THE IMPACT OF THE MATERNAL-CHILD CLINICAL LEARNING ENVIRONMENT ON UNDERGRADUATE NURSING STUDENTS' SELF-EFFICACY

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Title: The Impact of the Maternal-Child Clinical Learning Environment on Undergraduate Nursing Students' Self-Efficacy

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There are currently many challenges to clinical nursing education. The coronavirus 2019 pandemic compounded these challenges when hospitals and government mandates excluded nursing students from traditional in-person clinical experiences. These barriers made it challenging to continue nursing education for prospective future nurses. While the current standard of practice is to employ in-person clinical, the National Council of State Boards of Nursing recognizes that up to 50 percent of traditional undergraduate nursing clinical hours can be replaced with high-quality simulation for nursing in the seven core nursing courses, including maternal-child. Educators were pressured to keep the education flow moving ahead for prospective new nurses, confronting an upcoming nurse shortage. Nursing innovation and technology allowed educators to pivot their traditional clinical teaching to screen-based simulation. Guided by Bandura's self-efficacy and Ericsson's work on deliberate practice, this study evaluated the impact of the maternal-child clinical learning environment on undergraduate nursing students' obstetric self-efficacy. A non-experimental, cross-sectional, quantitative study design was implemented. A convenience sample of 381 Pennsylvania nursing students responded to the online survey from varying programmatic levels who completed maternal-child clinical during Fall 2020, Spring 2021, and Summer 2021 semesters. In alignment with previous research, this study's findings recognize that in-person traditional clinical experiences remain best for increasing maternal-child nursing students' obstetric self-efficacy rather than employing SBS or a mixture of SBS and traditional clinical. Findings revealed an inverse relationship between screen-based simulation and nursing students' self-efficacy, suggesting that the quality of teaching and learning is impacted. The best teaching and learning strategies using screen-based simulation merit further inquiry in teaching maternal-child clinical to undergraduate nursing students. Future research is warranted on investigating best practices for teaching strategies for students in maternal-child nursing using screen-based simulation in times of natural crisis or in the event of future pandemics.

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CHAPTER ONE

INTRODUCTION

The National Council of State Boards of Nursing (NCSBN) found that up to fifty percent of traditional undergraduate nursing clinical hours can be replaced with high-quality simulation with similar educational outcomes (Hayden et al., 2014). Simulation is a learning strategy used in nursing education that replicates a possible situation in real life (INACSL Standards Committee, 2016). Screen-based simulation (SBS) and high-fidelity simulation are two types of simulation. SBS is versatile; it can be applied in-person or at home with a computer or tablet connected to the Internet, while a high-fidelity simulation is primarily conducted in person. High-fidelity simulation is conducted in-person in a laboratory with state-of-the-art manikins with highly technical features, such as heart, lung, and bowel sounds. The NCSBN study found no statistical difference in clinical competency, comprehensive nursing knowledge, National Council Licensure Examination – Registered Nurse (NCLEX-RN) pass rates, clinical competency, and readiness for practice between nursing students who had no more than 10, 25, and 50% of their traditional hours replaced by high-fidelity simulation (Hayden et al., 2014). However, the NCSBN study did not evaluate SBS to replace traditional undergraduate nursing clinical hours. Despite the lack of evidence in the literature, SBS was used as a clinical replacement strategy for many nursing students due to the coronavirus disease 2019 (COVID-19) pandemic.

Nursing students are typically required to participate in hands-on or in-person clinical with patients in various healthcare settings. There are often fewer clinical hours dedicated to specialty courses, such as maternal-child, than other core nursing courses.

Additionally, maternal-child clinical is often combined with pediatric clinical. Nursing schools have different structures for offering maternal-child and pediatric clinical. For example, students may have maternal-child clinical every week, every other week, a portion of the semester, or the entire semester. As a result of the COVID-19 pandemic, during the 2020 spring and summer semesters, nursing students were unable to continue clinical hours in the hospital due to mandates from local and state government officials. Maternal-child clinical nursing faculty had to act quickly as there was not much time to plan for the abrupt switch to distance clinical learning. Therefore, many nursing students had in-person maternal-child clinical and high-fidelity simulation hours replaced with SBS. For maternal-child nursing students, this meant that some nursing students would only have SBS experiences, some would have mixed traditional clinical hours with screen-based experiences, and some completed all traditional clinical and simulation experiences. During Fall 2020, Spring 2021, and Summer 2021 semesters, many nursing students continued to be affected by the COVID-19 pandemic. Due to ongoing healthcare facility restrictions, some students were still completing SBS for a portion or all of the maternal-child clinical hours. In addition, students were required to quarantine for a week or two if they tested positive for COVID-19 or were exposed to someone with the disease. This resulted in missed in-person clinical time for some students.

Many SBS software program options include pre-programmed scenarios, which are easier to implement than developing new high-quality scenarios or other replacement strategies. The SBS pre-programmed scenarios benefit nursing faculty who need to quickly switch to distance clinical learning. In addition to teaching nursing students how to perform nursing tasks and skills, clinical education teaches nursing students cognitive skills, such as self-efficacy, time management, teamwork, communication, interprofessional communication, empathy, interpersonal skills, leadership, patient safety, clinical judgment, critical thinking, critical reasoning, clinical decision-making skills, professional role development, and situational awareness (INACSL Standards Committee, 2016; Li et al., 2019; Mitchell & Boyer, 2020; Turkelson et al., 2020; Yeh et al., 2019). Cognitive skills teach students to "think like a nurse." SBS replaces real-life patients with virtual human avatars. The avatars and scenarios allow nursing students to perform nursing tasks and skills distantly and develop cognitive skills required for nursing.

Both in-person clinical and SBS allow nursing students to develop cognitive skills. Nursing education relies heavily on a hands-on approach to train nursing students using traditional clinical and in-person simulation experiences. Typically, clinical has been in-person for students to gain hands-on clinical experiences. For example, hands-on clinical nursing experience allows nursing students to develop physical dexterity and cognitive muscle memory with skills such as medication administration, intravenous therapy, urinary catheter initiation and care, and assessments (Mitchell & Boyer, 2020). Though SBS does not allow students to develop physical dexterity, it has the advantage of students being able to deliberately practice cognitive skills and a variety of scenarios, including rare emergencies, to build muscle memory. Developing cognitive muscle memory allows nursing students to think and perform tasks almost automatically without thought (Mitchell & Boyer, 2020) critically. In emergencies, the response to treatment time is critical for patients. However, emergencies are often rare in real-life clinical; in this case, SBS provides nursing students with the opportunity to develop cognitive muscle memory to respond to emergency events. In addition, SBS allows students to complete the simulations from various personal devices, such as personal computers, laptops, and tablets, using an internet connection to practice anytime, anyplace, and complete multiple times (Lioce et al., 2020).

The maternal-child nursing students who had traditional clinical and simulation experiences replaced with SBS experiences may have less obstetric self-efficacy than those who had hands-on, traditional clinical and simulation experiences. Self-efficacy is an individual's belief in their ability to achieve, which may be reflected in their performance (Bandura, 1977; INACSL Standards Committee, 2016). Other than the COVID-19 pandemic, other challenges may prevent a hands-on clinical experience, including a lack of healthcare facilities, competition with other nursing schools, faculty shortages, no student electronic medical record access, patient safety initiatives, infectious diseases, and student injury or illness. Furthermore, there are challenges associated with high-fidelity simulation, including the cost of the equipment, maintaining the equipment, simulation software costs and updates, and training faculty members on equipment and facilitation (Bonnetain et al., 2010; Haerling, 2018). SBS experiences could effectively replace some or all of traditional maternal-child clinical and high-fidelity simulation experiences.

This study informed nursing faculty's future decisions regarding the maternal-child clinical learning environment. The impact of the maternal-child clinical learning environment on nursing students' obstetric nursing self-efficacy was explored. In this study, the maternal-child clinical learning environments included in-person traditional clinical, SBS, and a mixture of both.

This chapter discusses the background, problem, purpose, research question, and conceptual framework. The commonly used terms are defined. The chapter will conclude with a discussion of the assumptions and significance.

Background

SBS is a type of virtual reality simulation similar to the popular computer gaming format. Virtual reality is a computer-generated reality that allows learners to experience various auditory and visual stimuli (INACSL Standards Committee, 2016). The virtual reality simulation experience can be enhanced using specialized equipment, such as ear and eyewear. Virtual reality equipment can be expensive, and therefore, virtual reality simulations are usually conducted in a virtual lab. In contrast to the costly virtual reality simulation, SBS utilizes a computer screen and an input device, such as a mouse, joystick, or keyboard (Lioce et al., 2020). SBS does not include specialized equipment or haptic devices, such as head-mounted displays. There is no standard term used throughout the literature to describe the type of virtual simulation that utilizes a personal computer, tablet, or phone screen and a mouse, joystick, touch screen, and/or keyboard. The terms found in the literature include but are not limited to e-simulation, computer-based simulation, gaming simulation, SBS, and virtual simulation. This research used SBS as a universal term.

In healthcare, SBS presents a clinical scenario with a patient through a digital screen surface (Graafland et al., 2012; Ilgen et al., 2013). This computer-generated simulator provides nursing students with clinical scenarios that require real-time decision-making (Bonnetain et al., 2010) and imparts clinical nursing knowledge (Durmaz et al., 2012). The clinical scenarios in SBS use avatars to portray the patients and nurses in the simulation. An avatar is a 3D geographical representation of a person capable of relatively complex actions, including facial expressions and physical responses while participating in a virtual simulation experience. An avatar and a realistic environment can teach high-level cognitive and psychomotor skills through interactive technologies and an immersive, interactive environment (INACSL Standards Committee, 2016). The SBS experience provides an interactive learning experience by allowing the student to control the nurse avatar and the software or the instructor to manage the patient avatar. The patient room is an interactive virtual world where the learner controls the avatar through typed chat, voice, or selecting from a list of choices (INACSL Standards Committee, 2016). The learner can decide on specific assessments, interventions, and medication administrations. For example, the nursing student can control a labor and delivery nurse avatar to interact with and provide nursing care to a laboring patient in a virtual birthing room. In this way, SBS provides the learner with a safe, realistic, and experiential setting.

Another advantage of SBS is reaching a broad audience of learners separated by space and time. The learners can complete SBS individually or as a group. For example, an instructor may facilitate an online SBS activity that allows multiple learners to participate. This is beneficial for creating a group learning environment for students when separated by space and time. Other advantages include replicability, portability, asynchrony, distribution, and data tracking (Chang et al., 2016). The disadvantages include the up-front financial costs, less appropriateness for team-based education, and limited functional fidelity (Chang et al., 2016).

Due to the benefits of SBS in teaching, SBS is often used as an alternative to traditional clinical or simulation hours (Durmaz et al., 2012). Learners can complete specific tasks in various environments, use the information to provide assessment and care, make clinical decisions, and observe the results of their decisions in action. In addition, feedback can be provided during and after the clinical scenario. The learner's activity and decisions are tracked, allowing feedback and self-assessment to occur and eliminating the need for an instructor to be present. Although, SBS offers multiple ways for instructors to facilitate students' learning. For example, some SBS software allows the instructor to control the avatar or set algorithms. In addition, group debriefing can be conducted online using video conferencing. Therefore, the learner's instructor may or may not be present (Lioce et al., 2020; Ventre & Schwid, 2014).

The International Association of Clinical Simulation and Learning (INACSL) Standards Committee (2016) provides standards of practice for simulation, including simulation design, facilitation, outcomes and objectives, debriefing, participant evaluation, professional integrity simulation-enhanced-IPE, and operations. Debriefing aims to improve future performance. Learners participate in the simulation and then reflect on the experience during the debrief. Debriefing should be facilitated by an individual trained and competent in the process. The facilitator is to devote concentrated attention to debriefing in an environment that supports confidentiality, trust, open communication, self-analysis, feedback, and reflection. In addition, the debrief should be based on a theoretical framework structured and congruent with the objective and outcomes of the simulation experience (INACSL Standards Committee, 2016). The criteria to meet the debriefing standard do not necessarily consider self-debriefing or online facilitator-led debriefing following SBS. For example, the first criterion relies on a facilitator to be competent in the process of debriefing, including formal training. Not all nursing instructors have formal training in debriefing, especially in an online setting. Due to the COVID-19 pandemic, many instructors who were not trained in simulation and debriefing were using these strategies to meet clinical learning objectives. There are varying debriefing opportunities provided to nursing students following SBS experiences, such as self-debriefing and facilitator-led group debriefing. For example, instructors can have students participate in the SBS scenario in an online classroom setting and debrief as a group or complete the SBS scenario individually and then meet as a group in an online classroom setting. SBS has computer-generated debriefing built into the software program. This is a style of self-debriefing and will provide the learner with customized feedback based on their selections throughout the SBS. The feedback or debrief can be provided throughout the simulation at the end of the simulation or both.

There are many advantages to group debriefing, such as facilitator-led reflection and learning from each other. In-person or online facilitator-led groups and self-debriefing increase knowledge, but in-person or online facilitator-led group debriefing is more beneficial than self-debriefing alone (Gantt et al., 2018; Rueda-Medina et al., 2021). In particular, self-debriefing is perceived as less beneficial due to no feedback or guided reflection being provided. Learners are limited to their own answers and computer-generated feedback indicating whether their actions were correct or incorrect (Dreifuerst et al., 2020; Gantt et al., 2018). Self-debriefing with a facilitator-led group debriefing is perceived as more beneficial than self-debriefing alone (Rueda-Medina et al., 2021).

There are challenges related to effective group debriefing following SBS, including learners completing scenarios individually and being separated by time and space. Therefore, debriefing following SBS is often neglected, and the only debriefing provided is with the computer-generated feedback log associated with the program. This limits student learning and outcomes (Dreifuerst et al., 2020).

As per the INACSL guidelines for debriefing, it is essential to debrief following best practices (INACSL Standards Committee, 2016). Debriefing for Meaningful Learning (DML) is one evidence-based method that can be used to facilitate a group debrief with SBS (Dreifuerst et al., 2020). DML provides a constant structure to facilitate the development of clinical reasoning skills and provide deliberate practice for thinking like a nurse (Dreifuerst, 2015; Dreifuerst et al., 2020). Using this method, learners actively participate before, during, and after the SBS using worksheets that guide the exploration of relationships between thinking, actions, and patient responses (Dreifuerst et al., 2020).

Before the SBS scenario, the facilitator assigns preparatory work to set the stage and focus learners' attention on the scenario (Dreifuerst et al., 2020). Then, the facilitator provides a synchronous prebrief to review the technology, present the case information, answer questions, and complete the worksheet section describing the plan for the experience and the desired patient outcomes. During synchronous video conferencing, learners are randomly called on to ensure active participation and encouraged to keep their microphones on to facilitate open communication (Dreifuerst et al., 2020).

During the SBS, learners use the worksheet to guide clinical learning. Each virtual action that is taken and the associated patient response are recorded on the worksheet. This will be used to facilitate the discussion during the debrief.

After the SBS, the facilitator reviews the students' computer-generated reports and facilitates synchronous group debriefing online using video conferencing. The first two to three minutes are provided for learners to complete the worksheet sections related to naming the patient, framing the story, and identifying the key issues (Dreifuerst et al., 2020). The facilitator guides a reflective discussion using a virtual whiteboard, Socratic questioning, and double-loop learning to uncover the thinking and decision-making behind actions, incorrect and correct assumptions, and beliefs (Dreifuerst, 2015; Dreifuerst et al., 2020). Double-loop learning is an educational concept that teaches learners to think about their assumptions and beliefs (Cartwright, 2002). Socratic questioning is an educational method in which the facilitator does not provide information or answer learners' questions directly but instead asks a series of questions to guide the learners to answer their own questions or come to a deeper awareness of their knowledge limitations (American Heritage Dictionary of the English Language, n.d.).

Meanwhile, the virtual whiteboard makes the relationship between assessments, decisions, and actions visible and includes color-coding to help facilitate double-loop learning (Dreifuerst, 2015; Dreifuerst et al., 2020). For instance, black ink is used to record everything the learners say, including what happened, while the facilitator notes things to discuss further. Green ink indicates suitable, best, or correct choices, and red ink for wrong, incorrect, or not the best choices. Blue ink is used to show new or changes in thinking for all items in red (Dreifuerst, 2015; Dreifuerst et al., 2020). Learners are also encouraged to add notes to their worksheets (Dreifuerst et al., 2020). The SBS is recalled from the beginning to the end with the facilitator guiding and prompting learners to identify assessments, findings, decisions, actions, and patient responses while notating different actions and patient reactions. Correct and incorrect actions are reviewed as learners may or may not have chosen the right action for a valid reason.

