Promoting Interprofessional Collaboration Among Pediatric Physical Therapy Students Through Remote Simulation

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Interprofessional collaboration must be taught in healthcare curriculum to ready graduates for the clinic, however, limited evidence is available to guide pediatric physical therapy faculty in best practices. This quantitative retrospective pretest-posttest study examined collaborative competency attainment, satisfaction, and self-confidence of 84 Doctor of Physical Therapy students from four campuses of a private university. Students participated in a live, remote simulated learning experience and completed the Student Satisfaction and Self-Confidence in Learning scale and the Interprofessional Collaborative Competencies Attainment Survey–Revised. There was significant improvement in student collaborative competencies after the simulated learning experience and students were satisfied and confident in the learning experience regardless of demographics. Findings support implementation of a remote simulation for the purpose of interprofessional collaboration in pediatric physical therapy education and may relate to other fields. Future research may explore the influence of interdisciplinary, remote simulation interventions on student behavior in the clinic and patient outcomes.

Keywords: interprofessional collaboration, pediatric physical therapy, remote, simulation

INTRODUCTION

Pediatric physical therapy is a complex subspecialty which addresses the multifaceted care of children and their families. Per physical therapy education accreditation standards, new graduates are expected to be trained for the care of individuals across the lifespan (Commission on Accreditation in Physical Therapy Education [CAPTE], 2020). However, pediatric physical therapy content is usually housed within one course and clinical internships with children are not required (Schreiber et al., 2011). Resultantly, pediatric physical therapy faculty are faced with the task of educating physical therapy students about a specialty population within the general curriculum in preparation to meet entry-level clinical needs. In 2020, Moerchen et al. (2020) presented a call for research supporting pediatric physical therapy education in response to a lagging initiative in the area of scholarship of teaching and learning. One of the priorities for

investigation was to "identify effective teaching and learning methods/strategies" (Moerchen et al., 2020, p. 66) within pediatric physical therapy education.

Recommendations for pediatric physical therapy education include topics such as human development, age-appropriate patient management, family-centered care, health promotion and safety, and knowledge of legislation, policy, and systems which may influence the lives of children with disabilities and their families (Rapport et al., 2014). Additionally, collaboration between healthcare professionals for the treatment of children and families is essential to improve quality of care and patient outcomes (Del Rossi et al., 2017; Straub et al., 2020) and must be addressed per physical therapy education standards (CAPTE, 2020). Interprofessional competencies are defined as an individual's skills, knowledge, values, and attitudes that increase collaboration across disciplines to improve patient care (Interprofessional Education Collaborative [IPEC], 2016). Interprofessional competencies have been acknowledged as an important learning construct in all of healthcare and are characteristic of competent clinicians (World Health Organization [WHO], 2010). Evidence suggests that interprofessional competency skills such as teamwork, communication, and understanding professional roles can be learned within pediatric physical therapy curriculum (Del Rossi et al., 2017; Kerfeld et al., 2017).

The use of simulation allows healthcare students to experience a realistic representation of a healthcare event "for the purpose of practice, learning, evaluation, testing, or to gain understanding of systems or human actions" (Lioce et al., 2020, p. 44). Simulation-based education has been utilized as an effective strategy for training students in interprofessional care within adult-based physical therapy education and in parallel professions such as medicine and nursing (Alanazi et al., 2017; Donlan et al., 2020; Lee et al., 2018; Sabus & Macauley, 2016). Although limited studies exist which support the use of simulation as an efficacious teaching strategy highlighting psychomotor and communication skills in pediatric physical therapy education (Hough et al., 2019; Hung et al., 2019), there is no known research which addresses interprofessional collaboration using simulation within the subspecialty area. Due to the limited opportunities for pediatric physical therapy internships, simulation may be an especially relevant option for student development within the context of working with children and their families.

