-Clinical/Post-Clinical	-1.950	2.94	.000	-2.723 - -1.177
Post-Clinical/Ex post facto	-1.400	.568	.071	-2.892 - .092

Note: significance at $p < .05$ level

Table 10

Repeated *Measures ANOVA Results for all Six IPCP Core Competencies (Research Question 7)*

Descriptive Statistics

Time	Mean	SD	N
Ex post facto	126.263	10.770	19
Pre-Clinical	99.579	14.296	19
Post-Clinical	119.000	12.763	19

Within-Subjects Results

	SS	df	MS	F	p
Time	7232.526	2	3616.263	42.505	.000
Error	3062.807	36	85.078		

Bonferroni Results

	Mean Difference	SD	p	95% CI
Ex post facto/Pre-Clinical	26.684	3.301	.000	17.973 – 35.395
Pre-Clinical/Post-Clinical	-19.421	2.649	.000	-26.413 - -12.429
Post-Clinical/Ex post facto	-7.263	2.992	.078	-15.160 - .633

Note: significance at $p < .05$ level

Table 11

Mean Scores

	Ex post facto Mean	Pre-Clinical Mean	Post-Clinical Mean
RQ 1 (Communication)	31.00	25.95	29.85
RQ 2 (Collaboration)	18.76	14.62	18.19
RQ 3 (Roles & Responsibilities)	25.33	20.00	23.86
RQ 4 (Collaborative-centered Care)	19.14	14.29	17.86
RQ 5 (Conflict Management)	19.55	16.75	18.70
RQ 6 (Teamwork)	12.40	9.05	11.00
RQ 7 (Total IPCP)	126.26	99.58	119.00

Table 12

Pre-Clinical vs. Post-Clinical Results

	Pre-Clinical Mean	Post-Clinical Mean	*p-value*
RQ 1 (Communication)	25.95	29.85	.000
RQ 2 (Collaboration)	14.62	18.19	.000
RQ 3 (Roles & Responsibilities)	20.00	23.86	.000
RQ 4 (Collaborative-centered Care)	14.29	17.86	.000
RQ 5 (Conflict Management)	16.75	18.70	.001
RQ 6 (Teamwork)	9.05	11.00	.000
RQ 7 (Total IPCP)	99.58	119.00	.000