After the discussion, learners complete the worksheet section that summarizes reflection-on-action and reflection-in-action. Reflection-on-action refers to reflection that occurs after a task, activity, or experience occurred, while reflection-in-action refers to reflection during a task, activity, or experience. Reflection-in-action focuses on assimilation and accommodation (Dreifuerst et al., 2020). Assimilation is taking in and fully understanding information, and accommodation is changing existing ideas to take in new information (Dreifuerst, 2015).

Finally, the facilitator presents a parallel case that represents thinking-beyond-action by applying the concepts learned to a similar but different patient situation (Dreifuerst et al., 2020). Reflection-beyond-action focuses on anticipation and application to future situations (Dreifuerst, 2015; Dreifuerst et al., 2020). This section discussed the background related to SBS and nursing education, including advantages, challenges, and evidence-based practice for debriefing. The following section will discuss the statement of the problem.

Statement of the Problem

It is crucial to provide maternal-child nursing students with hands-on experience. However, limited clinical sites are a barrier to this type of experience. Nursing schools compete for the same clinical sites, but not all hospitals have obstetric units. The COVID-19 pandemic intensified the problem with maternal-child clinical placement due to school, facility, and government restrictions, and this intensity may persist following the pandemic. Therefore, many nursing schools turned to distance learning experiences, including SBS, to replace traditional in-person clinical and simulation experiences. Before the pandemic, depending on the structure of the maternal-child course, clinical hours may be completed by students in either the first or second half of the semester or every other week or every week throughout the entire semester. However, the COVID-19 pandemic response occurred for many nursing schools across the United States during spring break week. As a result, the maternal-child nursing students during Spring semester 2020 were exposed to various amounts of SBS. Some maternal-child nursing students could complete their traditional clinical and simulation experiences without SBS. Some had a portion of traditional clinical and simulation experiences replaced with SBS. At the same time, other maternal-child nursing students had all their traditional clinical and simulation experiences replaced with SBS. Nursing students continue to be impacted by the COVID-19 pandemic as units or schools may maintain the restrictions on the number of students permitted on the unit at one time. This perpetuates the problem of limited clinical site availability. Currently, SBS has been widely used to replace clinical hours. However, nursing schools and state boards of nursing do not currently have the level of evidence to make decisions on replacing traditional maternal-child clinical experiences with SBS experiences.

Purpose

The purpose of this study is to examine the impact of the maternal-child clinical learning environment on undergraduate nursing students' obstetric self-efficacy. The learning environments include traditional in-person clinical experiences, distance clinical with SBS, and a mixture of both. The proposed study used a large sample of students from associate, baccalaureate, and second-degree programs in Pennsylvania.

Research Question

The study utilized a non-experimental, cross-sectional, and quantitative design. The following research question evaluated the impact of the way undergraduate nursing students learn maternal-child clinical on obstetric nursing self-efficacy:

1. How does the maternal-child clinical learning environment impact undergraduate nursing students' obstetric nursing self-efficacy?
    a. What is the difference in obstetric nursing self-efficacy scores between undergraduate nursing students who complete in-person maternal-child clinical, those who complete maternal-child clinical with SBS, and those who complete a mixture of both?
        i. H_0: There is no difference in obstetric nursing self-efficacy scores between undergraduate nursing students who complete in-person maternal-child clinical, those who complete maternal-child clinical with SBS, and those who complete a mixture of both.

ii. H_1: There is a difference in obstetric nursing self-efficacy scores between undergraduate nursing students who complete in-person maternal-child clinical, those who complete maternal-child clinical with SBS, and those who complete a mixture of both.

b. How does the amount of maternal-child clinical with SBS impact undergraduate nursing students' obstetric nursing self-efficacy scores?

i. H_0: The amount of maternal-child clinical with SBS has no impact on undergraduate nursing students' obstetric nursing self-efficacy scores.

ii. H_1: The amount of maternal-child clinical with SBS impacts undergraduate nursing students' obstetric nursing self-efficacy scores.

Operational Definition

The operational definitions for research questions 1a and 1b are outlined in Table 1 and Table 2. The dependent variable for both questions was obstetric nursing self-efficacy and was measured using the total score on the Obstetric Nursing Self-Efficacy (ONSE) scale (Appendix E). The independent variable for question 1a was the type of maternal-child clinical learning environment and was determined using question number 11 on the demographic data survey (Appendix J). This question asked the participant to identify the type of learning environment(s) they participated in during maternal-child clinical, including in-person clinical, in-person simulation, distance learning using SBS, and distance learning using no SBS. The independent variable for research question 1b was the percentage of maternal-child clinical with SBS and was determined using question number 12 on the demographic data survey. This question asked participants to identify approximately what percentage of their maternal-child clinical was completed in a distance learning environment with screen-based simulation by entering a number between 0 and 100 where 0 means 0%; in other words, none and 100% means all.

Table 1

Operational Definition for Research Question 1a

Variable	Identification	Measurement
Independent	Type of maternal-child clinical learning environment	Question 11 on demographic data survey: What clinical learning environments did you participate in during your maternal-child nursing course? (Select all that apply) 1. In-person clinical (birthing center, hospital, or outpatient setting) 2. In-person simulation (laboratory setting) 3. Distance learning with screen-based simulation (at home using computer simulation software or online simulations, such as vSim® or Ryerson) 4. Distance learning with no screen-based simulation (at home using NO computer simulation software or online simulations, such as vSim® or Ryerson) 5. Other – Free text
Dependent	Obstetric nursing self-efficacy	Obstetric Nursing Self-Efficacy (ONSE) scale

Table 2

Operational Definition for Research Question 1b

Variable	Identification	Measurement
Independent	Percentage of maternal-child clinical with SBS	Question 12 on demographic data survey: Approximately what percentage of your maternal-child clinical was completed in a distance learning environment with screen-based simulation? Enter a number between 0 and 100 where 0 means 0% in other words none and 100% means all. Free text whole number between 0 and 100.
Dependent	Obstetric nursing self-efficacy	Obstetric Nursing Self-Efficacy scale

Conceptual Framework

The self-efficacy theory and theory of deliberate practice were combined to guide this study. Appendix A shows the conceptual model used to guide this study. This conceptual model shows that self-efficacy is influenced by physiological feedback, verbal persuasion, vicarious learning, and performance outcomes (Bandura, 1977). Self-efficacy can increase as an individual engages in deliberate practice. Deliberate practice relies on a motivated learner to define a goal, receive immediate feedback, engage in self-reflection, redefine the goal, and repeat the cycle to move from novice to mastery performance (Ericsson, 2008; Ericsson et al., 1993; Mabry et al., 2020). The goal is to improve nursing students' self-efficacy for applying quality nursing care by improving knowledge, skills, and attitude through deliberate practice using screen-based simulation.

Self-efficacy influences nearly every aspect of a nurse's practice, including the nurse's ability to think optimistically, persevere through difficulties, and complete tasks (Bandura, 1977; Pajares, 2002). Self-efficacy is critical for undergraduate prelicensure nursing students and novice nurses to advance their nursing careers (Tanner, 2006).

Nursing students with high self-efficacy are more likely to attain goals and engage in clinical and cognitive skills, such as time management and teamwork (Mitchell & Boyer, 2020; Turkelson et al., 2020), communication (Li et al., 2019; Turkelson et al., 2020), interprofessional communication (Yeh et al., 2019), empathy (Li et al., 2019), interpersonal skills (Mitchell & Boyer, 2020), leadership (Mitchell & Boyer, 2020), patient safety, clinical judgment, critical thinking, critical reasoning, clinical decision-making skills, professional role development, situational awareness, and overcome stress easier (Bandura, 1977; Clark et al., 2004). Clinical and cognitive skills are essential as nursing students need to know how to think and act appropriately to provide safe patient care. SBS allows nursing students to practice nursing care in a safe learning environment, improving nursing students' self-efficacy, validating positive self-efficacy beliefs, and correcting overconfidence (Bandura, 1980; Bandura, 2004; Mabry et al., 2020).

Self-efficacy from experience is generalizable to present and future situations (Bandura et al., 1975). For example, high self-efficacy in one case can lead to high self-efficacy in other situations. Simulation outcomes are expected to transfer into the nurse's future clinical nursing practice. Furthermore, simulation increases nurses' self-efficacy through hands-on experience, immediate feedback, peer modeling or vicarious experience, and repeated or deliberate practice in a psychologically safe environment (Bandura, 1977; Franklin & Lee, 2014; Lundberg, 2008). In other words, self-efficacy is an expected outcome of simulation in nursing education.

In addition to improving self-efficacy, SBS offers a deliberate practice design that can simulate any psychomotor or cognitive skill. The learning possibilities for SBS with deliberate practice are endless. Each skill is a micro-skill necessary for an individual to master collectively to become a successful nurse. The goal of SBS with deliberate practice is to transfer psychomotor and cognitive skills to clinical practice (Ericsson, 2004; Ericsson, 2015; Issenberg et al., 2005; McGaghie et al., 2008; Mitchell & Boyer, 2020).

Nursing students rarely have opportunities for deliberate practice with actual patients in the clinical setting. Many factors affect nursing students' ability to provide continuity of care. These factors include a lack of clinical hours, patient census, discharges, and exposure to rare or emergent situations. Maternal-child nursing students often receive fewer clinical hours than in core nursing courses. In addition, students attend maternal-child clinical during a portion of the semester or over the entire semester. For example, the student may attend one clinical shift every week or every other week for the entire or a part of the semester. SBS provides students with the opportunity to practice psychomotor and cognitive skills in repetition and a safe learning environment that poses no risk to patient safety (Bonnetain et al., 2010; Ericsson, 2015; Mitchell & Boyer, 2020). For example, SBS with deliberate practice allows students to learn from their medication errors without posing a risk to actual living patients.

The prelicensure undergraduate maternal-child nursing course provides nursing students with a varied number of clinical days, if any, on a labor and delivery unit. The labor and delivery unit includes a population with a high risk of litigation due to possible adverse maternal-child outcomes. Therefore, the nursing student's labor and delivery experience is usually an observation day with little or no hands-on experience. In addition to the cognitive skills required to "think like a nurse," there are many specialized skills a maternal-child nurse generalist must acquire to be safe and competent, such as fetal monitoring, labor management, postpartum assessment and management, recognizing and managing maternal and fetal signs of distress, epidural assistance and management, neonatal assessment, neonatal resuscitation, neonatal care, and APGAR scoring. Many skills are required for rare, emergent obstetric and neonatal emergencies, such as uterine rupture, postpartum hemorrhage, shoulder dystocia, and umbilical cord prolapse. Unfortunately, nursing students may not even observe the skill, let alone have the opportunity to engage in deliberate practice. This is especially true with cognitive skills. Importantly, SBS with deliberate practice allows students to actively learn the specialized psychomotor and cognitive skills required for maternal-child nursing in a safe learning environment. Through cultivating cognitive skills, these students can develop muscle memory for the nursing care required during rare and emergent situations that may result in adverse patient outcomes. Muscle memory allows a nurse to recognize and react faster to a patient deteriorating and improve outcomes by promptly providing appropriate nursing care (LeFlore et al., 2012). SBS with deliberate practice is essential for maternal-child nursing education as the opportunity to build self-efficacy through deliberate practice in traditional clinical settings may be limited (Cummings & Connelly, 2016).

Definitions of Terms

The terms and definitions used throughout this research study are as follow:

- Avatar: “A graphical representation, typically three-dimensional, of a person capable of relatively complex actions including facial expression and physical responses while participating in a virtual simulation-based experience. The user controls the avatar through the use of a mouse, keyboard, or a type of joystick to move through the virtual simulation-based experience" (INACSL Standards Committee, 2016, p. S40).

- Cognitive: "Refers to a domain of learning that includes knowledge, comprehension, application, analysis, synthesis, and evaluation. The goal of learning in this domain is to help participants progress to higher levels of learning so they are able to make judgments about the subject at hand" (INACSL Standards Committee, 2016, p. S40).
- Computer-based simulation: "A simulation-based learning activity designed to provide an experience through the use of an alternative medium. Learners can complete specific tasks in a variety of potential environments, use information to provide assessment care, make clinical decisions, and observe the results in action. Feedback can be provided during and after the interaction" (INACSL Standards Committee, 2016, p. S40).
- Debriefing: "A reflective process immediately following the simulated-based experience that is led by a trained facilitator using an evidence-based debriefing model. Participants' reflective thinking is encouraged, and feedback is provided regarding the participants' performance while various aspects of the completed simulation are discussed. Participants are encouraged to explore emotions and question, reflect, and provide feedback to one another. The purpose of debriefing is to move toward assimilation and accommodation to transfer learning to future simulations" (INACSL Standards Committee, 2016, p. S41).
- Deliberate practice: "When individuals engage in practice activities (which are, at least initially, developed by teachers and coaches) with full concentration on improving some specific aspect of performance" (Ericsson et al., 2009, p. 205).

- Facilitator: “A trained individual who provides guidance, support, and structure at some or all stages of simulation-based learning including prebriefing, simulation, and/or debriefing” (INACSL Standards Committee, 2016, p. S42).
- Feedback: “Information given or dialog between participants, facilitator, simulator, or peer with the intention of improving the understanding of concepts or aspects of performance” (INACSL Standards Committee, 2016, p. S42).
- Fidelity: “The ability to view or represent things as they are to enhance believability. The degree to which a simulated experience approaches reality; as fidelity increases, realism increases. The level of fidelity is determined by the environment, the tools and resources used, and many factors associated with the participants” (INACSL Standards Committee, 2016, p. S42).
- Haptic device: “Computer technology, generally three-dimensional in nature, that integrates proprioception (touch) to allow the participant(s) to interact with and control the virtual equipment based on feedback from the system. Haptics can be used to simulate touching; palpating an organ or body part; and/or cutting, tearing, or applying traction on tissue, such as when using simulated virtual chest tube or virtual intravenous insertion systems” (INACSL Standards Committee, 2016, p. S42-S43).
- High-fidelity simulation: “In health care simulation, high-fidelity refers to simulation experiences that are extremely realistic and provide a high level of interactivity and realism for the learner. It can apply to any mode or method of simulation; for example, human, manikin, task trainer, or virtual reality” (Lioce et al., 2020, p. 21).
- High-fidelity simulator: “A term often used to refer to the broad range of full-body manikins that have the ability to mimic, at a very high level, human body functions.

Also known as a high-complexity simulator. Other types of simulators can also be considered high-fidelity, and that fidelity (realism) has other characteristics beyond a particular type of simulator" (Lioce et al., 2020, p. 21).

- Low-fidelity: "Not needing to be controlled or programmed externally for the learner to participate; examples include case studies, role-playing, or task trainers used to support students or professionals in learning a clinical situation or practice" (Lioce et al., 2020, p. 28).
- Muscle memory: "The ability to repeat a specific muscular movement with improved efficiency and accuracy that is acquired through practice and repetition" (Merriam-Webster, n.d., para. 1).
- Objective structured clinical examination (OSCE): "A station or series of stations designed to assess performance competency in individual clinical or other professional skills. Learners are evaluated via direct observation, checklists, learner presentations, or written follow-up exercises. The examinations may be formative and offer feedback or summative and be used for making high stakes educational decisions" (Lioce et al., 2020, p. 34).
- Participant: "One who engages in a simulation-based activity for the purpose of gaining or demonstrating mastery of knowledge, skills, and attitudes of professional practice" (INACSL Standards Committee, 2016, p. 35).
- Prebriefing: "An information or orientation session immediately prior to the start of a simulation-based experience in which instructions or preparatory information is given to participants. The purpose of prebriefing is to establish a psychologically safe environment for participants. Suggested activities include reviewing objectives,

creating a 'fiction contract'; and orienting participants to the equipment, environment, mannequin, roles, time allotment, and scenario" (INACSL Standards Committee, 2016, p. 37).

- Distance learning: "A method of study where teachers and students do not meet in the classroom but use the Internet, email, mail, etc., to have classes" (Merriam-Webster, n.d., para. 1).
- Safe learning environment: "The emotional climate that is created through the interaction among all participants (including facilitators). In this positive emotional climate, all participants feel at ease taking risks, making mistakes, or extending themselves beyond their comfort zone. Awareness of the psychological aspects of learning, the effects of unintentional bias, cultural differences, and attentiveness to one's own state of mind helps to effectively create a safe environment" (INACSL Standards Committee, 2016, p. S44).
- Scenario: "A deliberately designed simulation experience (also known as a case) that provides participants with an opportunity to meet identified objectives. The scenario provides a context for the simulation and can vary in length and complexity, depending on the objectives" (INACSL Standards Committee, 2016, p. S44).
- Screen-based simulation (SBS): "A simulation presented on a computer screen using graphical images and text, similar to popular gaming format, where the operator interacts with the interface using a keyboard, mouse, joystick, or other input device" (Lioce et al., 2020, p. 41).

