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Kaitlin R. Sibbald
Dalhousie University

Diane E. MacKenzie
Dalhousie University

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Keywords

Simulation, fieldwork, occupational therapy, competency-based education, educational measurement

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Kaitlin Sibbald, MScOT

Diane MacKenzie, PhD, MAEd, BSCOT

Dalhousie University

Nova Scotia

ABSTRACT
Simulation has been recognized for its ability to develop competency-level skills and as a replacement for some introductory fieldwork (FW) hours. This study explored how occupational therapy competency-related skills developed over sequential in-person simulations across health practice contexts during Level 1 FW. Entry-to-practice occupational therapy students (N = 66) participated in six sequential, formative, Level 1 FW simulations. The first three sequential simulations (the same patient case evolves in each successive interaction) included a trained simulated patient in a community mental health context and the following three engaged a trained simulated inpatient in a physical health context. Evaluation rubric variables included selected Competencies for Occupational Therapists in Canada (2021) scaffolded to performance expectations at an introductory Level 1 FW placement level. Quantitative pre-post comparison design with secondary data analysis was analyzed using Wilcoxon signed-rank test and ordered logistic regression. Each additional simulation demonstrated significant increases in the odds of improved performance in clinical skills, clinical decision making, responding to evolving patient's needs and priorities, identifying their own strengths and weaknesses, articulating clinical reasoning, and receiving constructive criticism. However, students' skills in the physical health context for decision-making and responding to the patient's needs and priorities did not demonstrate the same improvement trajectories as the mental health context. Sequential simulations are an effective modality for developing Level 1 competency related skills in different practice contexts. Depending on the competency-related practice skill and context, three or more formative unfolding simulations in that context may be needed for a significant improvement.

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Introduction

Simulation is increasingly being used in occupational therapy education to facilitate the development of clinical reasoning, communication, and collaboration skills in preparation for the complexities of clinical practice (Bennett et al., 2017; Cahill, 2015; Gibbs et al., 2017; Grant et al., 2021). In line with other health professions accepting simulation as an effective substitute for a portion of clinical experience time (Hayden et al., 2014), occupational therapy is gradually recognizing simulation as an alternative method for providing some components of conventional fieldwork (FW) placements (Accreditation Council for Occupational Therapy Education [ACOTE], 2018; Harris et al., 2022; Occupational Therapy Council of Australia, 2020; Ozelie et al., 2022). Simulation with trained simulated patients during Level 1 FW in Canada (Level 1 FW focuses on the observation and demonstration of foundational occupational therapy skills) prior to participating in a full-time clinical placement was received positively by students as an opportunity to consolidate their knowledge, practice building relationships with patients, and practice clinical skills (Sibbald & MacKenzie, 2023). Students, peers, and faculty have also noted that simulation can address domains of professional behavior, clinical reasoning, communication, patient centeredness, and reflection on performance similarly to how they can be addressed in FW (Coss et al., 2023). Importantly, performance in simulation has been found to be the best predictor of success in FW (Lucas Molitor & Nissen, 2020), with simulated patient encounters being stronger predictor of FW performance than grade point average (GPA; Frasier et al., 2022). Specifically, simulation improves student performance in inpatient FW settings in areas such as evaluation, screening, intervention, communication, and professional behavior (Ozelie et al., 2016).

The emerging role of simulation with trained simulated patients as an equivalent for a percentage of conventional FW hours has led to guideline development for the implementation of effective simulations as part of FW requirements (Chu et al., 2019). Guidelines include ensuring complexity proportionate to the students’ level of learning, authenticity to clinical practice, using multiple modalities, and proximity to full-time FW (Chu et al., 2019; Rodger et al., 2010). These guidelines also acknowledge the importance of simulation requirements if they are to be considered in place of conventional FW hours. The simulations must unfold over time and cannot just provide a single snapshot of the practice process (Chu et al., 2019). In addition, best practice design and delivery guidelines in healthcare simulation highlight the importance of including a pre-brief prior to the simulation and a debrief following the simulation (International Nursing Association for Clinical Simulation and Learning [INACSL] Standards Committee, 2021). Importantly, debriefing helps to facilitate knowledge integration and improvements in future performance and assists with the development of insight and reflection (INACSL Standards Committee, 2021). These skills, along with occupational therapy practice skills, communication, and relationship building, as noted above, are directly transferrable to clinical practice and reflected in the *Canadian Occupational Therapy Competencies* (COTC; Association of Canadian Occupational Therapy Regulatory Organizations [ACOTRO], Association of Canadian Occupational Therapy University Programs [ACOTUP], & Canadian Association of Occupational Therapists [CAOT], 2021) and the *Competency-Based Fieldwork Evaluation for*

Occupational Therapy (Bossers et al., 2007). In comparing the performance of those who participated in simulation-based Level 1 FW and conventional Level 1 FW, no significant difference was found, suggesting simulation is a comparable alternative (Ozelie et al., 2023).

Introductory, or Level 1 FW, has seen an increasing use of trained simulated patients and simulation in occupational therapy education (Bennett et al., 2017). However, it is unclear how it is used to effectively develop occupational therapy competency skills and how those skills transfer to different practice contexts. For example, in their use of simulation in Level 1 FW, Sibbald et al. (2023) described using six live simulated encounters – three sequential simulations in each of two practice contexts; however they did not analyze the competency outcomes of these simulations. Similarly, Harris et al. (2022) described how students in their virtual simulation-based Level 1 FW course using Simucase® met with two to three patients; however they did not specify how many times a student met with each patient. Barclay and Chu (2023) described students working virtually with two patients in a simulated FW placement: one involving multiple encounters with the patient and their family and one for whom a research-based task was required. In contrast, Coss et al. (2023) described a version of Level 1 FW containing eight simulations – two sequential simulations in each of four practice contexts. Ozelie et al. (2023) also described students participating virtually in simulations using Simucase® across four practice contexts for Level 1 FW; however, did not specify whether encounters were sequential with the same patient over time. While simulation has been used to meet the objectives of Level 1 FW placements in multiple ways, further clarity is required for how skills transfer across practice contexts and how many simulations are required for a significant development in skill.