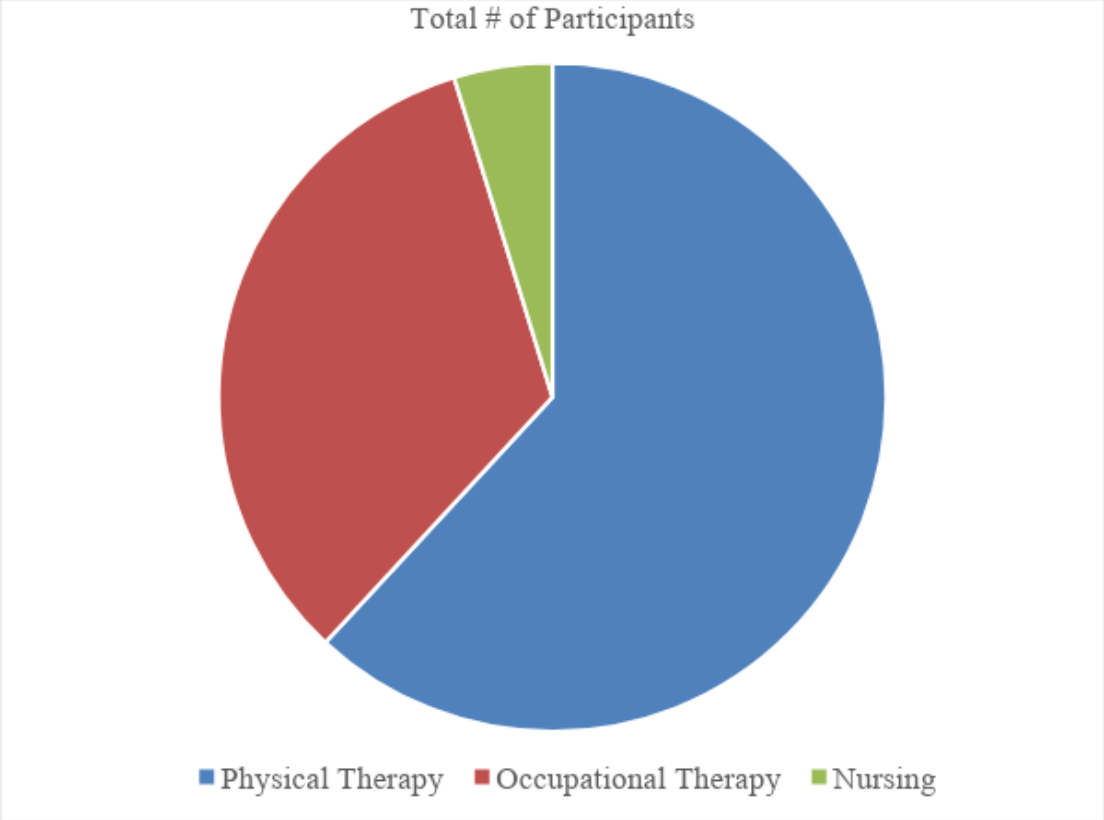

Figure 1. Number of Participants in the Study from Each Healthcare Professional Program