Although remote simulation was used prior to the Covid-19 pandemic, the learning method became increasingly popular when healthcare students were forced to attend courses virtually instead of face-to-face due to health concerns and distancing requirements (Diaz & Walsh, 2021; Ghoman et al., 2020; Newman & Lattouf, 2020; Prasad et al., 2020). Remote simulation is an educational technique in which learners and facilitators are in separate off-site locations (Diaz & Walsh, 2021; Lioce et al., 2020; Thomas et al., 2021) and has been used to effectively promote interprofessional collaboration among healthcare students (McCoy et al., 2017; Papanagnou, 2017; Prasad et al., 2020). Remote simulation is a realistic way to address interprofessional communication and teamwork, as the clinical setting often demands individuals from different disciplines to interact via telephone, video conference, or email. Investigating distance learning options such as remote simulation is a relevant area of study due to the increasing popularity of online education and the shift to online healthcare education because of rising health concerns (Ghoman et al., 2020; Hays et al., 2020; Newman & Lattouf, 2020; Seaman et al., 2018).

Generally, there is a paucity of research on the efficacy of pediatric physical therapy educational techniques. Specifically, little is known about how simulation as an educational technique can be used for the purpose of enhancing pediatric physical therapy education. This study used evidence from general physical therapy education and comparable healthcare professional practice to substantiate the use of remote simulation to promote interprofessional competencies among pediatric physical therapy students. The primary aim of this study was to investigate the use of a remote, interprofessional simulation to attain collaborative competencies among pediatric physical therapy students. Alternate aims of the study were to assess student satisfaction and self-confidence after participating in a remote simulation focused on interprofessional collaboration practices. Although this study addressed the effects of a remote simulation on pediatric physical therapy students' collaborative competencies, the information can be applied to general physical therapy education and parallel healthcare professions as interprofessional collaboration and communication are universal tenets within healthcare (WHO, 2010).

METHODS

Entry-level pediatric physical therapy students from a private health sciences university participated in a synchronous remote, interdisciplinary simulation experience that involved interaction with a licensed pediatric occupational therapist and speech language pathologist in a team meeting scenario to discuss a child's care. The quantitative study evaluated the effect of the interprofessional simulated learning experience which used video-conferencing technology on Doctor of Physical Therapy Students' perceived interprofessional collaborative competency attainment, and satisfaction and self-confidence related to the learning experience.

Participants

The sample for this study was one of convenience from second-year students within a stand-alone pediatric physical therapy course in an entry-level Doctor of Physical Therapy program on four campuses at a national health sciences university. Participants were recruited using a standardized video to convey information about the purpose and expectations of the study. Exclusion criteria included any student that was retaking the Pediatric Physical Therapy course. The pediatric physical therapy course was delivered in a hybrid manner; didactic information asynchronously online, occasional synchronous online activities, and abbreviated lab time due to COVID-19 restrictions for the summer of 2021.

Instrumentation

This study used two self-report survey instruments to determine the effectiveness of an interdisciplinary remote simulation among entry-level pediatric physical therapy students. The Interprofessional Collaborative Competency Attainment Survey- Revised (ICCAS-R) was used to evaluate student behaviors related to collaborative healthcare (Schmitz et al., 2017). Created by MacDonald et al. (2010), the original ICCAS scale had 20 items and employs a seven-point Likert-type format. The revised version of the ICCAS employs a five-point qualitative scale. No change in results was noted when the investigators recalibrated the item scores from the seven-point scale to the five-point scale which indicates that the ICCAS-R is sensitive to changes using the modified response format (Schmitz et al., 2017).The instrument was administered via retrospective pretest-posttest design in which learners were asked to reflect upon both their previous level of competency and current level of competency of interprofessional collaboration after the completion of an IPE experience (MacDonald et al., 2010). Cronbach's alpha was 0.96 indicating high internal consistency of all 20 items on the ICCAS-R, however, the items were inter-correlated indicating that there is conceptual overlap of the six constructs (Schmitz et al., 2017).