While there is evidence that simulation is comparable to conventional FW placement hours for meeting the objectives of Level 1 FW (Ozelie et al., 2023), how these objectives are met using different types of encounters and practice contexts varies. The purpose of this study was to examine how occupational therapy competency-related skills develop over sequential in-person simulations and across two practice contexts during introductory Level 1 FW.

Method

This study used a quantitative pre-post comparison design with secondary data analysis. The study was reviewed and approved by the university's Office of Human Research Ethics Administration (#2023-6619). The following research questions were addressed in this study:

- Do students demonstrate significant improvement(s) in occupational therapy competency-related skills across three sequential Level 1 FW simulations and two different content areas?
- Which competency skills developed through the simulation process transfer across two areas of practice in Level 1 FW simulation (mental health and physical health), and which do not?
- How do scores in competency-related variables change with increased exposure simulations?

Population

Participants included a convenience sample of 66 first-year Master of Occupational Therapy entry-to-practice students in an in-person program at one Canadian university. Demographic data were not collected. At the time of the simulation-based introductory Level 1 FW course, students had completed their curriculum training in mental health (MH) practice and were concurrently completing their curriculum training in physical health (PH) practice. The simulation-based FW course occurred in the term immediately prior to students' first full-time Level 2 FW placement (Level 2 FW includes increasing clinical reasoning and independence with further acquisition of adaptable skills). Preceptors in the course included seven licensed clinical occupational therapists from across the country who had at least two years' experience in one or both practice contexts used in the simulations. Simulated patients were recruited for either the MH or PH case content and trained by a simulated patient educator. Simulations took place in a simulation center with rooms organized to into a circular discussion space for MH simulations and an inpatient hospital space for PH.

Instrumentation and Procedure

Students participated in six formative and unfolding simulations: one simulation per week over the course of six weeks. Specific details of the sequential simulation design, case content, objectives, and process have been previously described and illustrated (Sibbald & MacKenzie, 2023). This study adopted a sequential design, content and objectives, but the ordering and timing of cases differed. The sequencing of simulations in this study included the first three simulations in the community MH context where students engaged with the same patient at three points in the practice process as the patient's case unfolded. The second three simulations involved encounters in the in-patient PH rehabilitation context where students saw the same patient at three points throughout the practice process and included hand-on skill requirements. The MH and PH cases did not include any challenges with cognition or ability to communicate. Each simulation was between 15 and 25 minutes in length and was audio and video recorded. Simulations were developed based on the guidelines outlined by Chu et al. (2019) and aligned with Rodger et al.'s (2010) recommendations for using simulation as part of FW. Students completed the simulations in pairs and interacted with the same simulated patient across the three iterations of the case. Each simulation involved a patient chart review and student research, an open lab practice session, the simulated patient encounter, documentation of the encounter, a pair-based debrief, and a debrief with a course preceptor. Debriefs with the preceptor were 15 minutes and occurred after the simulated encounter and prior to the following simulation. Students changed partners and preceptors when they changed practice contexts to facilitate the opportunity to work with different people and receive feedback from different perspectives.

Recordings of the simulations and rubrics with detailed explanations of content and debrief guides for each simulation were provided to preceptors for evaluation and debrief preparation. The structure of the rubrics was informed by MacKenzie et al. (2021). The rubric was designed to capture student performance on the objectives of the simulation as well as the quality of the students' interaction with the patient in variables aligned with the COTC (ACOTRO, ACOTUP, & CAOT, 2021) and suggest relevant advocacy inquiry questions to support the debrief (see Table 1). The performance level for the selected COTC (ACOTRO, ACOTUP, & CAOT, 2021) variables were tailored to match expected skills before their first full-time clinical placement based on their knowledge and experience to date in their curriculum (Chu et al., 2019) as well as Level 1 FW expectations described in the CBFE-OT (Bossers et al., 2007). The elements on the rubrics were at introductory levels to occupational therapy competency and did not exhaustively evaluate all elements of each competency.

Table 1

Simulation and Debrief Variables, Rubric Description, and Competency Category

Variable	Rubric Description	Competency Category (ACOTRO, ACOTUP, & CAOT, 2021)
Simulation		
Building a collaborative relationship	The student demonstrated a respectful and collaborative relationship with the patient. Respected the patient’s autonomy and lived experience throughout the session such as: Obtained informed consent for the session. Ensured ongoing consent throughout the session. Provided validation of experience when appropriate.	Communication and Collaboration; Culture, Equity, and Justice
Clinical skills	The student demonstrated the required clinical skills effectively and safely as outlined in the learning objectives such as: Applied psychomotor learning principles during the intervention. Gave appropriate dressing and toileting equipment recommendations. Gave appropriate recommendations for accessing community services. Completed a safe transfer. Set SMART (Specific, Measurable, Achievable, Relevant, and Time-Bound)-occupation based goals.	Occupational Therapy Expertise
Decision making	The student demonstrated appropriate decision-making skills for appropriate and effective application: Managed their time effectively to complete the components of the interaction. Chose an appropriate assessment from the options provided.	Occupational Therapy Expertise; Professional Responsibility

Responded to patient needs and priorities	The student identified and responded to the patient's needs and priorities in order to adapt the session such as: Modified the intervention/ assessment based on the patient's needs. Actively elicited priorities and input from the patient. Provided appropriate correction during skills practice. Maximized patient's participation in the intervention.	Communication and Collaboration; Culture, Equity and Justice
Debrief		
Identified strengths and weaknesses	The student clearly articulated their clinical strengths and areas for improvement based upon their performance during the simulation	Excellence in Practice
Received constructive criticism	The student respectfully received constructive feedback from their preceptor.	Professional Responsibility
Articulated clinical reasoning	The student articulated the clinical reasoning behind their observed actions in the simulation.	Communication and Collaboration; Occupational Therapy Expertise