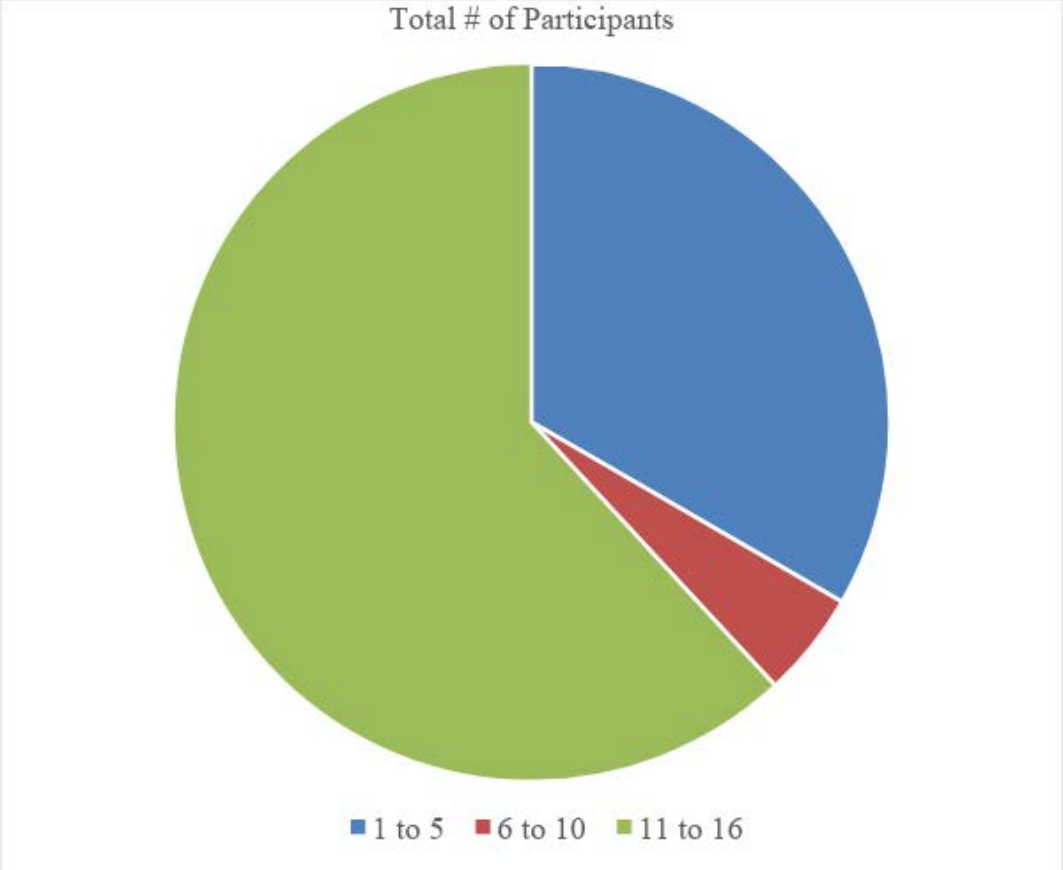

Figure 2. Number of Week Each Participant Spent on Clinical Rotation

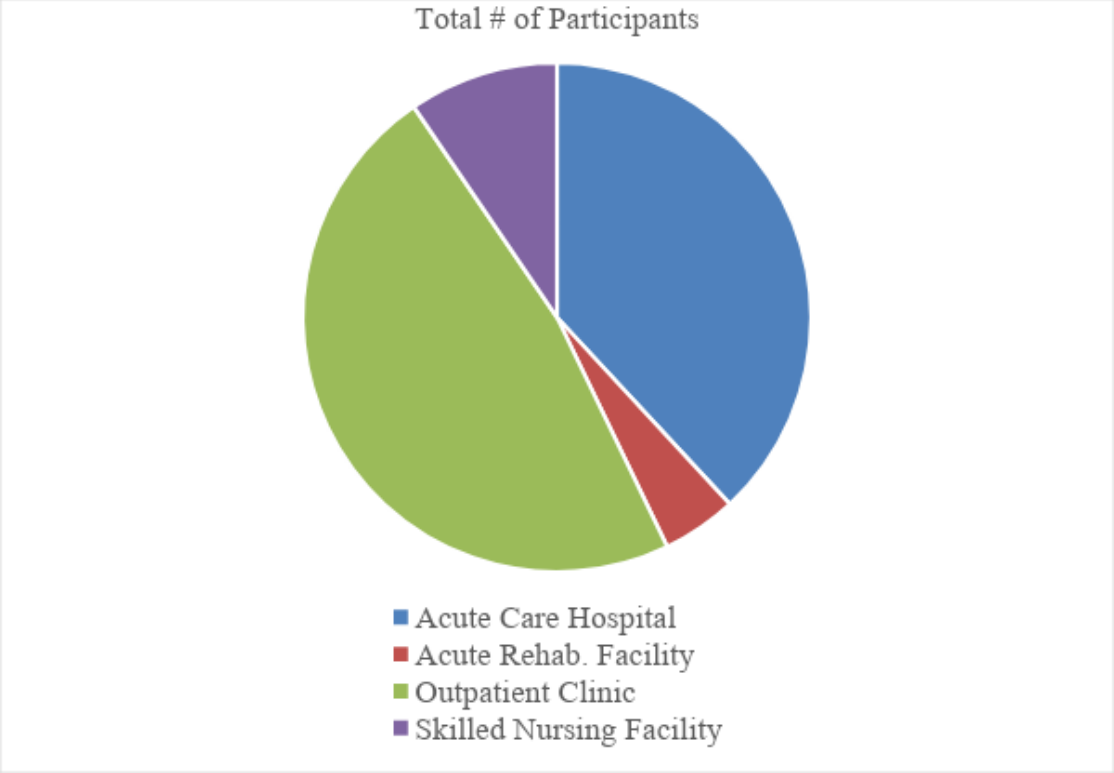

Figure 3. Number of Participants That Had a Clinical Rotation at the Identified Facility Type