The Student Satisfaction and Self-Confidence in Learning scale (SCLS) is a 13-item instrument designed in accordance with the National League for Nursing (NLN) to measure student satisfaction and confidence in learning associated with simulation-based education (NLN, 2005). The instrument is a self-report measure and uses a five-point Likert-type rating scale (1 = strongly disagree, 5 = strongly agree) with higher sum scores indicating more satisfaction and self-confidence (NLN, 2005). The survey consists of two constructs or dimensions: *Satisfaction with Current Learning* which contains 5 items, and *Self-Confidence in Learning* which contains 8 items (NLN, 2005). The *Satisfaction with Current Learning* domain contains items relating to teaching methods, facilitation during simulation, motivation, suitability of learning experience, and learning resources provided (Franklin et al., 2014; NLN, 2005). The instruments were later combined as one measure and psychometric properties were studied resulting in an overall Cronbach's alpha of 0.92 (Franklin et al., 2014).

Procedure

Prior to the recruitment of participants and collection of data, this study was approved by the university's Institutional Review Board (IRB). All students, regardless of participation in the study experienced the interdisciplinary, remote simulation for educational purposes. A brief video informing the students of the research and the informed consent was provided one week prior to the interdisciplinary, remote simulation learning activity. Preparation for the simulation experience included review of patient

care information, videos of patient presentation, description of clinician roles (occupational therapist and speech language pathologist), and a peer learning activity with guided questions. During the simulation, one student was the active participant while the others were observers. All students in the simulation group actively participated in the debrief session. After the simulation, those students who were participants in the study completed the demographics and survey information via SurveyMonkey. Demographic questions including age, race, and gender, three questions inquiring about interprofessional collaboration within the student's previous work history, academic career, and clinical education, the ICCAS-R, and the Student Satisfaction and Self-Confidence in Learning scale were also included. Survey data remained anonymous.

Statistical Analysis

Primary data from survey responses were downloaded from SurveyMonkey and analyses were completed using SPSS (26.0). A paired samples t-test was used to determine if the retrospective pretest to posttest mean scores of the ICCCAS-R changed at a significant level. The Cohen's *d* effect size was computed to determine the magnitude of the relationship between variables. Subscale scores of the Student Satisfaction and Self-Confidence in Learning scale were summed. To identify which explanatory variables (age, race, gender) were related to each respective dependent variable (satisfaction and self-confidence) at a statistically significant level, three initial parametric analyses were completed. Independent samples t-tests were calculated to determine if there was a relationship between gender and satisfaction and gender and self-confidence in learning. Pearson's r correlations were calculated to determine the relationship of age and satisfaction and age and self-confidence in learning, and a one-way analysis of variance (ANOVA) was calculated to determine the relationship between race and satisfaction and race and self-confidence. Bonferroni adjustment was utilized to mitigate Type I error (Portney & Watkins, 2015).

RESULTS

Eighty-four entry-level DPT students participated in the study by completing survey responses related to collaborative competency attainment, satisfaction, and self-confidence for a 36.8% return rate. Table 1 presents descriptive statistics of the study sample (n=84) which include the following areas: Age, gender, race, and previous academic, clinical education, and work interprofessional experience. Participants mainly were women (67.9%) and of white descent (53.6%). The mean age of the participants was 25.9 years old.

TABLE 1
DEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANTS

Characteristics	*n*	*%*	*M*	*SD*
Gender				
Female	57	67.9		
Male	27	32.1		
Age (years)			25.9	2.48
Race				
White	45	53.6		
Hispanic/Latino	12	14.3		
Black/African American	6	7.1		
American Indian/Alaska Native	0	0		
Asian	21	25		
Native Hawaiian/Pacific Islander	0	0		

Note. M = Mean; SD = Standard deviation

Data were analyzed for assumptions of normal distribution, homogeneity, linearity, and influence of outlier scores to validate the use of parametric tests. Cronbach's Alpha for the pre-test and post-test 20-item ICCAS-R was α = .96 and .78 respectively. Cronbach's Alpha for the 13-item SSSCL Scale was α = .88 (Satisfaction with Current Learning subscale α = .91; Self-confidence in Learning subscale α = .77).