The course instructor educated the preceptors on rubric and scoring strategy for both simulation and debrief prior to the simulations to promote standardization. Preceptors were instructed to view the recording only once and evaluate the student-therapists in real time, as if they were watching the encounter live. After reviewing the video of the encounters, preceptors met virtually with students in pairs using Microsoft Teams to debrief the encounter. Preceptors were trained to use the advocacy inquiry model of debriefing (Rudolph et al., 2006) at the outset of the course and were provided with scripted prompting questions for each simulation to support their leaning of the debriefing strategy. Table 1 contains the selected simulation and debrief evaluation variables, definitions, and link to primary competencies (ACOTRO, ACOTUP, & CAOT, 2021). Students' performance for the simulation and debrief variables were rated using a Likert scale of 1-5. Scores were defined as: 1) Not completed; 2) Completed ineffectively; 3) Completed sufficiently; 4) Completed effectively; and 5) Completed effectively, exceeding expectations. All evaluations were formative and meant to ensure consistent preceptor engagement and feedback, and to assess general trends across students for the purpose of program evaluation. Students were not informed of their scores, rather preceptors used the scores to highlight areas of strengths and challenge during the debrief. Rubric evaluations in no way contributed to students' grade in the course.

Students were evaluated as a pair during the simulation for their combined performance and evaluated individually during the debrief. Students and preceptors were informed that data collected throughout the course would be used for program evaluation purposes and that they could choose to have their data excluded from the evaluation for up to one month after the final grades for the course were submitted. Following this period of time, rubric data was collated, anonymized, and cleaned for the purpose of program evaluation.

Analysis

Wilcoxon matched-pairs signed-rank tests (Wilcoxon, 1945) were conducted to compare performance scores between: a) the first and second simulation in each practice context (MH1 and MH2; PH1 and PH2); b) the first and third simulation in each practice context (MH1 and MH3; PH1 and PH3); c) the first and final simulation in the course (MH1 and PH3); d) the final MH simulation and the first PH simulation (MH3 and PH1); and e) the first MH simulation and the first PH simulation (MH1 and PH1). These tests sought to determine whether there was a significant difference in performance in competency-related variables after two or three simulations in a practice area (a and b), whether there was a significant change in performance across the six simulations (c), whether performance was maintained when the practice context changed (d), and whether changes from baseline were present when the practice context changed (e).

The Wilcoxon signed-rank test is a comparison of ranks approach appropriate for Likert scale data that does not assume the data is normally distributed (Meek et al., 2007; Shieh et al., 2007). The sample size for all tests exceeded the requirement of at least 16 pairs (Dwivedi et al., 2017). Two-tailed tests were used to determine differences in ranks, followed post-hoc by one-tailed tests in both directions to confirm the direction of change where significant differences were found. Ordered logistic regression was used to estimate the relationship between the ordinal score on the simulation rubric and the number of simulations in which a student had participated. The probability of observing an increase in score given an increase by one in the number of simulations in which a student participated was calculated. STATA 16 (StataCorp, 2019) was used for all statistical calculations. Statistical significance was determined at alpha =.05.

Results

The data set in this study included scores from 66 different students. Descriptive statistics of rubric variables are presented in Table 2. Due to absences and missing data, the scores available for comparison over time ranged from 53 to 65.

Figure 1 presents a visualization of the means (*M*) and standard deviations (*SD*) per simulation content and order showing the trend in scores over time. The results of the Wilcoxon matched-pairs signed-rank tests for comparison of variables over time and across practice contexts are shown in Table 3. Table 4 contains the odds ratios for simulation and debrief variables across the six simulations.

Table 2

Simulation Order and Descriptive Statistics of Rubric Variables

Order	Simulation and Debrief Variables	*N*	*M*	*SD*	Median[a]
MH1	Clinical skills	58	2.71	.84	3[b]
	Clinical decision making	58	2.78	.90	3[b]
	Responding to patients' needs/priorities	56	2.51	1.00	3
	Building a collaborative relationship	58	2.74	1.10	3[b]
	Identifying strengths and weaknesses	58	3.00	.75	3[b]
	Articulating clinical reasoning	58	3.03	.73	3
	Receiving constructive criticism	58	3.94	.95	4
MH2	Clinical skills	57	3.04	1.01	3
	Clinical decision making	57	3.15	.77	3
	Responding to patients' needs/priorities	55	3.42	1.03	4
	Building a collaborative relationship	57	3.05	1.00	3
	Identifying strengths and weaknesses	58	3.28	.92	3
	Articulating clinical reasoning	58	3.25	.85	3
	Receiving constructive criticism	58	4.09	.82	4
MH3	Clinical skills	58	3.28	1.04	3
	Clinical decision making	58	3.59	.96	3
	Responding to patients' needs/priorities	58	3.64	1.12	4
	Building a collaborative relationship	57	3.76	.87	4
	Identifying strengths and weaknesses	56	4.00	1.10	4
	Articulating clinical reasoning	56	3.91	.95	4
	Receiving constructive criticism	56	4.51	.80	5
PH1	Clinical skills	63	2.68	1.10	3
	Clinical decision making	63	3.30	.92	3
	Responding to patients' needs/priorities	63	3.11	.85	3
	Building a collaborative relationship	63	3.26	.83	3[c]
	Identifying strengths and weaknesses	65	3.74	.95	4
	Articulating clinical reasoning	64	3.78	.91	4
	Receiving constructive criticism	65	4.14	.71	4
PH2	Clinical skills	63	3.25	.89	3
	Clinical decision making	63	3.40	.88	4
	Responding to patients' needs/priorities	63	2.96	1.10	3
	Building a collaborative relationship	63	3.56	.87	4[c]
	Identifying strengths and weaknesses	64	3.84	.89	4[c]
	Articulating clinical reasoning	64	4.20	.81	4[c]
	Receiving constructive criticism	64	4.52	.55	5[d]
PH3	Clinical skills	64	3.46	.81	3[c]
	Clinical decision making	64	3.39	.95	3[c]
	Responding to patients' needs/priorities	64	3.30	.90	3[c]
	Building a collaborative relationship	64	3.70	1.10	4[c]
	Identifying strengths and weaknesses	64	4.29	.72	4[d]
	Articulating clinical reasoning	64	4.49	.63	5[d]
	Receiving constructive criticism	64	4.62	.53	5[d]