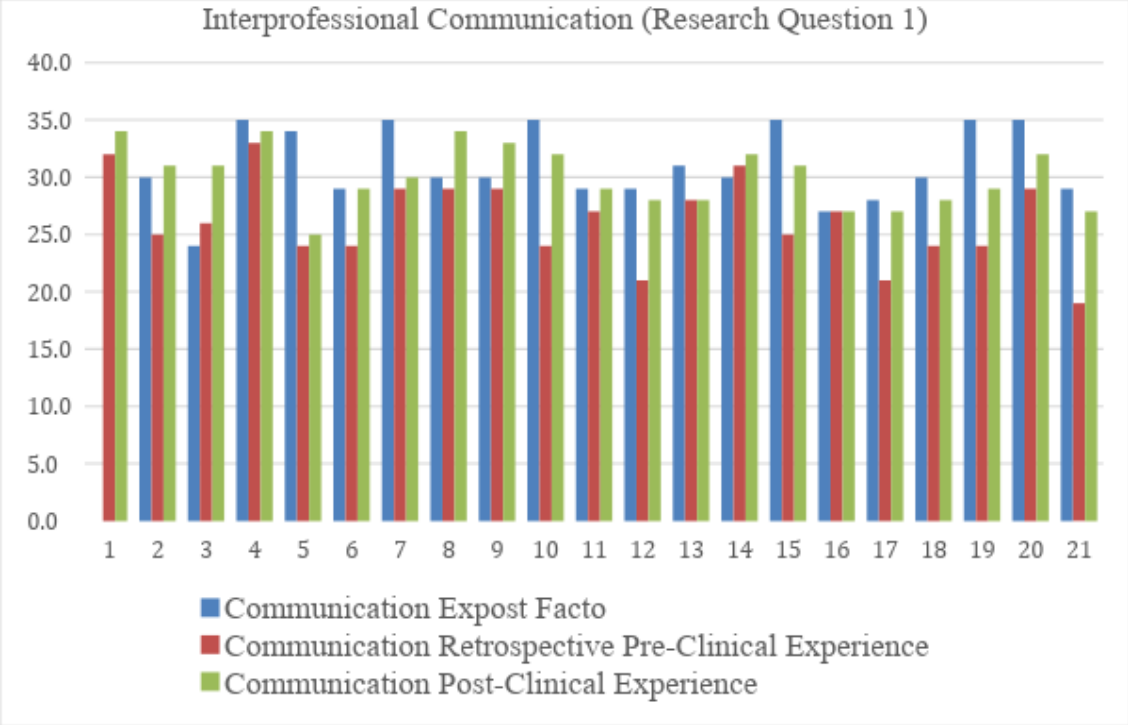

Figure 4. Total Interprofessional Communication Scores (questions 1-5) on ICCAS per Participant