- Self-efficacy: “An individual’s perception or belief in his or her ability to achieve. This may be reflected in how an individual behaves and/or performs” (INACSL Standards Committee, 2016, p. S44).
- Simulation: “An educational strategy in which a particular set of conditions are created or replicated to resemble authentic situations that are possible in real life. Simulation can incorporate one or more modalities to promote, improve, or validate a participant’s performance” (INACSL Standards Committee, 2016, p. S44).
- Simulator: “A setting, device, computer program or system that performs simulation. Any object or representation used during training or assessment that behaves or operates like a given system and responds to the user’s actions (SSH)” (Lioce et al., 2020, p. 48).
- Standardized patient (also known as simulated patient): “A person trained to consistently portray a patient or other individual in a scripted scenario for the purposes of instruction, practice, or evaluation” (INACSL Standards Committee, 2016, p. S45).
- Virtual reality: “A computer-generated reality, which allows a learner or group of learners to experience various auditory and visual stimuli. This reality can be experienced through the use of specialized ear and eyewear” (INACSL Standards Committee, 2016, p. S45).
- Virtual simulation: “A simulation involving real people operating simulated systems. Virtual simulations may include surgical simulators that are used for on-screen procedural training and are usually integrated with haptic device(s)” (Lioce et al., 2020, p. 54).

Assumptions

The assumptions for this study are described as follows:

1. Every participant was an undergraduate nursing student in a prelicensure program.
2. Every participant completed a past maternal-child nursing course during the Fall 2020, Spring 2021, or Summer 2021 semester.
3. Every participant answered the Obstetric Nursing Self-Efficacy (ONSE) scale and the questions honestly and to the best of their ability.

Significance

The National Council of State Boards of Nursing (NCSBN) conducted a landmark national, large-scale, randomized, controlled simulation study with undergraduate nursing students between August 2011 and May 2013. The NCSBN study found that traditional clinical hours can be replaced with up to 50% high-quality simulation in undergraduate nursing courses with comparable end of program outcomes and new graduates' readiness for practice (Hayden et al., 2014). The control group received no more than 10% simulation experience during clinical hours. The two experimental groups had 25% and 50% of traditional clinical hours replaced with simulation. There was no statistically significant difference in clinical competency, comprehensive nursing knowledge assessments, and NCLEX pass rates between the groups. A post-survey was conducted at six weeks, three months, and six months after graduation from the program; there was no statistically significant difference in manager ratings, overall clinical competency, and readiness for practice (Hayden et al., 2014). The NCSBN study provided nursing educators with evidence to replace traditional clinical hours with high-quality simulation experiences. However, there is no evidence found in the literature to support replacing traditional clinical hours with SBS experiences.

SBS has many benefits. It is standardized and can replicate any disease or situation in a highly realistic, safe, interactive learning environment (Bonnetain et al., 2010; Bracq et al., 2019). In addition, SBS is easy to use and access (Padilha et al., 2018) and teaches psychomotor and cognitive skills (Bracq et al., 2019). Learners can repeat the scenarios as many times as they need to meet the learning objectives. Engaging in deliberate practice with SBS helps learners develop muscle memory for psychomotor and cognitive skills (Mitchell & Boyer, 2020). SBS can meet the needs of nursing students who often have limited or no opportunity for deliberate practice in the traditional clinical environment or high-fidelity simulation.

Furthermore, SBS often has real-time, immediate feedback and debriefing. It allows the instructor to facilitate or participate in the simulation. Therefore, an instructor does not have to be present (Bonnetain et al., 2010). Also, costs are lower for SBS than high-fidelity simulation (Bonnetain et al., 2010; Haerling, 2018). SBS offers the flexibility of completing the scenario synchronously or asynchronously, and individually at home or separately or as a group in a computer lab (Bonnetain et al., 2010). There are no time or distance barriers. The number of students who can participate is unlimited.

Due to the COVID-19 pandemic, maternal-child nursing students had their traditional clinical hours partially or entirely replaced with SBS experiences. While utilizing SBS experiences to replace clinical hours was necessary, no research in the literature supports replacing traditional clinical hours with SBS. The findings from the proposed study will help inform nursing educators in making policy and course decisions related to the maternal-child clinical learning environment. Maternal-child nursing educators will be better prepared to make clinical changes based on personal or societal demands. The current or a future pandemic may restrict traditional clinical hours for some or all students, or an illness or injury may affect an individual student's ability to complete traditional clinical hours. Therefore, further research is needed to explore the effects of replacing traditional maternal-child clinical hours with SBS.

Mainly, there is a lack of hands-on training associated with SBS compared to traditional clinical hours and high-fidelity simulation. Nursing students are typically required to participate in hands-on or in-person clinical with patients in various healthcare settings. SBS and high-fidelity simulation allows nursing students to practice cognitive, motor, and critical thinking skills in a safe environment that does not endanger patients. However, a lack of hands-on training may affect self-efficacy differently than a hands-on training approach.

SBS may influence obstetric nursing self-efficacy as a replacement for traditional clinical hours and in-person simulation. When nursing students are exposed to different maternal-child clinical learning environments, the students' obstetric nursing self-efficacy may be impacted differently. This cross-sectional study explored undergraduate nursing students' self-efficacy related to the maternal-child clinical learning environment.

Summary

This chapter discussed the background, problem, purpose, and research questions. The commonly used terms in this research were defined. The chapter concluded with a list of the assumptions and a discussion related to the study's significance. The next chapter will detail the literature regarding the variables and survey tools used in this study.

CHAPTER TWO

LITERATURE REVIEW

This chapter reviews the literature on the maternal-child clinical learning environment and obstetric nursing self-efficacy. It begins with discussing screen-based simulation (SBS) and its advantages. Then, this chapter explains Bandura's "Self-Efficacy Theory" and the deliberate practice model, followed by the literature related to SBS and obstetric self-efficacy. Then, literature comparing SBS to other learning methods is explored, including non-clinical learning methods, low and high-fidelity simulation, and standardized patient simulation. Lastly, the ONSE scale is discussed regarding development and use in other studies.

Screen-Based Simulation

SBS, combined with haptic devices, began in healthcare in the 1990s to develop medical students' psychomotor skills before surgery on live patients (van Dongen et al., 2011). Haptic devices are three-dimensional computer technology that allows learners to simulate touching to interact with and control the virtual equipment. The computer program provides feedback to the learner (INACSL Standards Committee, 2016). Since haptic devices are unnecessary for all scenarios and require specialized equipment, screen-based simulation became available that utilized only the personal computer, tablet, or device. This allows for flexibility for the SBS to be completed in a computer lab or at home. SBS may be accessed online through a website or a software program. SBS provides individual connection and flexibility to access the simulation scenarios. This eliminates geographical and time constraint barriers (Bonnetain et al., 2010; Bracq et al., 2019). SBS portrays a realistic environment with medical instruments, tools, devices, furniture, and characters (Bracq et al., 2019). SBS offers learners a high level of interaction and realism in a safe, realistic, non-threatening learning environment (Bonnetain et al., 2010). Tutorials are built into the simulation program to assist the learner with orienting to the SBS environment. SBS allows learners to make and learn from their mistakes as there is no risk for patient harm, and learners may repeat the scenario until they meet their learning objective or outcome. Feedback and debriefing are usually provided throughout the SBS scenario; however, some SBS programs may rely on in-person debriefing or self-debriefing.

SBS has many advantages over high-fidelity simulation. First, SBS is less expensive than high-fidelity simulation as high-fidelity simulation requires purchasing expensive equipment, maintaining equipment, and paying staff and instructors. There are no expensive equipment and maintenance fees, and no instructor is necessary for SBS. Students may be required to pay a small price to purchase the software. Second, the number of students who can participate at one time is limited in high-fidelity simulation.

In contrast, SBS allows for an unlimited number of students to participate at once, either independently or as a group, with screen-sharing. There is SBS software that allows for synchronous or asynchronous instructor facilitation or participation. Third, a high-fidelity simulation is usually completed once and not repeated, which may not allow long-term retainment of complex procedures or specific behaviors. In contrast, SBS allows repetitive practice or repeating the scenarios as many times as needed to meet educational outcomes. Fourth, SBS can simulate various diseases and situations. Learners must know procedural knowledge for high-fidelity simulations to be successful. Often, SBS is used to learn procedural knowledge before a high-fidelity simulation. Thus, SBS and high-fidelity simulation are often used to complement one another (Bracq et al., 2019; Bonnetain et al., 2010; National League for Nursing, n.d.).

Overall, high-fidelity simulation may have limited education advantages over SBS (Bonnetain et al., 2010; Bracq et al., 2019). SBS encourages the development of cognitive skills, including decision-making (Durmaz et al., 2012; Michelet et al., 2019), communication (Steadman et al., 2020; Swerdlow et al., 2020), teamwork (Barre et al., 2019; Michelet et al., 2019; Steadman et al., 2020; Swerdlow et al., 2020), leadership (Barre et al., 2019; Steadman et al., 2020; Swerdlow et al., 2020), self-efficacy (Alsalemi et al., 2020; Taekman et al., 2017), time management (Michelet et al., 2019), and situational awareness (Michelet et al., 2019; Steadman et al., 2020). There is research related to replacing traditional clinical hours with high-fidelity simulation. Nursing students who participated in traditional clinical experiences compared to students who had 25% and 50% of traditional clinical hours replaced with high-fidelity simulation had similar knowledge, clinical competency, and NCLEX pass rates (Hayden et al., 2014). However, no research reports were found in the literature that compares replacing traditional clinical hours with SBS. Furthermore, there are no research reports on replacing prelicensure undergraduate nursing students' traditional maternal-child clinical hours with SBS experiences. Therefore, this study aims to explore the impact of the maternal-child clinical learning environment on undergraduate nursing students' self-efficacy.

Theoretical Framework

Albert Bandura's "Self-Efficacy Theory" and K. Anders Ericsson's "Theory of Deliberate Practice" were combined to guide this study. Self-Efficacy Theory will be discussed, followed by the Theory of Deliberate Practice.

Self-Efficacy Theory

Self-efficacy is an individual's belief or perception that they can complete an activity and have the capacity to organize and execute the behaviors necessary to produce specific performance or goal attainments (Bandura, 1977; Bandura, 1980; Bandura, 1986; Bandura, 1997). Self-efficacy is defined as the confidence that an individual has in controlling their self-motivation, behavior, and social environment (Bandura, 1977). Self-efficacy plays a central role in the ability of a student who is fearful or has avoidant behavior to make the personal and social changes required to achieve their goal of transitioning from a student nurse to a nurse (Bandura, 1977).

Self-Efficacy Theory was developed by Bandura (1977) as a part of his more extensive theory, Social Learning Theory, which later became known as Social Cognitive Theory. Social Cognitive Theory posits that individuals are not merely products of their environment. Instead, individuals produce their environment as their motivation and behavior are determined by the interaction between behavioral, environmental, and personal factors. The interaction between behavioral, environmental, and personal characteristics is triadic reciprocal causation (Bandura, 2012). Social Cognitive Theory has four interrelated processes of goal attainment and motivation: self-observation, self-evaluation, self-reaction, and self-efficacy (Bandura, 1986). SBS incorporates the interrelated processes that support Social Cognitive Theory.

An individual uses four sources of information, performance outcomes, vicarious experiences, verbal persuasion, and physiological feedback to judge their self-efficacy (Bandura, 1977). Performance outcomes, also known as performance accomplishments or past experiences, are the most important source of self-efficacy. A positive experience enables an individual to feel more competent and perform well at an associated task. In contrast, a negative experience makes an individual feel less competent and perform poorly at an associated task (Bandura, 1977). Self-efficacy is negatively impacted by fear, stress, and anxiety (Bandura, 1993). As an individual's self-efficacy increases, their anxiety decreases (Bandura, 1993). In addition, an individual's self-efficacy may be affected through observational learning or vicarious experiences. Individuals can learn vicariously through observing and analyzing another individual's experience and performance. Also, verbal persuasion can influence an individual's self-efficacy. Encouragement or discouragement related to an individual's performance or ability to perform may impact their self-efficacy. Lastly, physiological feedback is also known as emotional arousal. An individual's body sensations and how they perceive them may increase or decrease their self-efficacy (Bandura, 1977).

Self-Efficacy Theory posits that individuals are more likely to engage in activities that they have high self-efficacy and less likely to engage in activities with low self-efficacy (Bandura, 1977; Bandura, 1986). Individuals are more motivated to learn when they have high self-efficacy and engage in the required tasks to learn when completed successfully. In contrast, individuals are less likely to engage in tasks with low self-efficacy.

Self-efficacy beliefs influence goals and aspirations (Bandura, 1980). The stronger an individual perceives self-efficacy, the higher goals an individual will set and the stronger their commitment to achieving the goal. The mastery of new skills and experiencing success have the most substantial influence on self-efficacy (Bandura, 1977). An individual's self-efficacy can be built or increased by completing small, basic goals or tasks to experience success initially. By completing the small, basic goals or tasks, the individual is provided with the experience of positive performance outcomes. In other words, the individual is gaining a positive experience through initial successes that allow the individual to build a foundation for positive self-efficacy. Then, the individual's small, basic goals or tasks develop into larger, more complex, and challenging goals or tasks (Bandura, 1980). Providing mastery experiences will allow individuals to progress from avoidance to attempting the task (Bandura, 1993).

Furthermore, self-efficacy from past experience is generalizable to present and future situations (Bandura et al., 1975). For example, high self-efficacy in one situation can lead to high self-efficacy in other situations. Self-efficacy determines how obstacles and barriers are viewed. Individuals with positive self-efficacy view obstacles as surmountable by improving self-management skills and perseverance (Bandura, 2004).

Deliberate Practice

SBS increases nursing students' self-efficacy and level of mastery through deliberate practice (Mabry et al., 2020). Deliberate practice is a model to structure effective practice and the learning needs necessary to meet an individual's desired outcomes (Ericsson, 2009; Ericsson et al., 1993). Deliberate practice was first studied in expert performers, such as musicians (Ericsson, 2004), typists, professional violinists, master chess players, gymnastics, baseball players, and tennis players (Ericsson et al., 1993; Ericsson, 2008). The purposeful, repetitive, and extended practice with instructor feedback improved motivated learners' performance and helped prevent skill growth stagnation (Ericsson et al., 1993). In recent years, deliberate practice has been applied to medical, nursing, and other healthcare education, starting pre-clinically and continuing throughout undergraduate education to postgraduate and continuing education (Mitchell & Boyer, 2020; Yeh et al., 2019).

Deliberate practice trains a learner's behavior and thought patterns relevant to situational factors and the environment (Ericsson, 2015). Deliberate practice develops organized muscle memory guided by signals in the environment. Engaging in deliberate practice for psychomotor and cognitive skills will increase an individual's cognitive load and will likely be automated as rote muscle memory (Mitchell & Boyer, 2020). In nursing education, deliberate practice develops both psychomotor and cognitive skills necessary to "think like a nurse" (Li et al., 2019; Mitchell & Boyer, 2020; Turkelson et al., 2020; Yeh et al., 2019).

Deliberate practice requires a self-motivated individual to engage in a cycle of repetitive practice towards a well-defined goal, receive immediate feedback, self-reflect on their performance to reset practice goals, and engage in repetitive practice while focusing on achieving the revised goals (Ericsson, 2008; Ericsson et al., 1993; McGaghie et al., 2011; Yeh et al., 2019). The necessary steps for instructors or coaches required to develop well-designed, effective, and deliberate practice include motivating the learners, providing clearly defined learning objectives for specific tasks, defining precise, measurable metrics of performance, engaging in the repetitive practice of skills, and delivering real-time, constructive, actionable feedback (Ericsson, 2004; Ericsson, 2008). SBS provides instructors or coaches with the opportunity to accomplish well-designed, effective deliberate practice.

SBS, with deliberate practice, provides learners the training required to improve performance (Mabry et al., 2020). Due to low occurrences, some skills are rare or difficult for students to practice in a clinical setting repetitively. Alternatively, various psychomotor and cognitive skills are taught using SBS and deliberate practice, allowing students to practice skills that may be limited to practice in a traditional clinical setting. SBS, with deliberate practice, allows for real-time, immediate feedback and debriefing with time for reflection in a low-stakes environment (Mitchell & Boyer, 2020). In particular, immediate feedback will enable learners to process problem-solving, reevaluate, and set goals to improve performance. Then learners repeat the SBS to enhance their performance. In addition, real-time feedback during the SBS experience provides an external driver for learners to perform well. SBS applies formative and summative assessment. The goal of the formative assessment is to motivate learners through external drivers to improve their performance. Summative assessment may also encourage learners but is different from formative as it is an assessment at the end of either a unit, course, or program. Other ways for instructors to motivate learners with SBS and deliberate practice include requiring the SBS to be completed until a minimum or set score is achieved as a prerequisite for other skills, such as patient care, clinical remediation, and other activities.