Interprofessional Collaborative Competency Attainment

There was a significant change in mean scores between the retrospective pretest (M = 2.97, SD = 0.66) and posttest responses (M = 3.99, SD = 0.56) of the ICCAS-R total score indicating that the participants perceived a significant improvement in abilities of interprofessional collaborative skills in response to participation in the remote, interdisciplinary simulation learning experience, $t(83) = -17.72$, $p < .001$, with a large effect size (d = 1.67).

Satisfaction and Confidence

The mean overall SSSCL scale score was 4.41 with a standard deviation of 0.42. The mean satisfaction in learning subscale scale score was 4.54 (SD = 0.49) and the mean self-confidence in learning scale score was 4.33 (SD = 0.43). As seen in Table 2, students showed general levels of satisfaction and self-confidence in learning related to the interdisciplinary, remote simulated experience based on the frequencies of *agree* and *strongly agree* responses.

TABLE 2
FREQUENCIES OF SSSCL SCALE SCORES (N=84)

Survey Item	Strongly disagree (1) n (%)	Disagree (2) n (%)	Undecided (3) n (%)	Agree (4) n (%)	Strongly Agree (5) n (%)
Satisfaction with Current Learning					
1. The teaching methods used in this simulation were helpful and effective.	1(1.2)			37(44.0)	46(54.8)
2. The simulation provided me with a variety of learning materials and activities to promote my learning the medical surgical curriculum.			3(3.6)	32(38.1)	49(58.3)
3. I enjoyed how my instructor taught the simulation.			1(1.2)	31(36.9)	52(61.9)
4. The teaching materials used in this simulation were motivating and helped me to learn.			4(4.8)	33(39.3)	47(56.0)
5. The way my instructor(s) taught the simulation was suitable to the way I learn.			2(2.4)	36(42.9)	46(54.8)

Survey Item	Strongly disagree (1) n (%)	Disagree (2) n (%)	Undecided (3) n (%)	Agree (4) n (%)	Strongly Agree (5) n (%)
Self-confidence in Learning					
6. I am confident that I am mastering the content of the simulation activity that my instructors presented to me.			5(6.0)	45(53.6)	34(40.5)
7. I am confident that this simulation covered critical content necessary for the mastery of physical therapy curriculum.	1(1.2)	2(2.4)	14(16.7)	31(36.9)	36(42.9)
8. I am confident that I am developing the skills and obtaining the required knowledge from this simulation to perform necessary tasks in a clinical setting.			4(4.8)	39(46.4)	41(48.8)
9. My instructors used helpful resources to teach the simulation content during class time.			1(1.2)	35(41.7)	48(57.1)
10. It is my responsibility as the student to learn what I need to know from this simulation activity.		1(1.2)	2(2.4)	32(38.1)	49(58.3)
11. I know how to get help when I do not understand the concepts covered in the simulation.	1(1.2)			45(53.6)	38(45.2)
12. I know how to use simulation activities to learn critical aspects of these skills.			2(2.4)	47(56.0)	35(41.7)
13. It is the instructor's responsibility to tell me what I need to learn of the simulation activity.	2(2.4)	11(13.1)	14(16.7)	37(44.0)	20(23.8)

There was a negligible negative correlation between student satisfaction and age; however, results were not statistically significant, $r(82) = -.003$, $p = .979$. Results of the one-way ANOVA revealed that there was not a statistically significant difference in student satisfaction based on race ($F(3, 80) = [2.542]$, $p = .062$). Results indicated that there was no significant difference in satisfaction based on gender, $t(82) = .185$, $p = .854$. Student perceived self-confidence in learning scores were not significantly related to age ($r(82) = .172$, $p = .12$), race ($F(3, 80) = [2.173]$, $p = .098$), or gender ($t(82) = .228$, $p = .820$).