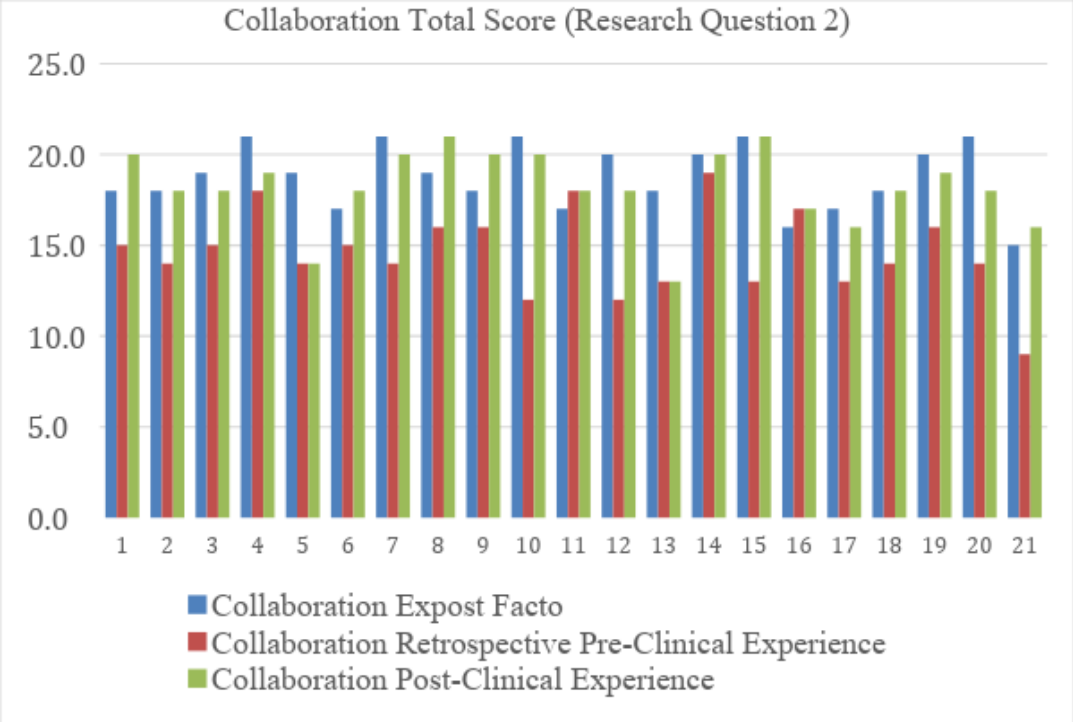

Figure 5. Total Collaboration Scores (questions 6-8) on ICCAS per Participant

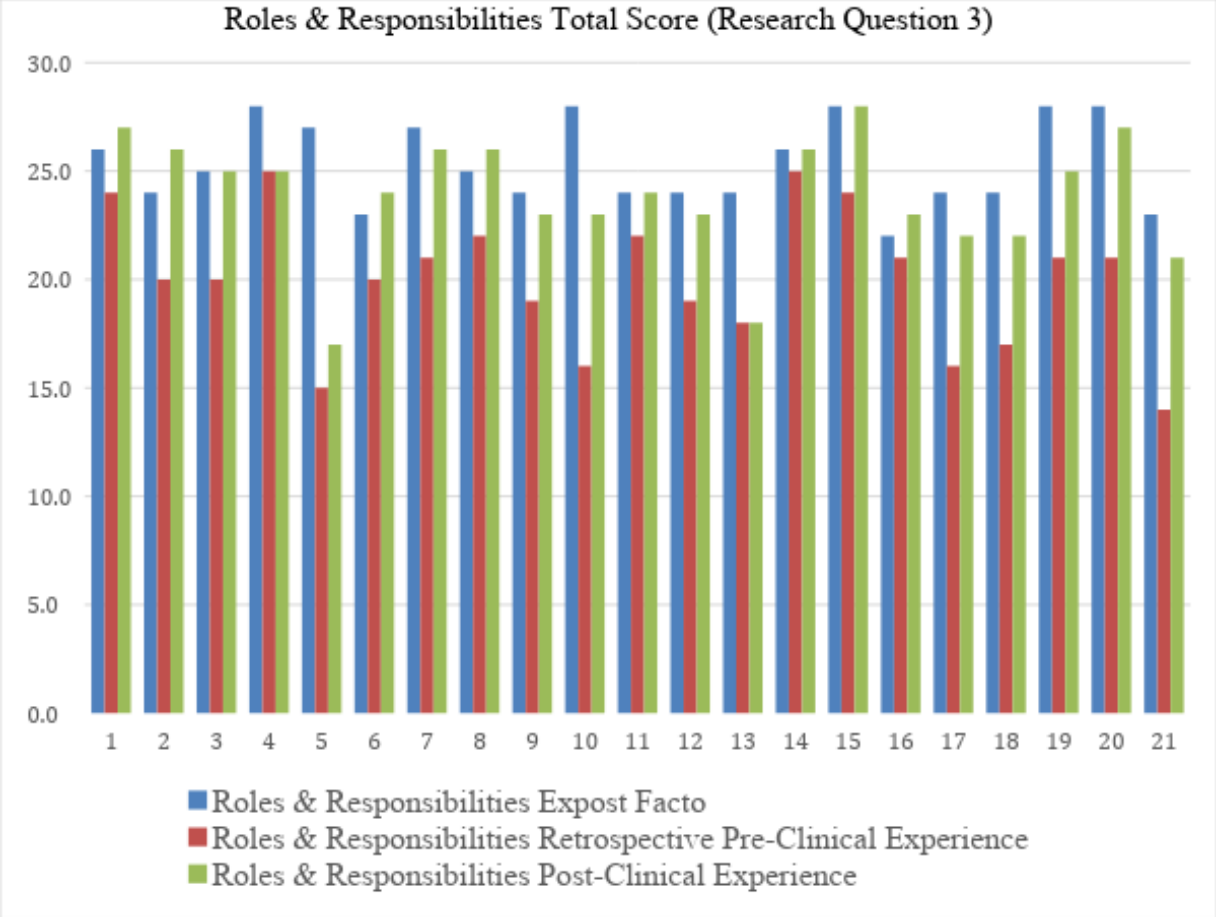

Figure 6. Total Roles and Responsibilities Scores (questions 9-12) on ICCAS per Participant