Note: [a] = Minimum (min) score of 1 to maximum (max) score of 5; [b] Min score of 1 to max score of 4; [c] Min score of 2 to max score of 5; [d] Min score of 3 to max of 5. While all rubrics used a 1-5 scale, students did not always select the full range of scores.

Figure 1

Variable Mean scores and Standard Deviation across MH and PH simulations

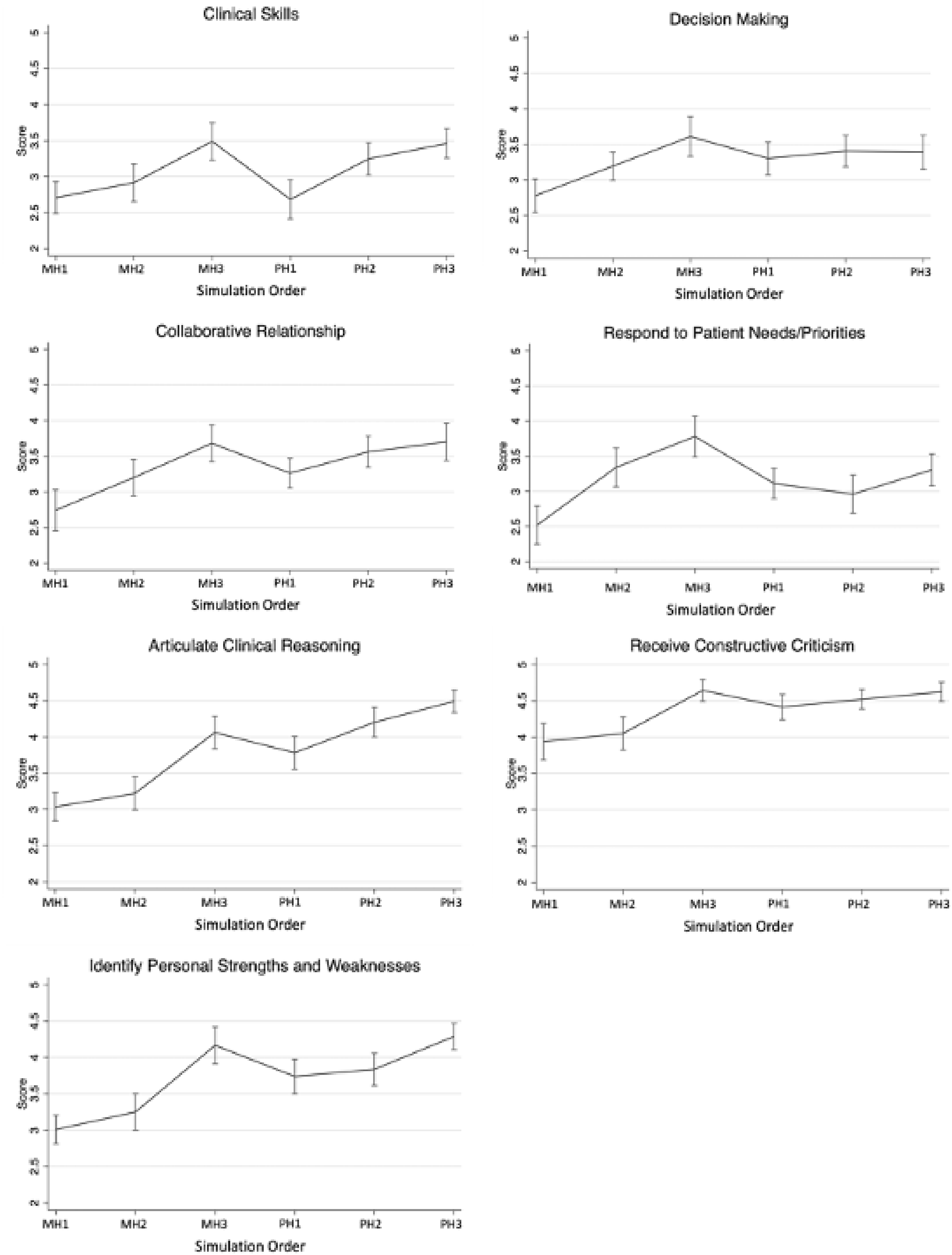

Table 3

Likelihood There was an Improvement or Decline in Variable Score

Variable	Comparison	*N*	*z*	*p*	Direction of Difference
Simulation					
Clinical Skills	MH1 - MH2	57	- 2.31	.02*	increase
	MH1 - MH3	58	- 3.30	<.01*	increase
	PH1 - PH2	61	- 4.20	<.001*	increase
	PH1 - PH3	62	- 5.55	<.001*	increase
	MH1 - PH1	55	.45	.66	
	MH3 - PH1	55	2.60	.01*	decrease
	MH1 - PH3	56	- 3.90	<.001*	increase
Clinical decision making	MH1 - MH2	57	- 2.51	.01*	increase
	MH1 - MH3	58	- 4.47	<.001*	increase
	PH1 - PH2	61	- 0.86	.38	
	PH1 - PH3	62	- 0.69	.49	
	MH1 - PH1	55	- 2.23	.03*	decrease
	MH3 - PH1	55	1.64	0.10	
	MH1 - PH3	56	- 2.94	<.01*	increase
Responding to patient needs/priorities	MH1 - MH2	53	- 4.23	.01*	increase
	MH1 - MH3	56	- 4.72	<.001*	increase
	PH1 - PH2	61	.07	.94	
	PH1 - PH3	62	- 1.53	.13	
	MH1 - PH1	53	- 2.55	.01*	increase
	MH3 - PH1	55	2.76	.01*	decrease
	MH1 - PH3	54	- 3.44	<.001*	increase
Building a collaborative relationship	MH1 - MH2	53	- 4.23	<.001*	increase
	MH1 - MH3	57	- 4 .71	<.001*	increase
	PH1 - PH2	61	- 2.75	.01*	increase
	PH1 - PH3	62	- 3.76	<.001*	increase
	MH1 - PH1	55	- 2.54	.01*	increase
	MH3 - PH 1	54	3.30	<.01*	decrease
	MH1 - PH3	56	- 4.05	<.001*	increase
Debrief					
Identifying strengths and weaknesses	MH1 - MH2	58	- 2.66	.01*	increase
	MH1 - MH3	56	- 5.48	<.001*	increase
	PH1 - PH2	64	- 0.81	.42	
	PH1 - PH3	64	- 3.43	<.01*	increase
	MH1 - PH1	57	- 4.03	<.001*	increase
	MH3 - PH1	55	2.03	.043*	decrease
	MH1 - PH3	56	- 5.97	<.001*	increase

Articulating clinical reasoning	MH1 - MH2	58	- 2.09	.038*	increase
	MH1 - MH3	56	- 5.35	<.001*	increase
	PH1 - PH2	63	- 3.04	<.01*	increase
	PH1 - PH3	63	- 4.95	. <.001*	increase
	MH1 - PH1	56	- 3.69	<.001*	increase
	MH3 - PH1	54	1.29	.20	
	MH1 - PH3	56	- 6.26	<.001*	increase
Receiving constructive criticism	MH1 - MH2	58	-1.13	.26	
	MH1 - MH3	56	- 5.25	<.001*	increase
	PH1 - PH2	64	- 1.17	.24	
	PH1 - PH3	64	- 2.84	<.01*	increase
	MH1 - PH1	57	- 2.81	<.01*	increase
	MH3 - PH1	55	1.13	.26	
	MH1 - PH3	56	- 4.17	<.001*	increase

Note: *= significant *p<.05*
If significant results were not observed, no post-hoc test was completed to determine direction of change.

Table 4

Odds Ratios for Simulation and Debrief Variables

Variable	MH			PH			Overall‡		
	Odds Ratio	Pseudo R^2	*p*	Odds Ratio	Pseudo R^2	*p*	Odds Ratio	Pseudo R^2	*p*
Simulation									
Clinical skills	2.20	0.03	<.001	1.95	0.03	<.001	1.22	0.01	<.001
Clinical decision making	2.42	0.04	<.001	1.06	<.001	0.69	1.21	0.01	<.001
Responding to patient needs/ priorities	2.91	0.06	<.001	1.17	<.001	0.29	1.07	0.00	0.172
Building a collaborative relationship	2.29	0.04	<.001	1.61	0.01	<.01	1.33	0.02	<.001
Debrief									
Identifying strengths and weaknesses	3.15	0.07	<.001	1.74	0.02	<.001	1.53	0.05	<.001
Articulating clinical reasoning	3.08	0.07	<.001	2.20	0.04	<.001	1.87	0.10	<.001
Receiving constructive criticism	2.16	0.04	<.001	1.36	0.01	0.07	1.38	0.03	<.001