In the past, SBS with deliberate practice was often used to learn procedural knowledge (Bonnetain et al., 2010; Mitchell & Boyer, 2020) but not necessarily to improve nursing students' hands-on skill performance (Gu et al., 2017). Therefore, SBS was usually recommended as preparation for high-fidelity simulation and traditional clinical experiences but not as a replacement (Bracq et al., 2019; Bonnetain et al., 2010; National League for Nursing, n.d.). However, SBS may effectively replace in-person traditional clinical experiences, given its advantages. SBS allows students to learn and practice essential concepts and experience situations that are rare, limited, or not available to practice in actual clinical situations. In addition, through SBS, students can practice and master cognitive skills that teach students how to "think like a nurse" (Li et al., 2019; Mitchell & Boyer, 2020; Turkelson et al., 2020; Yeh et al., 2019). The deliberate practice with SBS increases learners' psychomotor and cognitive nursing skills necessary for individuals to become successful, competent nurses (Ericsson, 2004; Ericsson, 2015; Issenberg et al., 2005; McGaghie, 2008).

Deliberate practice improves confidence through repetition and enhances critical thinking skills (Cummings & Connelly, 2016). Deliberate practice in simulation may help alleviate an individual's stress, anxiety, and fear that can negatively affect self-efficacy (Mabry et al., 2020). SBS with deliberate practice provides an opportunity for active learning that can lead to increased self-efficacy and self-confidence (Cummings & Connelly, 2016; Mabry et al., 2020). This is especially important for specialty courses, such as maternal-child nursing education, because SBS offers the opportunity to build self-efficacy through deliberate practice, which may be limited in traditional clinical settings (Cummings & Connelly, 2016).

Screen-Based Simulation and Obstetric Self-Efficacy

SBS increases nurses' self-efficacy through hands-on experience, immediate feedback, peer modeling or vicarious experience, and repeated or deliberate practice in a psychologically safe environment (Bandura, 1977; Franklin & Lee, 2014; Lundberg, 2008; Mabry et al., 2020). The improved self-efficacy is expected to transfer into the nurse's future clinical nursing practice. Learning from mistakes is part of the normal learning process (Bandura, 1993). SBS also provides learners with a safe environment to make and learn from mistakes to build self-efficacy.

The literature on obstetric self-efficacy and SBS was searched through the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline, and ProQuest between January 2010 and June 2021. Search terms included obstetric self-efficacy, maternal-child self-efficacy, maternity self-efficacy, or maternal self-efficacy, and SBS, virtual simulation, computer-based simulation, e-simulation, or gaming simulation. The gathered literature is as follows:

Table 3

Screen-Based Simulation and Self-Efficacy Literature

Studies	Participants/Sample	Measurement	Method
Barre et al., 2020	Postgraduate midwifery students	Self-efficacy	Quantitative quasi-experimental
Michelet et al., 2020	Postgraduate midwifery students	Self-efficacy	Quantitative randomized posttest only
Cobbett & Snelgrove-Clarke, 2016	Prelicensure undergraduate nursing students	Self-confidence	Quantitative randomized controlled trial

Specifically, the study conducted by Cobbett and Snelgrove-Clarke (2016) compared the self-confidence of 56 prelicensure undergraduate baccalaureate degree students following preeclampsia and GBS high-fidelity simulation and SBS. The participants were third year students from a Canadian public research university and enrolled in a maternal-child nursing course. The 84 students in the course were randomized into two groups and further randomized into 21 dyads. Only 56 students consented to participate in the study. The first group completed a preeclampsia SBS followed by a high-fidelity GBS simulation. The second group completed a high-fidelity preeclampsia simulation followed by a GBS SBS. The Nursing Anxiety and Self-Confidence with Clinical Decision-Making Scale contained 27-items and was used to measure self-confidence before and after the preeclampsia and GBS simulations. Construct validity using an exploratory factor analysis produced a stable scale (White, 2014). Convergent validity found statistically significant correlations of the subscales with two existing instruments. Internal consistency for self-confidence (.97) and anxiety (.96) indicated reliability (White, 2014). Results indicated that there was no significant ($p = .06$) difference in student self-confidence scores following preeclampsia and GBS between SBS (n = 27, $M = 104.89$, $SD = 17.52$) and high-fidelity simulation (n = 28, $M = 115.25$, $SD = 21.95$; $t = 1.93$) (Cobbett & Snelgrove-Clarke, 2016).

Michelet et al.'s (2020) research was conducted with a different population. They (2020) measured midwifery students' (n = 28) self-efficacy following SBS at a French university. Participants were randomized to receive either computer debriefing or no debriefing after completing neonatal resuscitation SBSs. The scenarios increased in difficulty from low to medium to high. Self-efficacy was measured using a one-item scale with a 6-point Likert scale at the end of the second and third simulation sessions. The scale ranged from "not at all confident" (scored as 0) to "very confident" (scored as 5). There was no significant ($p = .76$) difference between the computer debriefing ($M = 2$) and the non-debriefing ($M = 2$) self-efficacy scores following the first SBS. However, the debriefing group ($M = 3$) had significantly ($p = .02$) higher self-efficacy scores after the second SBS than the non-debriefing group ($M = 2$). Based on the results and acknowledging the limited number of participants, computer debriefing following a neonatal resuscitation SBS increased self-efficacy more than no debriefing (Michelet et al., 2020).

Furthermore, Barre et al. (2020) also measured midwifery students' (n = 14) self-efficacy following two neonatal resuscitation SBSs two months apart. The first scenario was considered baseline level, and the second scenario had a higher difficulty level. Self-efficacy was measured using a one-item scale with a 6-point Likert scale at the end of the second and third simulation sessions. The scale ranged from "not at all confident" (scored as 0) to "very confident" (scored as 5). The self-efficacy scale was completed twice, once after each simulation scenario. These studies found that self-efficacy increased significantly ($p <.05$) from the first SBS to the second SBS (Barre et al., 2020). The mean self-efficacy scores were not reported. Based on the findings, deliberate practice with SBS increased midwifery students' self-efficacy related to neonatal resuscitation.

However, several limitations were evident in the above studies. First, sample sizes were small, and all three studies had low power (Barre et al., 2020; Cobbett & Snelgrove-Clarke, 2016; Michelet et al., 2020). One study examined prelicensure undergraduate third-year nursing students (Cobbett & Snelgrove-Clarke, 2016), and two studies examined postgraduate midwifery students (Barre et al., 2020; Michelet et al., 2020). All studies recruited subjects from one location, limiting generalizability (Barre et al., 2020; Cobbett & Snelgrove-Clarke, 2016; Michelet et al., 2020). Second, their research design and measurement tools are limited. Michelet et al.'s (2020) study used a post-test only design (Michelet et al., 2020). The post-test only design did not allow for a baseline assessment to occur. Therefore, it is unknown if there were preexisting differences between the groups. Barre et al.'s (2020) study only provided a short report and did not provide details for results. Two studies did use the same tool to measure self-efficacy (Barre et al., 2020; Michelet et al., 2020); however, the tool is only one item and does not have psychometrics (Cobbett & Snelgrove-Clark, 2016; Michelet et al., 2020). Thus, there was limited psychometric testing available for the measurement tools. One study compared self-efficacy following a neonatal resuscitation SBS with no debriefing versus computer debriefing (Michelet et al., 2020). Two studies had debriefing methods built into the SBS (Barre et al., 2020; Cobbett & Snelgrove-Clarke, 2016). Thus, the debriefing methods varied among these studies. Lastly, these studies examined self-efficacy and SBS using different content areas. Two studies examined self-efficacy following a neonatal resuscitation SBS (Barre et al., 2020; Michelet et al., 2020). One study examined self-efficacy following preeclampsia and GBS SBSs (Cobbett & Snelgrove-Clarke, 2016). No studies examined self-efficacy after replacing traditional maternal-child clinical with SBS. Therefore, studies are needed that examine the impact of the maternal-child clinical learning environment on prelicensure undergraduate nursing students' self-efficacy.

While the above studies examined self-efficacy following maternal-child SBS, none specifically examined obstetric nursing self-efficacy following SBS. Furthermore, none of these studies examined self-efficacy after replacing traditional clinical hours with SBS. In addition, only one study examined self-efficacy in prelicensure undergraduate nursing students. Therefore, further research is needed with a large sample size from multiple sites that examines the impact of the maternal-child clinical learning environment, in particular SBS, on nursing students' obstetric self-efficacy.

Screen-Based Simulation Versus Other Learning Methods

The literature was searched for studies on SBS about other methods of learning. In these studies, SBS was compared to traditional clinical, lecture, skills lab, self-study module, low-fidelity simulation, high-fidelity simulation, and standardized patient simulation. The following subsections will discuss non-simulation learning methods versus SBS, low and high-fidelity simulation versus SBS, and standardized patient simulation versus SBS.

Traditional clinical experiences are defined as precepted experiences in healthcare settings, such as hospitals, outpatient, community health, and home nursing (Leighton, 2015). Whereas in-person simulation experiences occur in a simulation or skills lab, utilizing a standardized patient, high-fidelity or low-fidelity patient simulator, or task trainer (Leighton, 2015). Learners who participate in a patient scenario that simulates a real-life clinical scenario are oriented to the case and environment during a pre-briefing. Then, learners may be assigned to a role in the simulation, such as a primary nurse, medication nurse, observer, or family member. The facilitator observes the learners as they interact with the patient scenario during the simulation. Afterward, the facilitator guides a group debriefing.

Non-Simulation Learning Methods Versus Screen-Based Simulation

Four studies were found that compared traditional, non-simulation learning methods to SBS (Durmaz et al., 2012; Gu et al., 2017; LeFlore et al., 2012; Menzel et al., 2014) (see Appendix B for the literature review matrix). Particularly, these studies compared SBS to traditional clinical and lecture (Gu et al., 2017), SBS to lecture (LeFlore et al., 2012), skills lab to SBS (Durmaz et al., 2012), and self-study module to SBS (Menzel et al., 2014). In addition, these studies used different research designs, including quantitative randomized post-test only design (Gu et al., 2017; LeFlore et al., 2012) and pre-test post-test design (Durmaz et al., 2012; Menzel et al., 2014). Lastly, the above research focuses on different aspects. Some examined students' knowledge about the simulation content and skill or clinical performance (Durmaz et al., 2012; Gu et al., 2017; LeFlore et al., 2012), while others examined students' clinical decision-making (Durmaz et al., 2012) and students' attitude toward poverty (Menzel et al., 2014). The findings vary and will be discussed in the following paragraphs.

The study conducted by Gu et al. (2017) compared the effectiveness of SBS as a supplement to traditional clinical and lecture with traditional clinical and lecture. A sample of 27 prelicensure second-year baccalaureate degree nursing students from a university in Central City, China, was randomized into two groups. Both groups completed the traditional course and clinical work together. The control group (n = 14) only completed the traditional course and clinical work. In addition to the traditional course and clinical work, the intervention group (n = 13) completed one SBS before the corresponding lecture for that week for ten weeks. The simulation scenarios were for fundamentals in nursing, such as aseptic technique, medication administration, and foley catheter insertion. The intervention group deliberately practiced the scenarios until at least 80% was earned. A 100-item knowledge test and two skills performances on medication administration and aseptic technique were used to measure the study outcomes. No instrument reliability or validity was reported. Results indicated that the experimental group ($M = 73.31$, $SD = 9.27$) scored significantly ($p = .03$) higher on the knowledge test than the control group ($M = 65.36$, $SD = 8.93$). However, there was no significant difference in skills performance between the two groups (Gu et al., 2017).

In contrast to the previous study (Gu et al., 2017), LeFlore et al. (2012) compared the effectiveness of SBS to only traditional lectures. This study used a sample of 93 prelicensure senior baccalaureate nursing students from a university in a southern American state. The participants were randomized into two groups. Both groups received assigned readings and two high-fidelity and standardized patient simulations. The experimental group participated individually in a two-hour SBS developed by the researchers. The SBS included four pediatric respiratory scenarios (bronchiolitis, cystic fibrosis, pneumonia, asthma). The control group participated in a three-hour pediatric respiratory lecture. Participants completed two pediatric respiratory disease simulations following the SBS or pediatric respiratory lecture. The simulations used infant high-fidelity simulators and standardized patients. A 10-item tool was used to measure knowledge (Cronbach's alpha = .90). A Cronbach's alpha above a .7 is acceptable, and a .8 is considered good (Pallant, 2016). A 10-item (Cronbach's alpha = .70) and an 11-item (Cronbach's alpha = .80) Objective Structured Clinical Examinations (OSCEs) checklist were used to measure clinical performance. Two reviewers, one for each scenario, completed the checklists during the simulations. The reviewers recorded the amount of time participants took to complete critical tasks. The reviewers were blinded to the group assignments. Results indicated that the experimental group ($M = 83.9$, $SD = 15$) had significantly ($p = .004$) higher knowledge scores than the control group ($M = 75$, $SD = 12$). In addition, the experimental group also scored significantly ($p = .001$) better times for all of the critical tasks on both the OSCEs checklists than the control group (LeFlore et al., 2012).

Different from the studies above (i.e., Gu et al., 2017; LeFlore et al., 2012), Durmaz et al. (2012) compared SBS to skills laboratory for learning preoperative and postoperative nursing care management. Durmaz et al. (2012) used a sample of 82 prelicensure undergraduate second-year nursing students from a Turkish nursing school. The participants were randomized into two groups. Both groups completed a 50-item knowledge pre-test on preoperative and postoperative care management. The control group (n = 41) received preoperative and postoperative care management education in a four-hour skills laboratory session. In contrast, the experimental group ($n = 41$) received an SBS developed by the researchers on preoperative and postoperative care management education at the same time. The SBS was need-based, meaning students could repeat the scenarios as needed. Two weeks later, the knowledge post-test was administered. Skills were measured in the skills lab with an Objective Structured Clinical Examinations (OSCEs) checklist, and the 40-item Clinical Decision-Making in Nursing Scale Turkish version (Cronbach's alpha = .78) was administered. Results indicated that there was no significant ($p = .063$) difference between the experimental ($M = 47.07$, $SD = 8.13$) and control (*M* = 50.43, *SD* = 8.03) groups' pre-test scores. Similarly, there was no significant (*p* = .421) difference between the experimental (*n* =28, *M* = 60.72, *SD* = 8.21) and control (*n* = 22, *M* = 59.28, *SD* = 7.99) post-test knowledge scores. For the skills lab OSCEs checklists, there was no significant difference between the experimental (*n* = 36, *M* = 67.50, *SD* = 13.00) and control (*n* = 26, *M* = 66.90, *SD* = 16.00) group's practical deep breathing and coughing exercise education. For the Clinical Decision-making Scale, there was no significant (*p* = .065) difference between the experimental (*n* = 38, *M* = 154.78, *SD* = 10.55) and control (*n* = 38, *M* = 157.26, *SD* = 9.29) group's scores (Durmaz et al., 2012). However, there was a significantly (*p* = .04) higher admission of surgical patient OSCEs checklist score for the experimental group (*n* = 33, *M* = 72.40, *SD* = 12.00) than the control group (*n* = 21, *M* = 66.60, *SD* = 13.30).

Menzel et al. (2014) compared SBS to a self-study module to improve attitudes toward individuals and families living in poverty. They used an SBS that occurred in a computer lab and involved real-time interaction between the student participants and the faculty members. The researchers developed a poverty SBS using Second Life for the study. Second Life is a website that allows users to create and interact within three-dimensional virtual worlds. Faculty members were assigned roles in the screen-based poverty simulation. The roles included social worker, nurse practitioner, teacher, day labor and temporary office managers, banker, pawnshop and convenience store proprietors, and police officer. Faculty members participated in a group orientation and a one-on-one orientation. Participants received a Second Life practice session. Menzel et al. (2014) used a sample of 51 prelicensure undergraduate senior nursing students from an American university. Participants were recruited over three successive semesters from a community health nursing course and randomized into two groups. Both groups completed the 37-item Attitude toward Poverty Scale (Cronbach's alpha = .93) before and after the intervention. The experimental group (n = 33) participated in an interactive 2.5-hour poverty SBS. On the day of the SBS, participants were randomly assigned an avatar and a family based on where they sat in the computer lab. The control group (n = 18) completed a self-study module on poverty. There was no significant difference between the experimental and control group's Attitude toward Poverty Scale scores. Menzel et al. (2014) did not report groups' mean scores on the Attitude toward Poverty Scale.