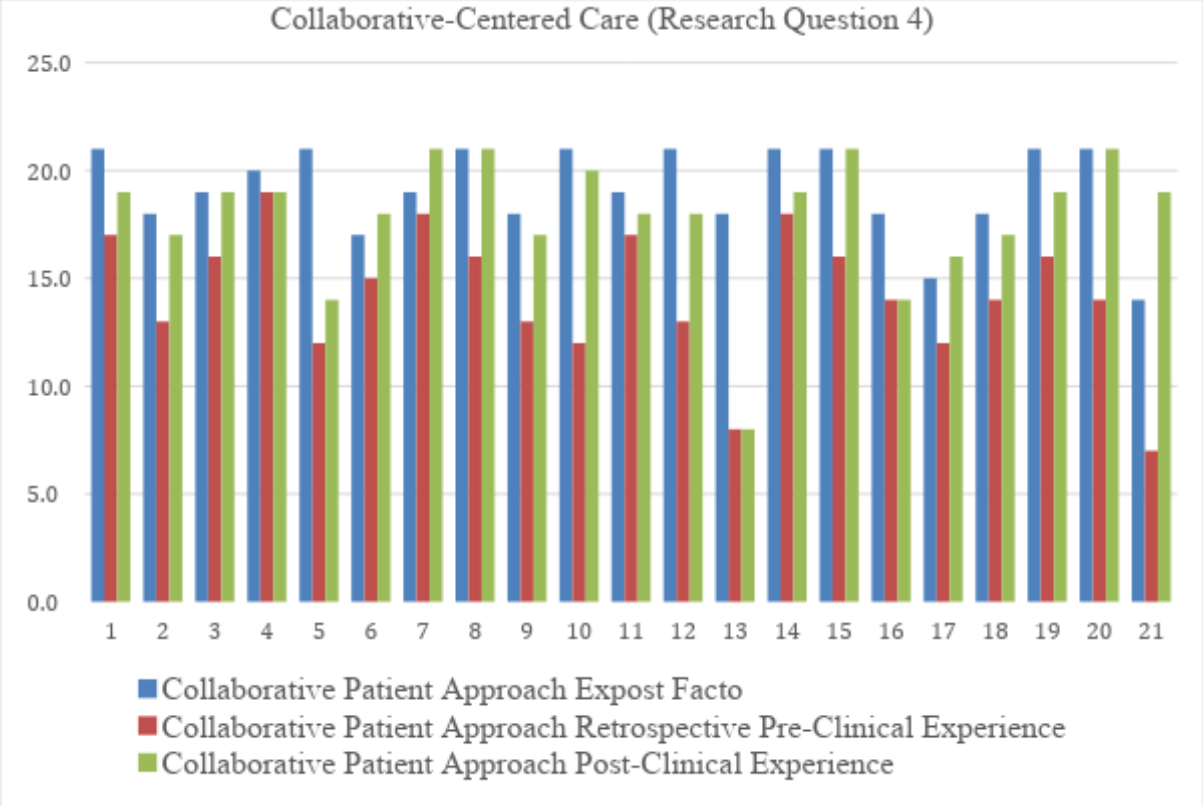

Figure 7. Total Collaborative-Centered Care Scores (questions 13-15) on ICCAS per Participant