Note: ‡Overall = all six simulations over time, regardless of practice area.

Comparison From First to Final Simulation (MH1 to PH3)
Significant changes in simulation-assessed performance of clinical skills (p<.001), clinical decision making (p=.001), responding to patient's needs and priorities (p<.01), and building collaborative relationships with patients (p<.001) were observed between the first and sixth (final) simulations (MH1 and PH3). Comparison of ranks indicate the significant changes were all in the direction of improvement. Similarly, significant changes in all debrief skills assessed, including identifying personal strengths and weaknesses (p<.001), articulating clinical reasoning (p<.001), and respectfully receiving constructive criticism (p<.001) were observed between the first and final simulations (MH1 and PH3). Comparison of ranks also indicated the significant changes were all in the direction of improvement. Ordered logistic regression analysis indicated that for each simulation students participated in, a student was about 1.22 times more likely to score at least one level higher in clinical skills (p<.001), 1.21 times more likely to score at least one level higher in clinical decision making (p<.001), and 1.33 times more likely to score at least one level higher in building a collaborative relationship with patients (p<.001). When examined across the six simulations, there was no significant increase in odds for students responding to patient's needs and priorities (p=.17). Similarly, ordered logistic regression indicated that for each simulation students participated in, a student was about 1.53 times more likely to score higher in identifying personal strengths and weaknesses (p<.001), 1.87 times more likely to score higher in articulating clinical reasoning (p<.001), and 1.38 times more likely to score higher in respectfully receiving constructive criticism (p<.001).

Comparison of Mental Health Simulations (MH1 and MH2, MH1 and MH3)
When examining only the three simulations taking place in a mental health context, significant differences in all assessed variables other than respectfully receiving constructive criticism were observed from MH1 to MH2. By the third MH simulation, significant differences across all assessed competency related-variables were observed. Comparison of ranks indicates that all significant differences indicated improvements. Ordered logistic regression analysis indicated that for each mental health simulation students participated in, a student was about 2.20 times more likely to score higher on clinical skills (p<.001), 2.42 times more likely to score higher on clinical decision making (p<.001), 2.91 times more likely to score higher on responding to a patient's needs and priorities (p<.001), and 2.29 times more likely to score higher on building a collaborative relationship with patients (p<.001). For each simulation students participated in, there was also a significant increase in the odds of them scoring at least one level higher on all debriefing skills. Odds increased by 3.08 times for articulating their clinical reasoning (p<.001), 2.16 times for receiving constructive criticism (p<.001), and 3.15 times for identifying strengths and weaknesses (p<.001), for scoring higher for every simulation students participated in in the mental health context.