In summary, studies found SBS to increase nursing students' knowledge scores as a supplement (Gu et al., 2017) and an alternative to traditional lectures (LeFlore et al., 2012). However, varying results were found in nursing students' clinical performance scores after SBS and lectures. Gu et al. (2017) found no difference between nursing students' clinical performance scores after supplementing lectures with SBS. In contrast, LeFlore et al. (2012) found that the SBS group had significantly better clinical performance scores than traditional lectures; Durmaz et al. (2012) found a significantly better performance for one clinical skill and not the other clinical skill. Regarding cognitive skills, there was no significant difference in nursing students' clinical decision-making after either SBS or skills lab (Durmaz et al., 2012) and nursing students' attitudes toward poverty after either SBS or a self-study module (Menzel et al., 2014).

Furthermore, these studies did not examine the impact of SBS on nursing students' self-efficacy. Thus, further research is needed regarding the effects of SBS versus non-simulation learning methods. This study aimed to explore the impact of the maternal-child clinical learning environment on nursing students' self-efficacy.

Several limitations were evident in the studies. Sample sizes were small for two studies (Gu et al., 2017; Menzel et al., 2014). The sample size and power were adequate for the LeFlore et al. (2012) study, however, not for the other studies (Durmaz et al., 2012; Gu et al., 2017; Menzel et al., 2014). Two studies used a post-test only design (Gu et al., 2017; LeFlore et al., 2012). The post-test only design did not allow for a baseline assessment to occur. Therefore, it is unknown if there were preexisting differences between the groups. Different tools were used to measure the variables for all the studies (Durmaz et al., 2012; Gu et al., 2017; LeFlore et al., 2012; Menzel et al., 2014). LeFlore et al. (2012) and Durmaz et al. (2012) developed the measurement tools for their study, and Gu et al. (2017) did not discuss the measurement tools in detail. Therefore, limited psychometric testing was available for many measurement tools (Durmaz et al., 2012; Gu et al., 2017; LeFlore et al., 2012). Gu et al. (2017) and Durmaz et al. (2012) examined second-year nursing students, while LeFlore et al. (2012) and Menzel et al. (2014) examined senior nursing students. The studies examined SBS using different content areas or populations, including adult medical-surgical fundamentals course (Gu et al., 2017), pediatric respiratory (LeFlore et al., 2012), perioperative (Durmaz et al., 2012), community health nursing (Menzel et al., 2014). No studies examined a maternal-child course or content. All studies recruited subjects from one location, limiting generalizability (Durmaz et al., 2012; Gu et al., 2017; LeFlore et al., 2012 Menzel et al., 2014). The debriefing methods were similar for the two studies, with debriefing built into the SBS (Gu et al., 2017; LeFlore et al., 2012). Menzel et al. (2014) conducted an in-person facilitator debrief following the interactive SBS, and Durmaz et al. (2012) did not discuss feedback or debriefing methods.

Studies with larger sample sizes from multiple sites are needed. In addition, to my knowledge, no studies examined replacing traditional clinical for a nursing course with SBS. Also, no studies examined content related to a maternal-child nursing course. Therefore, this dissertation aims to contribute to the field by recruiting a large sample size from multiple sites and examining replacing traditional maternal-child clinical with SBS.

Low-Fidelity and High-Fidelity Simulation Versus Screen-Based Simulation

Five studies were found that compare high-fidelity simulation to SBS (Cobbett & Snelgrove-Clarke, 2016; Erlinger et al., 2019; Haerling, 2018; Liaw et al., 2014; Verkuyl et al., 2017). Appendix C shows the literature review matrix used to compare low and high-fidelity simulation to SBS. One study was found that compared low-fidelity simulation to SBS (Padilha et al., 2019). These studies used quantitative randomized controlled trial design (Cobbett & Snelgrove-Clarke, 2016: Erlinger et al., 2019; Liaw et al., 2014; Padilha et al., 2019; Verkuyl et al., 2017) and mixed methods design (Haerling, 2018). They compared low or high-fidelity simulation and SBS students' knowledge about the simulation content (Cobbett & Snelgrove-Clarke, 2016; Haerling, 2018; Liaw et al., 2014; Padilha et al., 2019; Verkuyl et al., 2017). In addition, these studies examined learner's knowledge retention (Liaw et al., 2014; Padilha et al., 2019), satisfaction with simulation (Cobbett & Snelgrove-Clarke, 2016; Haerling, 2018; Padilha et al., 2019; Verkuyl et al., 2017), self-confidence (Cobbett & Snelgrove-Clarke, 2016; Haerling, 2018), self-efficacy (Padilha et al., 2019; Verkuyl et al., 2017), and anxiety levels (Cobbett & Snelgrove-Clarke, 2016). Furthermore, Erlinger et al.'s (2019) study compared learners' time to recognize an intraoperative myocardial infarction. The findings vary and will be discussed in the following paragraphs.

The study conducted by Cobbett and Snelgrove-Clarke (2016) compared high-fidelity simulation to SBS with 56 prelicensure undergraduate baccalaureate degree students from a Canadian public research university enrolled in a third-year maternal-child nursing course. The study utilized a scale to measure nursing anxiety and self-confidence, a simulation content knowledge pre/post-test, and a demographic and satisfaction questionnaire. The Nursing Anxiety and Self-Confidence with Clinical Decision-Making Scale was used to measure anxiety and self-confidence before and after the preeclampsia and group beta streptococcus (GBS) simulations. The Nursing Anxiety and Self-Confidence with Clinical Decision-Making Scale contained 27-items and is valid and reliable. Construct validity using an exploratory factor analysis produced a stable scale (White, 2014). Convergent validity found statistically significant correlations of the subscales with two existing instruments. Internal consistency for self-confidence (.97) and anxiety (.96) indicated reliability (White, 2014). A 10-item knowledge pre/post-test for preeclampsia and GBS was developed for this study. The maternity faculty and a Canadian Registered Nurse Exam item writer established face and content validity. The 84 students in the course were randomized into two groups and further randomized into 21 dyads; however, only 56 students consented to participate in the study. The first group completed a preeclampsia SBS followed by a high-fidelity GBS simulation. The second group completed a high-fidelity preeclampsia simulation followed by a GBS SBS. Results indicated with an independent samples *t*-test that SBS had a statistically significant effect on students' anxiety levels (M = 73.26, *SD* = 15.25; *t* = -3.2; *p* = .002). Student anxiety level scores were significantly higher for the SBS group (M = 73.26) than the high-fidelity simulation group (M = 57.75). In contrast, results indicated that there was no statistically significant difference in student self-confidence scores between SBS (M = 104.89, *SD* = 17.52) and high-fidelity simulation (M = 115.25, *SD* = 21.95; *t* = 1.93; *p* = .059). Results indicated with an independent samples *t*-test that there was no statistically significant difference in student knowledge scores between the preeclampsia SBS (M = 4.12, *SD* = 1.54) and preeclampsia high-fidelity simulation (*M* = 4.80, *SD* = 1.19; *t* (48) = 1.75, *p* = .09). There was also no statistically significant difference in student knowledge scores between the GBS SBS (*M* = 6.40, *SD* = 1.73) and the GBS high-fidelity simulation (*M* = 6.82, *SD* = 1.25; *t* (51) = 1.02, *p* = .31). Students who completed the satisfaction questionnaire (*n* = 24) reported a preference for high-fidelity simulation (*n* = 22) over SBS (*n* = 2). Nearly half of the students (*n* = 11) who did not like SBS reported technological issues as the rationale. Therefore, results indicated that both SBS and high-fidelity simulation increased students' maternal-child nursing knowledge and self-confidence; however, SBS increased students' anxiety levels more than high-fidelity simulation. In addition, results indicated that students preferred high-fidelity simulation over SBS (Cobbett & Snelgrove-Clarke, 2016).

Like the previous study (Cobbett & Snelgrove-Clarke, 2016), Verkuyl et al. (2017) utilized a sample of undergraduate, prelicensure, baccalaureate nursing students from a Canadian university. However, these students were in their second year of the program instead of the third year. A randomized controlled trial design was used to compare nursing students' pediatric nursing knowledge, self-efficacy, and satisfaction related to SBS to high-fidelity simulation. A sample of 47 nursing students was randomly assigned to either SBS or high-fidelity simulation. Both groups completed a similar post-appendectomy pediatric simulation scenario. The SBS was developed by the researchers and included feedback and debriefing built into the scenario. Nursing students completed the SBS in the computer lab. The high-fidelity simulation included an in-person debriefing immediately following the simulation. A 10-item multiple-choice pediatric nursing care knowledge test and a pediatric skill self-efficacy survey (Cronbach's alpha = .89) were administered before and after the simulation. The simulation satisfaction survey (Cronbach's alpha = .86) was completed after the simulation. The pre-simulation pediatric nursing care knowledge scores were not significantly different between the high-fidelity simulation ($M = 7.3/10$) and the SBS ($M = 7.4/10$) groups. The high-fidelity simulation ($M = 7.6/10$) and the SBS ($M = 8.0/10$) groups increased their pediatric nursing care knowledge scores post-simulation. However, the high-fidelity simulation group was not statistically significant, while the SBS group was statistically significant ($t = -2.12$, $df = 22$, $p = .045$). Similarly, the pre-simulation pediatric skill self-efficacy scores were not significantly different between groups. The post-simulation high-fidelity simulation ($M = 35.4/45$ or 78.6/100) and the SBS ($M = 38.7/45$ or 86/100) groups both increased significantly. The SBS group made statistically greater gains than the high-fidelity simulation group ($t = -2.1$, $df = 44$, $p = .041$). In contrast to Cobbett and Snelgrove-Clarke (2016), there was no statistically significant difference in simulation satisfaction scores between the high-fidelity simulation ($M = 46.0/50$ or 92/100) and SBS ($M = 46.4/50$ or 92.8/100) groups. Therefore, results indicated that high-fidelity and SBS satisfied learners and increased pediatric nursing care knowledge and pediatric skills self-efficacy with greater self-efficacy gains for the SBS group (Verkuyl et al., 2017).

Likewise, Liaw et al. (2014) utilized a sample of prelicensure undergraduate, baccalaureate degree nursing students to compare high-fidelity simulation to SBS. However, as opposed to the previous Canadian studies (Cobbett & Snelgrove-Clark, 2016; Verkuyl et al., 2017), this sample of 57 third-year nursing students was from Singapore. Similar to the previous studies' design, a randomized controlled trial was utilized to compare students' self-efficacy after participating in high-fidelity simulation versus SBS in assessing and managing patient deterioration. Students were randomly assigned to either a two-hour high-fidelity group simulation or a two-hour SBS individually in a computer lab. The high-fidelity simulation included a sepsis and septic shock scenario. The SBS was developed by the researchers using flash software and the Rescuing a Patient in Deteriorating Situations (RAPIDS) educational program to review assessing and managing deteriorating patients (e-RAPIDS). Both types of simulations used the same content, including acute coronary syndrome, hypoglycemic, hypovolemic shock, sepsis, and septic shock scenarios. A separate, individual high-fidelity simulation was used to assess both groups' knowledge of assessing and managing patients in deteriorating situations. Both groups participated in the simulation individually three times (pre-test, one-day post-test, and two-month post-test) and were video recorded. A RAPIDS tool (correlation coefficient = 0.92; 95% CI [0.82, 0.96]) was used to evaluate the students on the recorded video. The RAPIDS tool has two checklists, including Airway, Breathing, Circulation, Disability, and Expose/Examine (ABCDE) and Situation, Background, Assessment, and Recommendation (SBAR) with a maximum performance score of 54. There was no significant difference in the pre-test RAPIDS performance scores between the high-fidelity simulation (*M* = 29.46, *SD* = 6.67) and the SBS (*M* = 31.52, *SD* = 4.82) groups. There was a significant increase from the pre-test to the first post-test RAPIDS performance scores for both the high-fidelity simulation (*M* = 33.27, *SD* = 7.50, $p < .05$) and the SBS (*M* = 36.65, *SD* = 5.59, $p < .001$) groups. There was a significant decrease from the first post-test to the second post-test RAPIDS performance scores for the SBS group (*M* = 33.58, *SD* = 6.78, $p < .05$). However, there was no significant difference between the first and second post-test RAPIDS performance scores for the high-fidelity simulation group (*M* = 33.38, *SD* = 6.49, $p = .94$). Although, there was a significant increase from the pre-test to the second post-test RAPIDS performance scores for both the high-fidelity ($p < .01$) and screen-based ($p < .05$) simulation groups. Only the SBS group completed a modified 19-item e-learning systems success (ELSS) satisfaction survey. The mean scores indicated that students were satisfied with the SBS (*M* = 6.06/7, *SD* = 0.71). Therefore, results indicated that high-fidelity and SBSs increased performance scores in assessing and managing care for patients in deteriorating situations. The SBS group was satisfied with their simulation experience (Liaw et al., 2014).

Similarly, Haerling (2018) used a sample of 84 prelicensure nursing students to compare cognitive, affective, and psychomotor learning outcomes between students using high-fidelity simulation versus SBS. However, this was a sample of associate degree nursing students from the United States instead of the previous sample of baccalaureate degree nursing students from Canada and Singapore. Haerling's (2018) study used a quasi-experimental nonequivalent comparison group mixed methods design. Participants were randomly assigned to high-fidelity simulation (n = 46) or SBS (n = 38). The simulation scenario was similar for both groups and involved caring for a hospitalized patient experiencing a chronic obstructive pulmonary disease exacerbation. Before the simulation, students in both groups completed computer-based learning, including pathophysiology, pharmacology, and nursing interventions related to chronic obstructive pulmonary disease. The high-fidelity simulation was completed in small groups of two to four nursing students with an immediate in-person debrief, while the SBS was completed independently in a lab. Nursing students completed a pre-and post-simulation content knowledge exam and the National League of Nursing (NLN) Student Satisfaction and Self-Confidence Learning survey. Participants answered post-simulation reflection questions that were scored using the Lasater Clinical Judgement Rubric (LCJR) and the Creighton Simulation Evaluation Instrument (C-SEI). The overall pre-simulation knowledge scores were not significantly different between groups ($M = 69.54$, $SD = 14.17$, $p = .189$). Similar to the pre-simulation knowledge scores, the overall post-simulation knowledge scores were not significantly different between groups ($M = 80.89$, $SD = 15.19$, $p = .476$). There was a significant increase in knowledge scores for both groups from pre- to post-simulation ($p < .05$). The overall change mean was not significantly different between groups ($M = 11.34$, $SD = 18.50$, $p = .659$). The satisfaction and self-confidence scores had similar results as the knowledge scores. The overall pre-simulation satisfaction and self-confidence scores were not significantly different between groups ($M = 72.05$, $SD = 12.98$, $p = .657$). The post-simulation satisfaction and self-confidence scores were not significantly different between groups ($M = 80.93$, $SD = 10.37$, $p = .126$). There was a significant increase in satisfaction and self-confidence scores for both groups from pre- to post-simulation ($p = <.05$). The overall change mean was not significantly different between groups ($M = 8.88$, $SD = 14.04$, $p = .112$). Qualitatively, three themes emerged, including safety, communication, and prioritization. In addition, a cost-utility analysis was completed, which found high-fidelity simulation costs were $36.55 per student and SBS was $10.89 per student. Therefore, results indicated that high-fidelity and SBS offered similar learning outcomes related to knowledge, satisfaction, and self-confidence (Haerling, 2018).