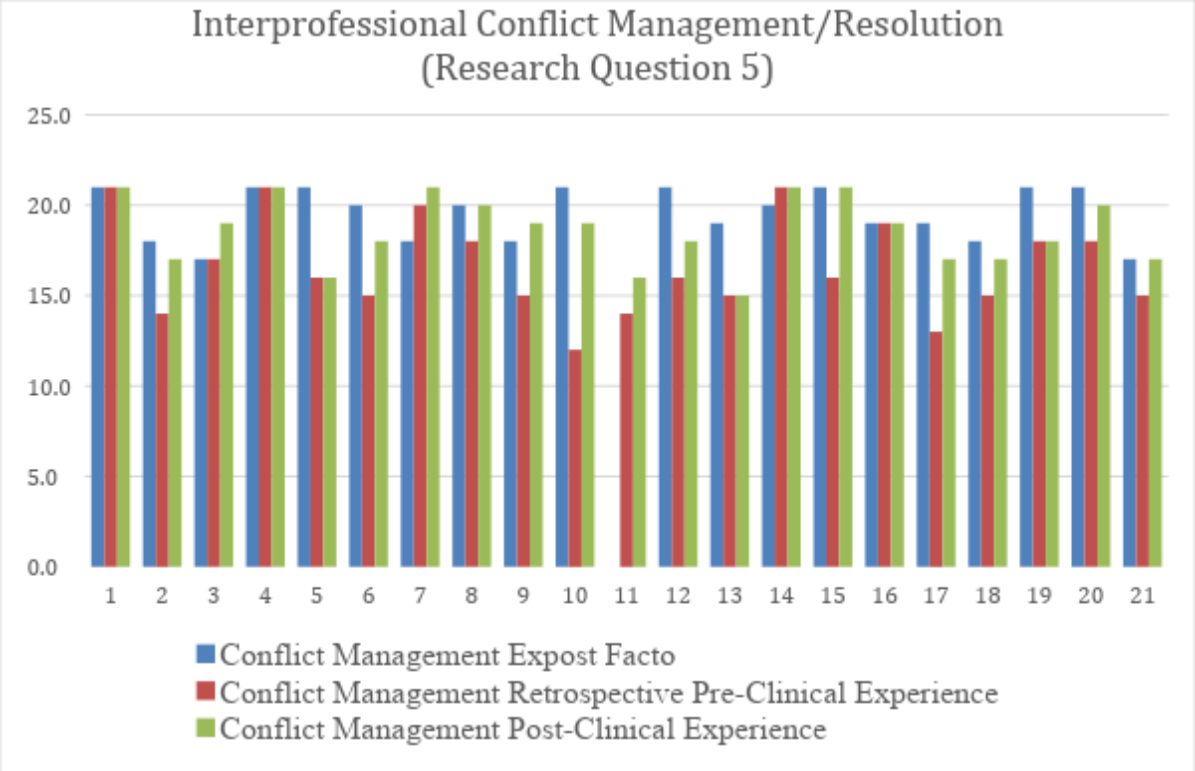

Figure 8. Total Interprofessional Conflict Management/Resolution Scores (questions 16-18) on ICCAS per Participant