Comparison of Physical Health Simulations (PH1 and PH2, PH1 and PH3)
When examining only the three simulations taking place in a physical health context, which took place after three simulations in the mental health context, significant differences were observed after two simulations in students' performance of clinical skills (p<.001), building a collaborative relationship (p=.01), and articulating clinical

reasoning (p<.01). Comparison of ranks suggests these differences were significant in the direction of improvement. After three simulations, significant differences were observed in all assessed competency-related variables, other than responding to patient's needs and priorities (p=.13). Ordered logistic regression analysis indicated that for each physical health simulation students participated in, the odds of scoring at least one category higher on the rubric increased by 1.95 times for clinical skills (p<.001), 1.61 times for building a collaborative relationship with patients (p<.01), 1.74 times for identifying strengths and weaknesses (p<.001), and 2.20 times for articulating clinical reasoning (p<.001). The odds of scores improving for clinical decision making (p=.69) responding to patients' needs and priorities (p=0.29) and receiving constructive criticism (p=.24) were not significant.

Comparison of Before and After Practice Context Change (MH3 and PH1)
Between the third (final) mental health practice context simulation and the first physical health practice context simulation, significant differences in scores were observed in the variables clinical skills (p=.01), building a collaborative relationship with the patient (p<.01), responding to patients' needs and priorities (p=.01) and identifying one's own strengths and weaknesses (p=.043). Comparison of ranks suggest these differences represent a significant decrease in scores. No significant difference in scores was observed in clinical decision-making skills (p=.10), articulating clinical reasoning (p=.20) or receiving constructive criticism (p=.26). The students' performance on these three skills was not altered by a change in practice context.

Comparison of Baseline to Change in Practice Context (MH1 and PH1)
In comparing the scores on the first mental health simulation and the first physical health simulation, significant differences were observed in scores on clinical decision making (p=.03), responding to patients' needs and priorities (p=.01), building a collaborative relationship with patients (p=.01), identifying personal strengths and weaknesses (p<.001), articulating clinical reasoning (p<.001), and receiving constructive criticism (p<.01). Comparison of ranks suggest all significant differences indicate significantly higher scores for the first physical health simulation in comparison to the first mental health simulation. No significant difference was observed in clinical skills between the MH1 simulation and PH1 simulation (p=.66).

Discussion

The purpose of this study was to explore how occupational therapy competency-related skills developed over sequential in-person simulations and across different case content (MH and PH) during introductory Level 1 FW. Using secondary data analysis, we examined what skills developed through the simulation process, which skills transferred across areas of practice and which did not, and how scores in competency-related variables changed with increased exposure to formative, sequential simulations.

Overall, and in keeping with other studies, with increased exposure to formative simulations, students demonstrated significant improvements in Level 1 FW competency-related skills (Chu et al., 2019; Coss et al., 2023; Ozelie et al., 2016; Sibbald et al., 2023). In this study, after the three sequential MH simulations, students demonstrated significant improvements in all assessed competency-related skills. Improvements in the variables of clinical decision making, articulating clinical reasoning, and receiving constructive criticism did not significantly decrease even when the practice context changed to PH. The maintenance of these skills is likely because these skills were enacted similarly, regardless of the practice context. Not surprisingly, when the practice context changed to PH, some performance skills were not maintained at their level of improvement, such as clinical skills, responding to patients' needs and priorities, building collaborative relationships with patients, and identifying one's own strengths and weaknesses. This decrease is likely because these skills need to be enacted differently and draw on different theories, frames of reference, assessments, and interventions in different contexts. Notably, the scores were significantly lower in the first PH simulation compared to the preceding final MH simulation. However, significant improvements were maintained from the baseline scores on all assessed variables even when the practice context changed, with the exception of clinical skills. This suggests that when the practice context changed to PH, the gains made over time in the MH cases may not have been maintained at the level they developed to in MH3 but did not return to baseline levels. Overall, performance scores were still significantly improved in most areas in comparison to the MH1 simulation. Of note, the odds of scores increasing with additional simulations were higher during the first three MH simulations than in the final three PH simulations. Examined overall, each additional simulation significantly increased the odds of students scoring higher in all variables with the exception of the competency for responding to patients' needs and priorities, for which the odds only significantly increased during the mental health simulations. This may have been due to the addition of PH simulation skill demands.

Our results suggest there was no significant improvement in the performance of clinical skills between the first MH simulation and the first PH simulation. Skill performance was not significantly different on the first PH simulation from baseline despite students having already participated in three MH simulations in a different practice context. This suggests that clinical skills specific to a particular practice context, such as assessing functional strength, fitting a wheelchair, and safely performing a transfer, are not significantly improved with the development of separate clinical skills in another practice context, such as taking an occupational history, facilitating access to community resources, and goal setting, which were required in the mental health simulations. In contrast, skills that were required similarly across contexts, such as the decision-making skills to manage time during an interaction, building a collaborative relationship with the patient, and responding to patients' needs and priorities, maintained some improvement from baseline even with the change in practice context. In line with previous research (Bennett et al., 2017; Coss et al. 2023; Frasier et al., 2022), this suggests that simulation may be an effective teaching modality for developing competency related skills that span practice contexts. However, it does not replace the need to teach clinical skills that are context specific and may indicate the need for exposure to a wide variety of practice areas to develop these context-specific skills. In addition, awareness that specific clinical skills do not transfer well between practice domains may indicate where extra attention is needed to develop competence in a particular practice area.