DISCUSSION

This quantitative quasi-experimental, retrospective pretest-posttest study investigated a group of entry-level pediatric physical therapy students' collaborative competency abilities, satisfaction, and self-confidence following participation in an interdisciplinary, remote simulation. Results indicated that there was a significant difference in student reported collaborative competencies among entry-level DPT students after participation in an interdisciplinary, remote simulation compared to before. The significant findings in the change scores of the ICCAS-R support previous literature within the field of physical therapy and allied health professions that confirms a simulated learning experience significantly improves students' collaborative competency abilities (Baker & Durham, 2013; Campbell et al., 2020; Canadian Interprofessional Health Collaborative, 2010; Foronda et al., 2013; Haber et al., 2017; Kostoff et al., 2016; Lee et al., 2018; MacKenzie et al., 2017; Mai et al., 2018; Shaikh et al., 2020; Smith et al., 2018). The results add credibility to the use of a remote simulation within the subspecialty of pediatric physical therapy education to train interprofessional collaboration skills.

Students in this study demonstrated a general high level of satisfaction and self-confidence in learning with an interdisciplinary, remote simulation as a learning activity. This confirms reports in previous studies that students are generally satisfied with the use of simulation as a learning method in the nursing and physical therapy fields (Costa et al., 2020; Jones et al., 2021; Ohtake et al., 2013; Zapko et al., 2018). Additionally, results of this study compliment previous literature which showed positive changes in attitudes toward working with a healthcare team and general satisfaction with online learning experiences using teleconferencing technology (Jiménez-Rodríguez et al., 2020; Shrader et al., 2016). Results showed that student demographic characteristics did not influence student satisfaction or self-confidence in learning. Further interpretation can lead to the conclusion that age, race, and gender are not predictors for student satisfaction or self-confidence in learning when using an interprofessional, remote simulation for the studied population. Consideration for student perception of learning activities based on demographic characteristics may be a consideration for healthcare faculty as diversity of the student population increases.

While the results imply that students had a positive reaction to an interdisciplinary, remote simulation within a pediatric physical therapy course, the design of the study limits generalizations about the learning method. This study did not employ a control group to compare the simulated learning experience to a standard educational method. Therefore, the intervention cannot be assumed to be superior to other methods of learning. All data was collected via self-report of the participants. It was assumed that students were truthful and accurate in their responses. While the study sought to recruit a diverse demographic population, there were some race and age groups that were underrepresented of the population. Additionally, responses from one university in one semester were obtained via convenience sampling. The results of this study only provided a perspective from the one timepoint.

CONCLUSION

Uniquely, the results of this study lend credibility to the use of a remote simulation activity to address interprofessional collaboration learning objectives within a pediatric physical therapy course. Although this research addressed the specific population of pediatric physical therapy education, the use of a remote simulation to address interprofessional learning has merit to be generalized to related healthcare fields as interprofessional teamwork is essential to improve outcomes, quality, and safety of patient care (Joint Commission, 2015; WHO, 2010). Additionally, the findings underscored the importance of experiential learning as one of the main teaching and learning methods within pediatric physical therapy education (Anderson et al., 2019; Barta et al., 2018; Schreiber et al., 2015; Smith & Crocker, 2017). Students were generally satisfied with the simulated learning experience regardless of their age, race, or gender. Other healthcare educators may find the results useful when planning online courses in the future.

Recommendations for Future Research

This study informed educators about a meaningful and effective way to increase pediatric physical therapy student-perceived collaborative competencies. The research may be expounded upon by studying a larger and more diverse population to determine if similar results can be found and generalizations expanded. The use of a control group would provide more robust evidence to determine if there is an advantage of the use of an interdisciplinary, remote simulation over a more traditional educational approach. Ultimately, the goal of professional healthcare education is to teach students to act as clinicians. Although student perception of satisfaction and attitudes is one of the most commonly assessed outcomes among healthcare simulation education, investigators need to pursue research which will assess behaviors and practice (Lavoie et al., 2017). Further investigation of long-term effects of the intervention via clinical instructor or workplace report could provide insight into whether students are prepared for collaborative practice in the workplace.

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