Likewise, Padilha et al. (2019) used a sample of 42 prelicensure undergraduate nursing students. However, in contrast to the previous samples that were from Canada (Cobbett & Snelgrove-Clarke, 2016; Verkuyl et al., 2017), Singapore (Liaw et al., 2014), and the United States (Haerling, 2018), the participants were enrolled in their second year at a Portuguese nursing school. Also, in contrast to the previous studies that compared high-fidelity simulation to SBS (Cobbett & Snelgrove-Clarke, 2016; Liaw et al., 2014; Verkuyl et al., 2017), Padilha et al. (2019) compared low-fidelity simulation to SBS. The regular course instructor developed a pre-test/post-test knowledge test administered immediately before the simulation, immediately after, and two months later. In addition, the Learner Satisfaction with Simulation tool Portuguese version (Cronbach's alpha = .952) and the General Self-Efficacy scale Portuguese version (Cronbach's alpha = .860) were administered to both groups immediately after the simulation. Participants were randomized into two groups. Both groups were prebriefed for five minutes and participated in a 45-minute respiratory simulation in the laboratory. The control group ($n = 21$) participated in a low-fidelity simulation during the class. The experimental group ($n = 21$) participated in a facilitator-led SBS during the class. This contrasts with the previous studies that examined individual SBSs (Cobbett & Snelgrove-Clarke, 2016; Liaw et al., 2014; Verkuyl et al., 2017). Both simulations were 20 minutes in length. Both groups participated in a 20 minute debrief with the same structure. Results indicated that there was no significant difference between the experimental (*M* = 10.15, *SD* = 1.27) and control (*M* = 9.87, *SD* = 2.24) group's pre-test knowledge scores. The experimental group scored significantly (*p* = .001) higher on the immediate (*M* = 12.47, *SD* = 1.57) and the two-month (*M* = 11.93, *SD* = 1.84) knowledge post-tests from the pre-test scores. The control group did not score significantly higher on the immediate (*M* = 10.51, *SD* = 1.89) or the two-month (*M* = 10.55, *SD* = 1.81) knowledge post-test from the pre-test scores. The learning satisfaction scores for the experimental group (*M* = 9.04, *SD* = 0.55) were significantly higher than the control group (*M* = 7.47, *SD* = 1.58). Although, there was no significant difference between the self-efficacy scores between the experimental (*M* = 30.38, *SD* = 4.57) and control (*M* = 30.14, *SD* = 4.29) groups (Padilha et al., 2019).

Different from the previous studies (Cobbett & Snelgrove-Clarke, 2016; Haerling, 2018; Liaw et al., 2014; Padilha et al., 2019; Verkuyl et al., 2017), Erlinger et al. (2019) used a sample of 39 post-licensure graduate nurse anesthetist students as opposed to prelicensure undergraduate nursing students. High-fidelity simulation was compared to SBS for recognition of an intraoperative myocardial infarction. The participants were either in their second year (*n* = 19) or third year (*n* = 20) of the nurse anesthetist program. Each student completed all simulations individually. Each student completed an intraoperative myocardial infarction scenario and another intraoperative critical event scenario. Data was only collected from the intraoperative myocardial infarction scenario. The simulation scenario order was randomized. Group one completed an SBS first, followed by a high-fidelity simulation. Group two completed a high-fidelity simulation first, followed by an SBS. A within-subjects counterbalancing design was used to reduce the likelihood of students performing better on the second simulation due to practice gained from the first simulation. A data collection form was used to record the time it took for nurse anesthetist students to recognize a critical event verbally. A timer was set during the intraoperative myocardial infarction simulations when signs began. The timer was stopped when the student verbally recognized the myocardial infarction or after seven minutes and 30 seconds passed without verbal recognition of the myocardial infarction. Nonparametric tests were conducted due to the small sample size and non-normal data distribution. Q-Q plots and a Shapiro-Wilk normality test confirmed nonnormality. Mann-Whitney *U* tests were performed (Erlinger et al., 2019).

Results indicated that when a virtual simulation was used, there was a statistically significant difference between the time it took second-and third-year nurse anesthetist students to recognize the intraoperative myocardial infarction was occurring ($U = 270.5$; $p = .02$). The third-year students recognized the intraoperative myocardial infarction faster than second-year students. However, there was no significant difference between second-and third-year students' recognition times when using high-fidelity simulation ($U = 195.5$; $p = .89$). In addition, there was no significant difference in recognition times between nurse anesthetist students who completed the SBS first ($U = 226$, $p = .15$) versus those who completed the high-fidelity simulation first ($U = 209.5$, $p = .29$). Wilcoxon rank-sum tests were conducted. Results indicated a significant difference in second-year nurse anesthetist students' myocardial infarction recognition time when participating in high-fidelity simulation versus SBS ($W = 29$; $p = .01$). Second-year nurse anesthetist students recognized the intraoperative myocardial infarction faster when participating in a high-fidelity simulation. However, there was no significant difference in intraoperative myocardial infarction recognition time for third-year nurse anesthetist students when participating in high-fidelity simulation or SBS ($W = 93$; $p = .67$). Therefore, results indicated that high-fidelity and SBS modalities were appropriate for recognizing an intraoperative myocardial infarction. Although, for students with less didactic and clinical training, high-fidelity simulation may have been more beneficial than SBS (Erlinger et al., 2019).

In summary, both high-fidelity and SBS increased nursing students' content knowledge (Cobbett & Snelgrove-Clarke, 2016; Haerling, 2018; Verkuyl et al., 2017). However, low-fidelity simulation did not increase nursing students' knowledge (Padilha et al., 2019). In addition, both high-fidelity and SBS increased performance scores (Liaw et al., 2014) and decreased recognition time for critical events (Erlinger et al., 2019). Although, Erlinger et al. (2019) found that second-year graduate students recognized the critical event faster with high-fidelity simulation and no difference in recognition times between high-fidelity and SBS for third-year students. Thus, students further along in the program may respond better to SBS than earlier students. In addition, both high-fidelity and SBS increased students' self-confidence (Cobbett & Snelgrove-Clarke, 2016; Haerling, 2018) and self-efficacy (Verkuyl et al., 2017).

However, Verkuyl et al. (2017) found that the SBS group made statistically significant gains in post-test content knowledge and self-efficacy, while the high-fidelity group did not make significant gains in content knowledge or self-efficacy. In addition, Padilha et al. (2019) found no significant difference between nursing students' self-efficacy following participation in low-fidelity or SBS. Nursing students in one study reported being satisfied with both high-fidelity and SBS (Verkuyl et al., 2017), while students in another study preferred high-fidelity simulation over SBS (Cobbett & Snelgrove-Clarke, 2016). Nursing students in another study preferred SBS over low-fidelity simulation (Padilha et al., 2019). Liaw et al. (2014) found that nursing students were satisfied with SBS and did not evaluate the high-fidelity simulation group. Cobbett & Snelgrove-Clarke (2016) was the only study to evaluate anxiety between high-fidelity and SBS and found that the SBS experienced more anxiety than the high-fidelity group. The limitations will be discussed next.

Several limitations were evident in the studies regarding the sample, tools used to measure the variables, and the debriefing method. First, sample sizes were small (e.g., Cobbett & Snelgrove-Clarke, 2016; Erlinger et al., 2019; Liaw et al., 2014; Padilha et al., 2019; Verkuyl et al., 2017); there was low power (e.g., Cobbett & Snelgrove-Clarke, 2016; Erlinger et al., 2019; Verkuyl et al., 2017). The sample size and power were adequate for the Haerling (2018) study; however, there was no randomization. The other studies utilized randomization (e.g., Cobbett & Snelgrove-Clarke, 2016; Erlinger et al., 2019; Liaw et al., 2014; Verkuyl et al., 2017). In addition, the tools used to measure the variables were different in these studies. All six studies recruited subjects from one location, therefore, limiting generalizability (e.g., Cobbett & Snelgrove-Clarke, 2016; Erlinger et al., 2019; Haerling, 2018; Liaw et al., 2014; Padilha et al., 2019; Verkuyl et al., 2017). Lastly, the debriefing methods used in these six studies mainly were similar to the debriefing built into the SBS and immediate in-person debriefing after the high-fidelity simulation. However, Erlinger et al. (2019) did not conduct debriefing for either the high-fidelity or SBS, and Padilha et al. (2019) conducted an in-person debrief for the low-fidelity and SBS. This is a limitation because debriefing is a crucial part of the simulation that allows reflection. Reflection allows students to think through the implications of the actions taken during the simulation, including integrating knowledge, skills, and attitudes with prior knowledge (INACSL, 2016). Debriefing can lead to a new understanding of the appropriate actions to take in clinical practice, also known as cognitive reframing, which is essential to learning. In addition, debriefing increases students' self-efficacy and supports the transfer of knowledge, skills, and attitudes to the clinical environment (INACSL, 2016). This promotes best practice and safe, quality nursing care for patients. Therefore, future research needs to apply a larger and randomized sample size, employ methodology using valid and reliable tools, and include debriefing to determine the impact of SBS on maternal-child nursing students' self-efficacy.

Standardized Patient Simulation Versus Screen-Based Simulation

Three studies were found that compared standardized patient simulation to SBS (Claudius et al., 2015; Cooper et al., 2015; Triola et al., 2006). Appendix D shows the literature review matrix used to compare standardized patient simulation to SBS. One study used a quantitative randomized controlled trial design (Triola et al., 2016), one study used a comparative design (Claudius et al., 2015), and one study used a mixed-methods design (Cooper et al., 2015). Two studies compared standardized patient simulation and SBS students' content knowledge (Cooper et al., 2015; Triola et al., 2006). One study examined simulation effectiveness (Triola et al., 2006), one study examined simulation quality (Cooper et al., 2015), and one study examined simulation fidelity (Claudius et al., 2015). One study compared learners' time to triage pediatric mass casualty patients (Claudius et al., 2015). The findings vary and will be discussed in the following paragraphs.

A quasi-experimental quantitative and descriptive qualitative study conducted by Cooper et al. (2015) compared standardized patient simulation to SBS with 427 prelicensure, baccalaureate degree nursing students from five Portuguese universities and colleges. Participants were enrolled in their final year of a three-year bachelor's degree or a four-year dual bachelor's degree in midwifery, paramedic, or other prelicensure graduate degree program. The study utilized an 11-item, multiple-choice knowledge test on physiology, assessment, and management of patient deterioration. The knowledge test was given to the standardized simulation group as a pre-test and the SBS group as both pre and post-test. Three different Objective Structured Clinical Examinations (OSCEs) checklists with 24-30 items were used to evaluate clinical performance for each simulation. The standardized patient group's clinical performance was evaluated by one of three expert trained clinical nurse observers. The SBS group's clinical performance was assigned a weighted value of one, two, or three based on the students' selected answers. A 10-item, five-point skill rating scale was used to measure students' self-perceived knowledge, skill, and confidence pre-intervention and post-intervention. A seven-item, five-point scale with open-ended feedback was used to measure students' perception of course quality, measured post-simulation for the standardized patient group (Cronbach's alpha = .81) and the SBS group (Cronbach's alpha = .90). The study was completed in two phases. Phase one was completed in 2012, and phase two was completed in 2013. The students participated in simulations with the same three scenarios: cardiac, respiratory, and shock scenarios. The students in phase one (n = 97) participated in standardized patient simulations, and students in phase two participated in SBS (n = 330). Results indicated that the pre-test clinical knowledge scores were similar for the standardized patient simulation (*M* = 7.25) and the SBS (*M* = 7.7) groups. For the SBS group's post-test, a paired samples *t*-test indicated that clinical knowledge increased significantly between the pre-simulation (*M* = 7.75, *SD* = 1.47) and the post-simulation scores (*M* = 8.75, *SD* = 1.46). For clinical performance, results indicated that students in the standardized patient simulation (*M* = 49%) and the SBS (*M* = 69%) groups both had moderate scores on the OSCEs checklists. The skill rating scale indicated that the SBS group's pre-test scores (*M* = 16.03, *SD* = 3.58) were higher than the standardized patient simulation group's pre-test scores (*M* = 13.09, *SD* = 2.63). For the post-test, the SBS group's skill rating scores (*M* = 20.75, *SD* = 2.58) remained higher than the standardized patient simulation group (*M* = 19.46, *SD* = 2.58). The standardized patient simulation group (*d* = 0.74) had a greater effect size than the SBS group (*d* = 0.60). Although, both groups reported a moderate increase in clinical skills post-simulation. The course quality ratings for both standardized patient (*M* = 33.15, *SD* = 2.26) and screen-based (*M* = 32.05, *SD* = 3.70) simulation groups were positive. Several common themes emerged related to standardized patient and SBS course quality, such as translating theory into practice, being systematic, and practicing builds confidence. The SBS group reported feeling isolated in the decision-making process. In summary, results indicated that both SBS and standardized patient simulation increased students' knowledge and clinical skills. In addition, clinical performance and course quality were similar between the screen-based and standardized patient simulation groups (Cooper et al., 2015).

In contrast, Triola et al. (2006) used a sample of 55 licensed healthcare providers consisting of registered nurses, physicians, psychologists, and public health workers to determine the effectiveness of SBS compared to standardized patient simulation. The participants were attendees of a continuing medication education workshop in Tampa, Florida. Both groups participated in a workshop, a large group bioterrorism simulation, and a lecture before a series of standardized patient simulations and SBSs. The study does not specify the number of individuals who participated in the large group bioterrorism simulation at one time. The participants were randomized into two groups. The control group ($n = 32$) participated in four standardized patient simulations (posttraumatic stress syndrome, sub-diagnostic distress, acute stress disorder, and bereavement), and the intervention group ($n = 23$) received two standardized patient simulations (acute stress disorder and bereavement) and two SBSs (posttraumatic stress disorder and sub-diagnostic distress). The standardized patient simulations were completed in small, interdisciplinary groups, while the SBSs were completed individually.

Similar to the previous study (Cooper et al., 2015), Triola et al. (2006) measured learners' knowledge. However, this study measured knowledge through clinical vignettes that required learners to identify screening strategies and diagnose conditions. In addition, the pre-test and post-test included a 5-item tool to measure learners' perception of their attitudes toward the subject matter and comfort or reluctance in caring for patients. The post-test included an effectiveness survey. Results indicated no significant difference between the two groups' pre-test scores. In addition, there was no significant difference between the group's pre-test and post-test knowledge scores for the posttraumatic stress disorder, acute stress disorder, and bereavement simulations. However, for only the intervention group, there was a significant (*p* = .05) increase in sub-diagnostic distress knowledge scores from the pre-test (*M* = 6 or 29%) to the post-test (*M* = 17 or 81%). In addition, results indicated a similar perception of attitude toward subject matter and comfort or reluctance in caring for patient pre-test scores between groups. There was no significant difference between pre-test and post-test scores in participants' comfort assessing the psychosocial needs of patients after a disaster, overall reluctance to address psychosocial needs of patients during a crisis, preparedness to respond to psychosocial needs of patients during a crisis, and preparedness to screen patients for stress disorders in the setting of a crisis. However, there was a significant (*p* = .05) difference between pre-test and post-test scores in participants' perception of preparedness to care for and treat stress and anxiety during a crisis for both groups. Both groups rated the simulation experience high with no significant difference between the group's scores (*p* = .79) (Triola et al., 2006). Thus, both SBS and standardized patient simulation improved nursing students' performance with similar satisfaction levels.

In contrast to the previous studies (Cooper et al., 2015; Triola et al., 2006), Claudius et al. (2015) used a sample of 33 first and second-year pre-clinical medical students from one American university to compare standardized patient simulation to SBS. The students participated in a 15-minute lecture on a pediatric triage disaster algorithm and a drill that consisted of four standardized patient simulations and seven SBSs. Using the child version of the Simple Triage Rapid Treatment (JumpSTART) triage algorithm, this study compared the triage accuracy, time, and fidelity between SBS and standardized patient simulation. The standardized patient simulation used four medical students as standardized patients. The student actors portrayed children in the mass pediatric casualty incident. Moulage was used to mimic bone lacerations and facial abrasions. In the meantime, a pediatric physician observed the standardized patient simulation to record critical actions' time, accuracy, and performance. For the SBS, the participants used a private, individual laptop. The software (Moodle Systems) tracked the students' triage level, actions, and scenario duration. The participants triaged the 11 pediatric mass casualty patients individually. There were 132 standardized patient encounters and 231 screen-based patient encounters for a total of 363 encounters. After comparing standardized patient simulation with SBS, results indicated that participants triaged the standardized patients (57 seconds) faster than the screen-based patients (80 seconds). The median difference was 23 seconds (95% CI, 10-36 seconds). In addition, results indicated that the standardized patients (122/132 or 92.4%) were overall more accurately triaged than screen-based patients (189/231 or 81.8%). This represented a relative risk of 1.3 (95% CI [1.1, 1.6]) for the standardized patient encounters over the screen-based patient encounters for correct triage assessment (p = .005). The overall median time for both simulation types was 85.7%. Most participants (M = 88%, SD = 33%) felt that the standardized patient encounters were more realistic than the screen-based encounters. Using a generalized estimating equations model, the correlations were adjusted for each student, case, triage acuity, and the number of missing or unnecessary actions. The screen-based encounters were associated with an average increase in triage duration of 74 seconds (95% CI [23.4, 124.6]; p = .004). In brief, participants triaged standardized patients faster and more accurately than screen-based patients. Also, standardized patient encounters were more realistic than screen-based encounters (Claudius et al., 2015).