Interestingly, while the trajectory of improvement was similar and showed steady increase for clinical skills, building collaborative relationships, and articulating clinical reasoning across the three MH simulations and the three PH simulations, other skills showed different trajectories of development in MH and PH. For example, while a consistent improvement was observed in students' abilities to respond to patients' needs and priorities and decision making in a MH context, this was not the same in a PH context. This suggests that while all practice contexts may require similar competency-related skills, different practice context may develop and integrate competency skills along different timeline trajectories.

Additional Content Considerations

It is important to acknowledge that in this study, components to simulate the full FW experience, rather than just participating in simulations in itself, may have contributed to the skill development observed. For example, during the course, students were also required to prepare by reading patient charts, produce documentation after their simulations, schedule meetings with their preceptor for feedback, navigate a simulated health center, and seek out and integrate additional practice-based resources. With repetition over time, practice in these aspects meant to simulate additional aspects of FW and the development of related skills, likely also contributed to their performance on competency-related skills during the simulations and debriefs. Acknowledging these other simulated FW components and their importance for building competency is also important for understanding how to effectively use simulation as part of FW hours.

Limitations

There are a few limitations to this study. The study focussed on a single cohort of students from an accredited program with curriculum design that may have different ordering of courses than other curricula prior to introductory Level 1 FW. The findings will therefore need to take this context into consideration and may not be generalizable to all Level 1 FW simulation training. The study occurred concurrently to students' academic PH course, which may have influenced the trajectory of how some competency-related and integration across skills developed. For example, the cognitive load of demonstrating a newer skill may have been higher, decreasing the concurrent focus on responding to a patient's priorities. Because students were taking their academic curricular content in PH concurrently to participating in the simulation (in contrast to how they had completed their curricular content in MH the term before the introductory FW course) it is possible that they had not yet achieved an integration of practice knowledge and an understanding of the practice context to the same extent they had for MH. This could potentially account for the increased difficulty of integrating their PH learning when working with a simulated PH patient for both process of practice elements and physical skill requirements.

As well, while there was an attempt to evaluate students individually during the simulation, this did not prove feasible and so the simulation was completed and evaluated in pairs. While not assessed, improvements in scores may therefore have also reflected an increase in collaborative leadership and communication skills between the pair of students, leading to a stronger performance of competencies overall.

Future Research

Future research should address the gap in the literature and knowledge on how competency-related skills developed using simulation in Level 1 FW transfer and contribute to further competency development Level 2 FW. Future research may wish to explore the impact of case content order on competency development. Additionally, investigation should also include quantification of the average length of time or number of simulations that are required to develop competencies for practice content and context. Finally, the shift in learning required for students to move from “doing to” versus “collaborating with” a client as case complexity and required clinical competencies increases requires further investigation.

Implications for Occupational Therapy Education

Sequential simulations effectively contribute to developing certain competency-related skills during Level 1 FW. Depending on the practice context and competency-related skill(s), it may take three or more formative simulations in that context to develop context-specific competency related skills. FW simulation experiences should incorporate unfolding case content with context-specific practice which require integration of competencies together with the opportunity to receive feedback. Knowing skills like self-reflection, respectfully receiving feedback, articulating clinical reasoning, and decision making to manage time more effectively transfer across contexts than clinical skills and responding to patient’s needs and priorities may influence how simulations are designed to promote a just right learning challenge.

Conclusion

These results suggest that sequential simulations are effective in developing competency related skills. While many different types of simulations are currently being used to contribute a small portion of the minimum requirement of 1000 hours (World Federation of Occupational Therapy [WFOT], 2016) for occupational therapy educational programs, our results suggest that more than one simulation with a patient in a given practice context may be required to significantly develop competency-related skills.

References

Accreditation Council for Occupational Therapy Education (ACOTE). (2018). *2018 Accreditation Council for Occupational Therapy Education (ACOTE®) Standards and Interpretive Guide (Effective July 31, 2020): August 2020 Interpretive Guide Version*. https://acoteonline.org/wpcontent/uploads/2020/10/2018-ACOTE-Standards.pdf

Association of Canadian Occupational Therapy Regulatory Organizations, Association of Canadian Occupational Therapy University Programs, & Canadian Association of Occupational Therapists [ACOTRO, ACOTUP, & CAOT]. (2021). *Competencies for Occupational Therapists in Canada/Référentiel de compétences pour les ergothérapeutes au Canada.* https://acotro-acore.org/sites/default/files/uploads/corecom_document_en_web.pdf

Barclay, L., & Chu, E. (2023). Pilot of a simulated clinical placement in occupational therapy education in an Australian university delivered online: A cross-sectional study of students' perceptions. *Journal of Occupational Therapy Education, 7*(2), 12. https://doi.org/10.26681/jote.2023.070212

Bennett, S., Rodger, S., Fitzgerald, C., & Gibson, L. (2017). Simulation in occupational therapy curricula: A literature review. *Australian Occupational Therapy Journal, 64*(4), 314-327. https://doi.org/10.1111/1440-1630.12372

Bossers, A., Miller, L. T., Polatajko, H. J., & Hartley, M. (2007). *Competency-based Fieldwork Evaluation for Occupational Therapists*. Nelson Education.