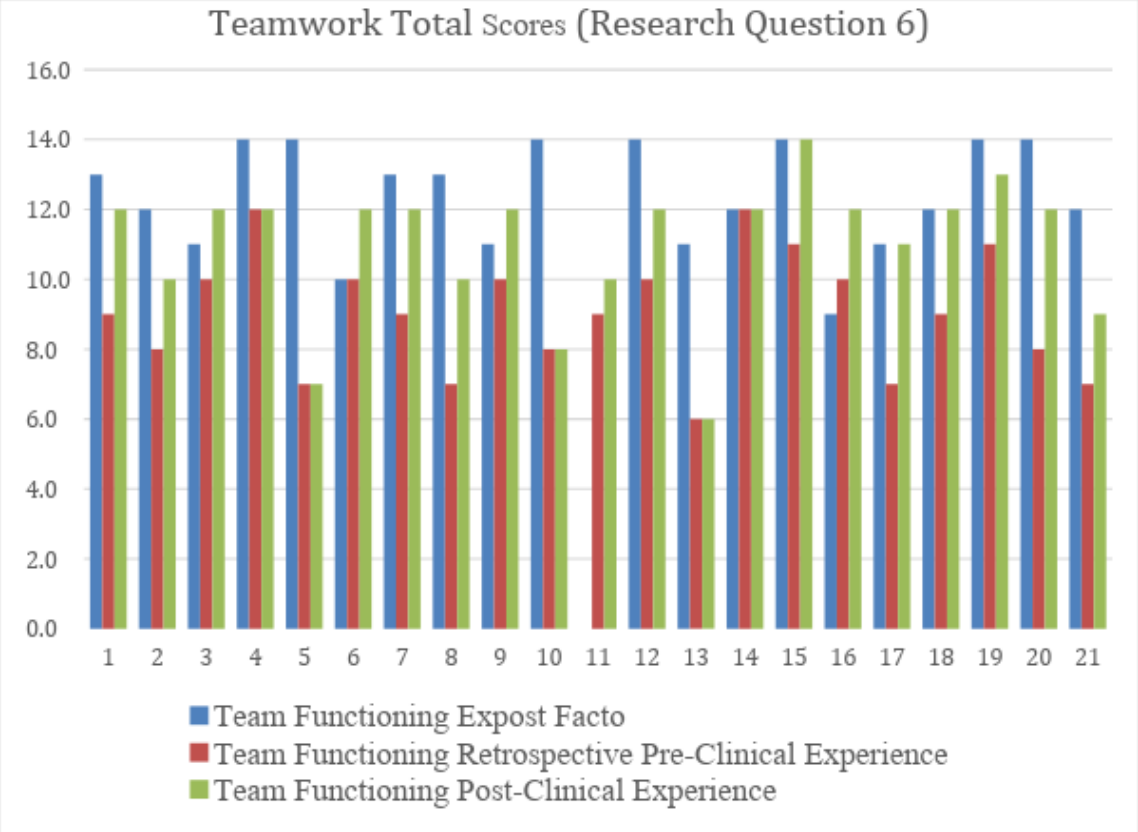

Figure 9. Total Teamwork Scores (questions 19-20) on ICCAS per Participant

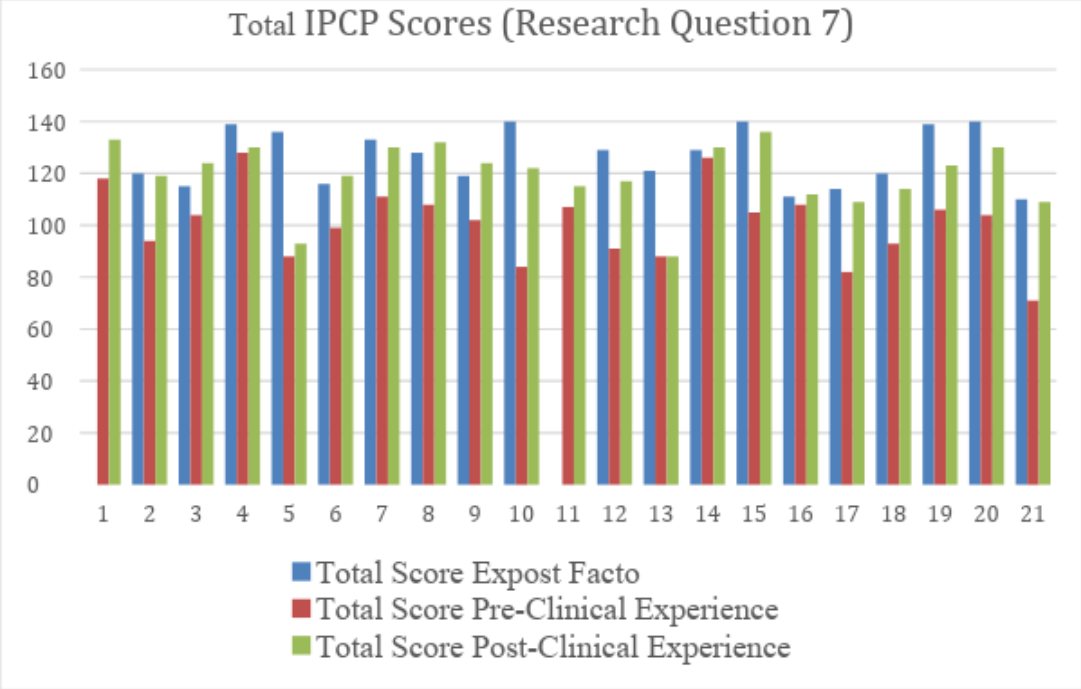

Figure 10. Total Teamwork Scores (all 20 questions) on ICCAS per Participant