These studies indicate that both standardized patient and SBS increased students' content knowledge and clinical skills with similar clinical performance (Cooper et al., 2015). However, Triola et al. (2006) found a significant increase in knowledge scores with only the group that completed a mix of standardized patient simulations and SBSs. Furthermore, the standardized patient encounters were triaged faster and more accurately than SBS encounters (Claudius et al., 2015). In addition, both standardized patient and SBS resulted in a similar perception of attitude toward subject matter and comfort or reluctance in caring for patients (Triola et al., 2006). Both groups rated the simulation experience high (Triola et al., 2006) with similar course quality (Cooper et al., 2015). However, the standardized patient simulation offered more realism (Claudius et al., 2015).

Despite the insights these studies offered, none examined replacing standardized patient simulation with SBS. In addition, sample sizes were small, and participants from two of the three studies were recruited from one location, thus limiting generalizability (e.g., Claudius et al., 2015; Triola et al., 2006). Furthermore, these studies did not conduct debriefing (e.g., Claudius et al., 2015; Triola et al., 2006). Also, no studies examined content related to a maternal-child nursing course. Further research is needed that examines the maternal-child clinical learning environment and SBS to better understand the impact of SBS on obstetric nursing self-efficacy.

In-Person Clinical Versus In-Person Simulation Versus Screen-Based Simulation

Published during this study's data collection period, Leighton et al.'s (2021) study investigated prelicensure undergraduate nursing students' (n=113) perceptions of how well they learned in three clinical learning environments: in-person traditional clinical, in-person simulation, and SBS. This study was not specified to any course subject and included nursing students at any educational level from three countries: the United States, Japan, and Canada. Snowball sampling was used to recruit participants (Leighton et al., 2021).

The Clinical Learning Environment Comparison Survey (CLECS) is valid and reliable and was used in the NCSBN national simulation landmark study (Hayden et al., 2014). CLECS was adapted to include SBS as an additional clinical learning environment and renamed the Clinical Learning Environment Comparison Survey 2.0 (CLECS 2.0) (Leighton et al., 2021). CLECS 2.0 was used to measure participants' perception of how well they learned in three clinical learning environments. CLECS 2.0 is 29 items and has six subscales, including communication, nursing process, holism, critical thinking, self-efficacy, and teaching-learning dyad. SBS was rated significantly lower than in-person traditional clinical on all 6 items on the self-efficacy subscale (Leighton et al., 2021).

Leighton et al. (2021) planned to use a repeated-measures ANOVA; however, the assumption of normal distribution was violated. Therefore, the Friedman test, a non-parametric alternative with post hoc multiple comparisons, was conducted to investigate how well students believed their learning needs were met with in-person traditional clinical, in-person simulation, and SBS. Participants perceived in-person traditional clinical better at meeting their learning needs than SBS on all 29 items. Also, participants perceived in-person simulation better at meeting their learning needs than SBS on 10 out of 29 items. In addition, participants preferred in-person traditional clinical over in-person simulation on two items (Leighton et al., 2021).

Each scale item was assessed individually for statistical significance between the three clinical learning environments. Twenty-seven of the 29 scale items had significant results between at least two of the clinical learning environments. The participants rated the SBS clinical learning environment significantly ($p<.0001$) lower than in-person traditional clinical on all six holism subscale items. Five out of six nursing process subscale items had significant ($p<.0001$) results with in-person traditional clinical rated higher than SBS, and one item had significant ($p<.0001$) results with in-person simulation rated higher than SBS. The participants rated the SBS clinical learning environment significantly ($p<.0001$) lower than both in-person traditional clinical and in-person simulation on four out of five teaching-learning dyad subscale items. The SBS clinical learning environment was rated significantly ($p<.0001$) lower than in-person traditional clinical on both critical thinking items and rated significantly ($p<.0001$) lower than in-person simulation on one out of two critical thinking items. The SBS clinical learning environment was also rated significantly ($p<.0001$) lower than the in-person traditional clinical learning environment on all four communication subscale items and rated significantly ($p<.0001$) lower than in-person simulation on three communication subscale items. In addition, one communication subscale item was rated significantly ($p<.0001$) lower for in-person simulation than in-person traditional clinical. The SBS clinical learning environment was rated significantly ($p<.0001$) lower than in-person traditional on all four self-efficacy subscale items and rated significantly ($p<.0001$) lower than in-person simulation on one self-efficacy subscale item (Leighton et al., 2021).

In addition, two items did not belong to a subscale: medication administration and documentation. The SBS clinical learning environment was rated significantly ($p<.0001$) lower than traditional in-person clinical on medication administration and documentation items. Also, the documentation item was rated significantly lower ($p<.0001$) for the in-person simulation learning environment than in-person traditional clinical. Leighton et al.'s (2021) findings show that prelicensure undergraduate nursing students perceived in-person clinical better at meeting their learning needs than SBS, and in some cases, better than in-person simulation (documentation and communication). In addition, nursing students perceived the in-person simulation clinical learning environment better at meeting their learning needs than SBS (Leighton et al., 2021).

Instrument

One tool that measures maternal-child nursing self-efficacy is the Obstetric Nursing Self-Efficacy (ONSE) scale. The ONSE is an 18-item tool that measures nursing students' perception of their ability to assess, intervene, and communicate changes when caring for obstetric patients (Guimond & Simonelli, 2012). The rating scale has five responses. The responses are as follows: not at all sure (A), slightly sure (B), moderately sure (C), very sure (D), and completely sure (E). For scoring, A is coded as 1, B is 2, C is 3, D is 4, and E is 5. A total self-efficacy score is calculated from the sum of the scores from all 18 items. The minimum score is 18, and the maximum score is 90 (Guimond & Simonelli, 2012).

Betsy Guimond developed the ONSE in 2010 to measure behaviors related to competence in obstetric and perinatal safety (Guimond & Simonelli, 2012). The ONSE is used to detect changes after participation in a simulation designed to improve obstetric assessment, intervention, and communication skills. Bandura's Social-Cognitive Theory, the 2007 NCLEX -RN Detailed Test Plan, the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) standards for assessment and interventions, and the Situation-Background-Assessment-Recommendation (SBAR) technique for communication were used to guide the ONSE's development (Guimond & Simonelli, 2012).

Content validity was assessed using two expert review rounds (Guimond & Simonelli, 2012). The expert review panel consisted of six faculty with obstetric experience and graduate-level education. The first expert review round reviewed the ONSE for omissions and deletions. The second expert review round completed a content validity index. Each item was rated on a 4-point scale, and individual item content validity was calculated. The content validity of four items was less than .78. The lowest scoring item with a content validity of .50 was omitted from the scale. The other three low-scoring items were newer concepts that the experts may not have recognized the importance of including the items in the scale; therefore, the items were included in the scale. The average content validity for the ONSE was .91, which demonstrates excellent content validity (Guimond & Simonelli, 2012).

Face validity was assessed using two rounds of student focus groups (Guimond & Simonelli, 2012). The student focus groups consisted of senior undergraduate nursing students from the University of Central Florida who completed maternal-child theory and clinical courses. The first student focus group (n = 15) provided language, format, and readability feedback. Items were reviewed or revised based on focus group feedback. The second focus group (n = 3) consisted of key informants from the first student focus group. The key informants reviewed the revised ONSE and determined that the identified issues were addressed. The ONSE displayed acceptable face validity (Guimond & Simonelli, 2012).

Reliability was assessed using a sample of undergraduate nursing students (n = 20) who completed a 45-hour obstetric clinical rotation from a large public university in the Southeast United States (Guimond & Simonelli, 2012). Split-half reliability scores (.96, .96, and .85) were calculated to test the homogeneity of the ONSE. The scores were greater than .70, which indicated the ONSE is reliable (Guimond & Simonelli, 2012).

Content validity was assessed using a sample of undergraduate junior nursing students (n = 47) who completed an obstetric theory course, obstetric clinical rotation, and two obstetric simulations at a private catholic university (Guimond & Simonelli, 2012). The ONSE was completed by the same group of students immediately before the simulation preparation class (pre-simulation) and immediately following the two simulation experiences (post-simulation). Therefore, the same group of students completed the ONSE twice pre-simulation and twice post-simulation for a total of four times. The pre-simulation and post-simulation scores were compared with a paired samples t-test. The first pre-simulation mean score was 43.49 (SD = 10.38), and the second pre-simulation mean score was 57 (SD = 7.76). A statistically significant increase in scores from the first to the second pre-simulation score ($t(46) = 6.858$, $p = .000$). The first post-simulation mean score was 59.26 (SD = 7.52), and the second post-simulation mean score was 62.80 (*SD* = 8.08). There was a statistically significant increase in scores from the first to the second post-simulation score (t(45) = -2.178, *p* = .03). The mean ONSE scores increase over time, consistent with self-efficacy in obstetric nursing improving as the course progresses. The findings support the ONSE as a valid instrument (Guimond & Simonelli, 2012).

There were limited further reports of the use of the ONSE found in the literature. Only Guimond et al. (2019) used the ONSE to measure prelicensure undergraduate nursing students' (n = 46) obstetric self-efficacy. Students participated in the same unfolding obstetric simulation scenario twice a few weeks apart to allow for deliberate practice. The first simulation used a high-fidelity manikin, and the second used a standardized patient. The ONSE was administered three times: as a baseline measure and after each simulation experience. The ONSE scores increased significantly (*p* = .000) from the baseline measurement (*M* = 40.78) to the first (*M* = 61.0) and second (*M* = 69.27) post-tests. The ONSE Cronbach's alpha for each measurement was .95, .95, and .94. Cronbach's alpha greater than .7 is considered acceptable, .8 is considered good, and .9 is excellent (Pallant, 2016). All three measurements for this study were above .9, indicating excellent reliability of the ONSE.

Summary

This chapter discussed the theory and studies relating to obstetric self-efficacy and simulation, highlighting specific research comparing SBS to other learning methods. Furthermore, a critique of the studies was incorporated throughout this chapter. These studies offered insights on SBS but did not explore the impact of the maternal-child clinical learning environment on nursing students' self-efficacy; therefore, further research with larger sample sizes and multiple sites is needed. Lastly, the reliability and validity of the ONSE were discussed. The next chapter discusses the methodology of the study.

CHAPTER THREE

METHODOLOGY

Chapter three explains the methods used in this study. The design, setting, sample, instrument, and study procedures will be described. The chapter concludes with a plan for data collection and analysis.

Design

The purpose of this study was to examine the impact of the maternal-child clinical learning environment on prelicensure undergraduate nursing students' obstetric self-efficacy. Institutional Review Board (IRB) approval was obtained through the Indiana University of Pennsylvania (IUP). This study used a non-experimental, cross-sectional, and quantitative design. A non-experimental research study does not involve implementing interventions (Polit & Beck, 2017). This study used a sample of 381 undergraduate nursing students semesters who attended nursing school in Pennsylvania during Fall 2020, Spring 2021, and Summer 2021 semesters. For research question 1a, the three groups (in-person, mixed, and SBS) were analyzed to determine complement, similarities, and differences. Due to the limitations of in-person traditional clinical experiences, many maternal-child nursing students met clinical objectives through SBS experiences. This study was cross-sectional as the nursing students' obstetric nursing self-efficacy learning was measured at a single point in time (Polit & Beck, 2017).

A Cronbach's coefficient alpha and split-half reliability were used to assess the ONSE scale's internal consistency reliability and homogeneity with this sample. This will determine how well the ONSE scale items measured obstetric nursing self-efficacy. The following section will discuss the sample and setting.

Sample and Setting

The setting for the study was multiple accredited nursing programs in Pennsylvania, and a convenience sample was used to recruit nursing students. Nursing students (n = 381) were recruited who completed a maternal-child nursing course during Fall 2020, Spring 2021, or Summer 2021 semesters from associate, baccalaureate, and second-degree accelerated programs. A total of 23 nursing administrators and faculty agreed to email the survey to their eligible nursing students. Six schools offered an associate degree program, 15 schools offered a baccalaureate degree program, and two offered both associate and baccalaureate degree programs. The survey did not collect information identifying participants' schools, so it is unknown which schools were represented. The inclusion criteria were as follow:

1. An undergraduate pre-licensure nursing student at an accredited nursing school in Pennsylvania;
2. Completed a maternal-child nursing course during Fall 2020, Spring 2021, or Summer 2021 semester; and
3. First-time enrollment in a maternal-child course and passed the course on the first attempt.

The exclusion criteria were as follow for students who:

1. Did not complete any in-person clinical and only completed distance learning with SBS; and
2. Were graduated at the time of the survey.

A power analysis was used to determine the appropriate sample size needed for the study. The power analysis software program G*Power 3.1 was used to calculate the sample size. The input parameters were entered for research questions 1a and 1b, and the larger sample size was used for recruitment. The effect size for question 1a was calculated using Eta-squared (Bannon, 2013). The input parameters selected for question 1a were as follows: F-test, analysis of variance (ANOVA), fixed effect, omnibus, one-way, medium effect size 0.2526, Alpha 0.05, Power 0.80, and the number of predictors 3. The total sample size was 156, and the sample size per group was 52 for question 1a. The groups were undergraduate pre-licensure maternal-child nursing students exposed to traditional clinical experiences, distance clinical learning experiences with SBS, or a mixture of both clinical learning environments (need 52 per group). The input parameters selected for question 1b were as follows: t-test, linear bivariate regression, one group, slope size, two-tails, slope H1 0.25, Alpha 0.05, Power 0.80, slope H0 0, standard deviation x and y 1. The total sample size was 120 for question 1b. The larger sample size of 156 from question 1a was used for recruitment. For research question 1a, the three groups (in-person, mixed, and SBS) were compared to determine if they had similar demographics and number of participants. The following section will discuss the instrument used to measure obstetric nursing self-efficacy.

Instrument

Demographics for this study were gathered during data collection. Using the Obstetric Nursing Self-Efficacy (ONSE) scale, the study measured participants' obstetric nursing self-efficacy.

Obstetric Nursing Self-Efficacy Scale

The ONSE (Appendix E) was used to measure undergraduate maternal-child nursing students' obstetric self-efficacy. Betsy Guimond provided permission to use the

ONSE (Appendix F). The ONSE was an 18-item tool that measured nursing students' perception of their self-efficacy to assess, intervene, and communicate changes when caring for obstetric patients (Guimond & Simonelli, 2012). The ONSE was developed to measure behaviors related to competence in obstetric and perinatal safety, which is used to detect changes after participation in a simulation designed to improve obstetric assessment, intervention, and communication skills. Bandura's Social-Cognitive Theory, the 2007 NCLEX-RN Detailed Test Plan, the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) standards for assessment and interventions, and the Situation-Background-Assessment-Recommendation (SBAR) technique for communication were used to guide the ONSE's development.

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Validity was assessed using a sample of undergraduate junior nursing students (*n* = 47) who completed an obstetric theory course, obstetric clinical rotation, and two obstetric simulations at a private catholic university (Guimond & Simonelli, 2012). The ONSE was completed by the same group of students immediately before the simulation preparation class (pre-simulation) and immediately following the two simulation experiences (post-simulation). Therefore, the same group of students completed the ONSE twice pre-simulation and twice post-simulation for a total of four times. The pre-simulation and post-simulation scores were compared with a paired samples t-test. The first pre-simulation mean score was 43.49 (*SD* = 10.38). The second pre-simulation mean score was 57 (*SD* = 7.76). There was a statistically significant increase in scores from the first to the second pre-simulation score ($t(46) = 6.858$, $p = .000$). The first post-simulation mean score was 59.26 (*SD* = 7.52). The second post-simulation mean score was 62.80

(*SD* = 8.08). There was a statistically significant increase in scores from the first to the second post-simulation score (t(45) = -2.178, p = .03). The mean ONSE scores increase over time, consistent with self-efficacy in obstetric nursing improving as the course progresses. The findings support the ONSE as a valid instrument (Guimond & Simonelli, 2012).

The rating scale has five responses. The responses are as follows: not at all sure (A), slightly sure (B), moderately sure (C), very sure (D), and completely sure (E). For scoring, A is coded as 1, B as 2, C as 3, D as 4, and E as 5. A total self-efficacy score is calculated for the sum of the scores from all 18 items (Guimond & Simonelli, 2012). The lowest score is 18 and indicates low obstetric nursing self-efficacy. The highest score is 90 and indicates high obstetric nursing self-efficacy.

Procedures

Institutional Review Board (IRB) approval was obtained through the Indiana University of Pennsylvania (IUP). The IUP IRB log number was 21-115. Nursing program and coordinators' contact information was located through the Pennsylvania State Board of Nursing website and professional contacts. Nursing program coordinators, maternal-child course coordinators, and professional contacts were emailed (Appendix G) to invite their students to participate in the study (Appendix H). Specifically, this email asked the program and/or course coordinators to send an invitation to the maternal-child nursing clinical course students during the Fall 2020, Spring 2021, and Summer 2021 semesters. The email invitation also included a link to an online Qualtrics survey.