Cahill, S. M. (2015). Perspectives on the use of standardized parents to teach collaboration to graduate occupational therapy students. *American Journal of Occupational Therapy, 69,* (Suppl. 2). https://doi.org/10.5014/ajot.2015.017103

Chu, E. M. Y., Sheppard, L., Guinea, S., & Imms, C. (2019). Placement replacement: A conceptual framework for designing simulated clinical placement in occupational therapy. *Nursing & Health Sciences*, *21*(1), 4–13. https://doi.org/10.1111/nhs.12551

Coss, D., de Sam Lazaro, S., & Brady, K. (2023). Level I fieldwork: Could simulation be the answer? A descriptive study. *Journal of Occupational Therapy Education, 7* (3). https://doi.org/10.26681/jote.2023.070312

Dwivedi, A. K., Mallawaarachchi, I., & Alvarado, L. A. (2017). Analysis of small sample size studies using nonparametric bootstrap test with pooled resampling method. *Statistics in Medicine*, *36*(14), 2187-2205. https://doi.org/10.1002/sim.7263

Frasier, L., Rider, J. V., & Fecht, A. (2022). Use of standardized patient encounters as predictors of fieldwork performance: A pilot study. *Open Journal of Occupational Therapy, 10*(2), 1-11. https://doi.org/10.15453/2168-6408.1917

Gibbs, D. M., Dietrich, M., & Dagnan, E. (2017). Using high fidelity simulation to impact occupational therapy student knowledge, comfort, and confidence in acute care. *Open Journal of Occupational Therapy, 5*(1), 10. https://doi.org/10.15453/2168-6408.1225

Grant, T, Thomas, Y, Gossman, P & Berragan, L (2021) The use of simulation in occupational therapy education: A scoping review. *Australian Journal of Occupational Therapy*, *68*(4), 345-356. https://doi.org/10.1111/1440-1630.12726

Harris, N. C., Nielsen, S., & Klug, M. G. (2022). Level I fieldwork using simulation: Student performance outcomes and perceptions. *Journal of Occupational Therapy Education*, *6*(2), 16. https://doi.org/10.26681/jote.2022.060216

Hayden, J. K., Smiley, R.A., Alexander, M., Kardong-Edgren, S., and Jeffries, P. R. (2014). The NCSBN National Simulation Study: A longitudinal, randomized, controlled study replacing clinical hours with simulation in prelicensure nursing Education. *Journal of Nursing Regulation*, *5*(2), S3-S40. https://doi.org/10.1016/S2155-8256(15)30062-4

International Nursing Association for Clinical Simulation and Learning [INACSL] Standards Committee. (2021). Healthcare Simulation Standards of Best Practice™ Operations. *Clinical Simulation in Nursing*, *58*, 33-39. https://doi.org/10. 1016/j.ecns.2021.08.012

Lucas Molitor, W., & Nissen, R. (2020). Correlation between simulation and fieldwork performance in adult physical rehabilitation. *Journal of Occupational Therapy Education, 4*(2).https://doi.org/10.26681/jote.2020.040209

MacKenzie, D.E., Kiepek, N., Picketts, L., Zubriski, S. Landry, K., & Harris, J. (2021). Preparing learners for practice through simulation: Key features for educational design, preceptors, and learners. *Open Journal of Occupational Therapy, 9*(4), 1 -17. https://doi.org/10.15453/2168-6408.1799

Meek, G. E., Ozgur, C., & Dunning, K. (2007). Comparison of the t vs. Wilcoxon signed-rank test for Likert scale data and small samples. *Journal of Modern Applied Statistical Methods*, *6*(1). https://doi.org/10.22237/jmasm/1177992540

Occupational Therapy Council of Australia (OTC). (2020). Occupational Therapy Council Accreditation Standards Explanatory guide: The use of simulation in practice education/fieldwork. https://www.otcouncil.com.au/wp-content/uploads/Explanatory-notes-for-simulation-in-practice-education-updated-March2020.pdf

Ozelie, R., Both, C., Fricke, E., & Maddock, C. (2016). High-fidelity simulation in occupational therapy curriculum: Impact on level II fieldwork performance. *Open Journal of Occupational Therapy, 4*(4). https://doi.org/10.15453/2168-6408.1242

Ozelie, R., Domenighetti, S., Sugar, A., & Conrad, S. (2022). Evolution of level I fieldwork during an international pandemic: Students' perceptions of the effectiveness of virtual simulation-based level I fieldwork. *Journal of Occupational Therapy Education, 6*(3). https://doi.org/10.26681/jote.2022.060310

Ozelie, R., Moeller, M., & Newmark, T. (2023). Impact of simulation-based level I fieldwork on level II fieldwork performance. *American Journal of Occupational Therapy, 77*(suppl 2). https://doi.org/10.5014/ajot.2023.77S2-PO330

Rodger, S., Bennett, S., Fitzgerald, C. & Neads, P. (2010). Use of simulated learning activities in occupational therapy curriculum. *University of Queensland on behalf of Health Workforce Australia*. www.hwa.gov.au/publications

Rudolph, J. W., Simon, R., Dufresne, R. L., & Raemer, D. B. (2006). There's no such thing as "nonjudgmental" debriefing: A theory and method for debriefing with good judgment. *Simulation in Healthcare*, *1*(1), 49-55. https://doi.org/10.1097/01266021-200600110-00006

Shieh, G., Jan, S. L., & Randles, R. H. (2007). Power and sample size determinations for the Wilcoxon signed-rank test. *Journal of Statistical Computation and Simulation*, *77*(8), 717-724. https://doi.org/10.1080/10629360600635245

Sibbald, K. R. & MacKenzie, D. E. (2023). Sequential simulations during introductory part-time fieldwork: Design, implementation, and student satisfaction. *Open Journal of Occupational Therapy, 11*(3), 1-12. https://doi.org/10.15453/2168-6408.2105

Sibbald, K. R., MacKenzie, D. E., & Harris, J. (2023). Occupational therapy students' perceptions of feedback during pre-fieldwork simulation debrief: Useful and why. *Journal of Occupational Therapy Education, 7* (1). https://doi.org/10.26681/jote.2023.070113

StataCorp (2019) Stata Statistical Software: Release 16. StataCorp LLC, College Station, TX.

World Federation of Occupational Therapists (WFOT). (2016). *Minimum standards for the education of occupational therapists*. https://wfot.org/assets/resources/COPYRIGHTED-World-Federation-of-Occupational-Therapists-Minimum-Standards-for-the-Education-of-Occupational-Therapists-2016a.pdf

Wilcoxon, F. (1945). Individual comparisons by ranking methods. *Biometrics Bulletin,1*(6), 80–83. https://doi.org/10.2307/3001968