All data were collected using the online survey software, Qualtrics. Follow-up invitation emails were sent as needed. Informed consent and confirmation of eligibility were collected on the first question of the Qualtrics survey (Appendix I). Next, participants were asked to answer multiple-choice and free text entry demographic questions (Appendix J) and complete the ONSE scale. Qualtrics software settings were used to keep the survey responses anonymous and restrict participants from completing the survey more than once.

Finally, participants were offered an incentive to participate in the study. Each participant could enter for a chance to win one of ten $25 Visa gift cards. The last question on the actual survey asked participants if they wanted to participate in a chance to win one of ten $25 Visa gift cards. Therefore, an additional incentive survey was used to collect the participants' email addresses for a chance to win the gift cards. The actual and incentive surveys were kept entirely separate to maintain anonymity. Qualtrics software settings were used to restrict access to the incentive survey to only the participants who selected yes and restricted participants from completing the survey more than once. After data collection, ten winners were chosen randomly from the participants who entered their email addresses on the incentive survey. Each email address was assigned a number. An online random number generator was used to select ten email addresses. The gift cards were emailed to the winners. The participants' email addresses were kept confidential and stored on a password-protected computer and will be saved for five years. The following section will discuss data analysis.

Data Analysis

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS) software version 26 for Mac. First, a codebook was developed to code data entered into the software. Then, the Qualtrics data for all participants, including demographics, questions, and ONSE, were imported into SPSS. Next, the data was cleaned, examined for missing information and errors, and readied for analysis. Exclude cases pairwise, also known as exclude cases analysis by analysis, was used to exclude the case or individual only if they were missing the data required for the specific analysis (Pallant, 2016).

The case or individual was included in the analysis for which necessary information is complete. Box plots and histograms were used to explore normality. Linearity, homogeneity, and sphericity were examined to verify that the assumptions were met for statistical analysis. The homogeneity assumption was violated; therefore, a non-parametric statistic test, Kruskal-Wallis, was used. The Kruskal-Wallis test is the non-parametric and distribution free version of the one-way ANOVA (Bannon, 2013). Equal group variances is not needed for the Kruskal-Wallis test. Basic statistics were run on all data. As per the bivariate analysis test key (Bannon, 2013), a one-way ANOVA was proposed to answer question 1a. However, the non-parametric alternative, the Kruskal-Wallis test, was conducted since the assumption of homogeneity was violated (Pallant, 2016). Linear regression was performed to answer question 1b.

In addition, a Cronbach's coefficient alpha and split-half reliability were conducted to assess the ONSE scale's internal consistency reliability and homogeneity with this sample. This will demonstrate how well the ONSE scale items measured obstetric nursing self-efficacy. The following section will discuss the statistical tests used for the demographic data and research question.

Demographic Data

The demographic data for this study included age, sex, race, ethnicity, previous experience in the medical field, previous degree, military experience, type of maternal-child clinical learning environment(s), percentage of maternal-child clinical completed in a distance learning environment with SBS, year in nursing school now and when completed maternal-child clinical, type of debriefing experience, type of SBS software, and grade point average. Descriptive statistics described the sample demographics (Pallant, 2016). Frequencies were completed for sex, race, ethnicity, previous experience in the medical field, previous degree, military experience, year in nursing school now and when completed maternal-child clinical, type of debriefing experience, and type of SBS software. Means, standard deviations, and ranges were completed for age, percentage of maternal-child clinical completed in a distance learning environment with SBS, and grade point average.

Statistical Analysis

The research questions for this study were as follows:

1. How does the maternal-child clinical learning environment impact undergraduate nursing students' obstetric nursing self-efficacy?
    a. What is the difference in obstetric nursing self-efficacy scores between undergraduate nursing students who complete in-person maternal-child clinical, those who complete maternal-child clinical with SBS, and those who complete a mixture of both?
    b. How does the amount of maternal-child clinical with SBS impact undergraduate nursing students' obstetric nursing self-efficacy scores?

A between-groups or independent samples ANOVA was proposed to answer research question 1a. The ANOVA assumption of equal variances was violated. Therefore, the non-parametric statistic test, Kruskal-Wallis, was used (Pallant, 2016). The three groups were undergraduate, prelicensure maternal-child nursing students who had traditional in-person clinical, distance-learning clinical with SBS, or a mixture of both clinical learning environments. The variability in ONSE scores between the three groups (believed to be due to the maternal-child clinical learning environment) with the variability within each of the groups (believed to be due to chance) (Pallant, 2016).

Simple linear regression was used to answer research question 1b. Simple linear regression was used to model the linear relationship between the dependent (obstetric nursing self-efficacy) and independent (amount of maternal-child clinical with SBS) variables (Yan & Su, 2009). The dependent variable was the response variable, and the independent variable was the predictor variable. The predictor variable (amount of maternal-child clinical with SBS) explained the causal changes in the response variable (obstetric nursing self-efficacy) (Yan & Su, 2009).

In addition, this study reported Cronbach's coefficient alpha ($\alpha = .95$) and split-half reliability (.87, .94, and .97) to assess the ONSE scale's internal consistency reliability and homogeneity. This will determine how well the ONSE scale items measured obstetric nursing self-efficacy.

Summary

This chapter described the methodology used for this study. First, the non-experimental, cross-sectional, and quantitative design was described. First, the sample and setting were described. Then, the ONSE scale was discussed, including reliability and validity. Finally, the procedures and data analysis, including statistical analysis, were discussed. The next chapter will discuss the results of the study.

CHAPTER FOUR

RESULTS

This chapter discusses the results of the statistical analysis of this study. This chapter will start with a description of the sample. Descriptive statistics include age, sex, race, ethnicity, past or current medical experience, previous degree, military experience, type of nursing degree sought, current year in nursing school, year in nursing school during maternal-child clinical, type of maternal-child clinical learning environment(s), percentage of maternal-child clinical learning environment completed with screen-based simulation (SBS), type of SBS software, type of debriefing experience(s), and current grade point average. The Cronbach's coefficient alpha for the Obstetric Nursing Self-Efficacy (ONSE) scale is reported. Results of this study relating to the research questions and hypotheses are included and described.

Sample Description

The sample (n = 381) included pre-licensure undergraduate nursing students from multiple Pennsylvania universities. Nursing administrators and faculty were asked to send an email invitation to students after completing maternal-child clinical during the Fall 2020, Spring 2021, and Summer 2021 semesters. Data collection began after Fall 2020 and Spring 2021 semesters and during Summer 2021 semester. If nursing administrators or faculty had eligible students for Summer 2021 semester, they were asked to wait until the semester was over to email the survey to potential participants. The surveys were distributed via Qualtrics® after students completed maternal-child clinical. The Qualtrics® security settings were used to prevent participants from taking the survey more than once. A total of 23 nursing administrators and faculty from various colleges and universities agreed to email the study invitation to their eligible nursing students. Six schools offered an associate degree program, 15 schools offered a baccalaureate degree program, and two offered both associate and baccalaureate degree programs. The survey did not collect information identifying participants' schools, so it is unknown which colleges and universities were represented. The responses to demographic items ranged between 309 and 381 due to missing items. The overall sample (n = 381) was predominately female (91.3%). The subjects' (n = 309) age ranged from 20 – 55 years (*M* = 22.8, *SD* = 4.40) with 85.4% between 20 – 24 years. The majority of the participants were Caucasian (89%). Table 4 presents a summary of these demographic characteristics.

Table 4

Demographic Characteristics of the Sample

Variable	n	%
Gender		
Female	348	91.3
Male	31	8.1
Non-Binary	1	0.3
Prefer not to answer	1	0.3
Age		
20 – 24	264	85.4
25 – 29	22	7.0
30 – 39	18	5.6
40 – 55	5	1.5
Race		
Asian	19	5.0
Black	13	3.4
Caucasian	338	88.7
Hispanic or Latino	9	2.4
Prefer not to answer	2	0.5
Ethnicity		
Hispanic	22	5.8
Non-Hispanic	358	94.2

Note. Total responses ranged from 309 – 381 due to missing items.

Other demographic information included type of nursing degree program, previous experience in the medical field, grade point average, previous degree, year in nursing school at the time of the survey and at time of maternal-child clinical, previous military experience, amount of maternal-child SBS, type of maternal-child SBS debriefing experience, and type of SBS software used. The majority of participants sought baccalaureate degrees (n = 327, 85.8%) and second-degrees (n = 52, 13.6%). There were only two (0.5%) participants seeking associate degrees. Most participants reported past and/or current experience in the medical field (84.8%). The participants' grade point averages ranged from 2.50 – 4.00 (*M* = 3.56, *SD* = 0.27) on a 4.00 scale. Of the total sample, 13 had previous military experience (3.4%), and 75 had previous degrees (19.7%). If participants answered yes to previous degree, they were given a free text question that asked them to describe their previous degree type. Of the 75 with previous degrees, 38 (10%) had bachelor's degrees, 25 (6.6%) listed a major with no degree level, 3 (0.8%) had a master's degree, 3 (0.8%) had international medical degrees, 3 (0.8%) did not respond, 2 (0.5%) had associate degrees, and 1 (0.3%) had a high school diploma. The majority of the participants (82.7%) were in their third year of nursing school when they completed maternal-child clinical and in their fourth year at the time of completing the survey (90.8%). The participants' amount of maternal-child clinical with SBS ranged from 0% – 100% (*M* = 28.63, *SD* = 32.99). For the type of maternal-child clinical learning environment question, participants were able to select all that apply. The majority participated in both maternal-child in-person clinical (n = 339, 89%) and in-person simulation (n = 285, 74.8%) experiences. Less than half of the participants (n = 186, 48.8%) experienced maternal-child SBS. The most common type of SBS debriefing was facilitator-led with video conferencing (31.2%), followed by computer-generated (26.8%). vSim® for Nursing was the most common SBS software used by the participants (20.5%). Table 5 provides a detailed summary of these demographics.

Table 5

Distribution of Other Demographic Variables

Variable	n	%
Type of nursing degree program		
Associate	2	0.5
Bachelor's	327	85.8
Second-degree accelerated	52	13.6
Experience in medical field		
Yes	323	84.8
No	58	15.2
Previous degree		
Yes	75	19.7
No	302	79.3
Type of previous degree (free text)		
High school	1	0.3
Associate	2	0.5
Bachelor's	38	10.0
Master's	3	0.8
International medical	3	0.8
Unspecified (major listed with no degree type)	25	6.6
Previous military experience		
Yes	13	3.4
No	365	95.8
Year in nursing school during maternal-child clinical		
First	14	3.7
Second	24	6.3
Third	315	82.7
Fourth	28	7.3

Year in nursing school at time of survey		
First	6	1.6
Second	14	3.7
Third	14	3.7
Fourth	346	90.8
Type of maternal-child clinical learning environment		
In-person clinical	339	89
In-person simulation	285	74.8
SBS distant	186	48.8
Distant with no SBS	37	9.7
Other (movies, case studies, etc.)	4	1
Type of maternal-child SBS debriefing experience		
Computer generated	102	26.8
Facilitator-led with video conferencing	119	31.2
Facilitator-led in-person	64	16.8
Self-debriefing	59	15.5
Type of SBS software		
Swift River™/ati®	15	3.9
Canvas Learning Management System	1	0.3
Elsevier	1	0.3
Google survey/answer	1	0.3
iHuman Patients Kaplan®	16	4.2
Lippincott thePoint®	9	2.4
Mixed	21	5.5
None	205	53.8
Pearson	1	0.3
Ryerson University	12	3.1
Shadow Health®	3	0.8
Unsure	16	4.2
vSim® for Nursing	78	20.5
Zoom©	2	0.5

Note. Total responses ranged from 377 – 381 due to missing items.

The three groups for research question 1a consisted of 181 (47.5%) in-person, 168 (44.1%) mixed in-person and SBS, and 32 (8.4%) SBS maternal-child clinical participants. The groups had similar ages and grade point averages. Table 6 provides the groups' means and medians for age and grade point average. All three groups had the majority of participants seeking baccalaureate degrees. However, the in-person maternal-child clinical group had the only two associate degree seeking participants. The maternal-child clinical with SBS group was comprised of all (100%) female participants (n = 32). While males were represented in the other two groups. The mixed group consisted of 148 (88.1%) female and 19 (11.3%) male participants. The in-person group had 168 (92.8%) female and 12 (6.6%) male participants. In addition, the maternal-child clinical with SBS group was primarily Caucasian (n = 31) and non-Hispanic (n = 32), while the other two groups had more racial and ethnic diversity. Also, the maternal-child clinical with SBS group did not have any participants with past military experience. The other two groups had similar military experience. There was a variation among the groups' previous medical experiences and previous degrees. Table 7 provides a detailed summary of the groups' demographic characteristics, including gender, race, ethnicity, previous medical experience, previous degree, type of degree sought, and past military experience.

Table 6

Age and Grade Point Average Means and Medians for the In-Person, Mixed, and SBS Groups

Group	Age			Grade Point Average		
	n	Mean	Median	n	Mean	Median
In-Person	181	22.5	21	146	3.55	3.56
Mixed	168	23.2	21	137	3.58	3.60
SBS	32	23.4	22	23	3.60	3.70

Note. SBS = maternal-child clinical with screen-based simulation. In-person = in-person maternal child clinical. Mixed = mixed in-person and SBS maternal-child clinical.

Table 7

Distribution of In-Person, Mixed, and SBS Groups' Demographic Variables

Variable	In-Person		Mixed		SBS	
	n	%	n	%	n	%
Gender	181	100.0	168	100.0	32	100.0
Female	168	92.8	148	88.1	32	100.0
Male	12	6.6	19	11.3	0	0.0
Non-Binary	1	0.6	0	0.0	0	0.0
Prefer not to answer	0	0.0	1	0.6	0	0.0
Race	181	100.0	168	100.0	32	100.0
Asian	12	6.6	6	3.6	1	3.1
Black	4	2.2	9	5.4	0	0.0
Caucasian	161	89.0	146	86.9	31	96.9
Hispanic or Latino	4	2.2	5	3.0	0	0.0
Prefer not to answer	0	0.0	2	1.2	0	0.0
Ethnicity	181	100.0	167	99.4	32	100.0
Hispanic	10	5.5	12	7.1	0	0.0
Non-Hispanic	171	94.5	155	92.3	32	100.0
Type of nursing degree program	181	100.0	168	100.0	32	100.0
Associate	2	1.1	0	0.0	0	0.0
Bachelor's	161	89.0	141	83.9	25	78.1
Second-degree accelerated	18	9.9	27	16.1	7	21.9
Experience in medical field	181	100.0	168	100.0	32	100.0
Yes	168	92.8	133	79.2	22	68.8
No	13	7.2	35	20.8	10	31.3
Previous Degree	178	98.4	167	99.4	32	100.0
Yes	26	14.4	40	23.8	9	28.1
No	152	84.0	127	75.6	23	71.9
Previous Military Experience	179	98.9	168	100.0	31	96.9
Yes	6	3.3	7	4.2	0	0.0
No	173	95.6	161	95.8	31	96.9

Note. SBS = maternal-child clinical with screen-based simulation group. In-person = in-person maternal child clinical group. Mixed = mixed in-person and SBS maternal-child clinical group.

Obstetric Nursing Self-Efficacy Scale Reliability

Three hundred and eighty-one pre-licensure undergraduate nursing students completed the ONSE scale. The ONSE scale consists of 18 items. Consistent with previous literature (Guimond & Simonelli, 2012; Guimond et al., 2019), the Cronbach's coefficient alpha was $\alpha = .95$, indicating excellent internal consistency reliability for the scale with this sample. Cronbach coefficient alpha values above .7 are considered acceptable, above .8 are preferable, and above .9 are excellent (Pallant, 2016). The corrected item-total correlation values were between .62 and .77, indicating that the 18-items measured obstetric nursing self-efficacy as a whole. Corrected item-total correlation values less than .3 would indicate that the item is measuring something different from the scale as a whole (Pallant, 2016). Split-half reliability coefficients were conducted, including a simple (.87), quarter (.94), and odd-even (.97) split. The split-half reliability coefficients exceeded the .70 threshold for reliability as recommended by Nunnally (1978). The research question results are described next.

Research Questions

This study evaluated the impact of the maternal-child clinical learning environment on pre-licensure undergraduate nursing students' obstetric nursing self-efficacy. Participants who completed maternal-child clinical during Fall 2020, Spring 2021, and Summer 2021 semesters in Pennsylvania nursing schools were eligible to participate. Using a non-experimental, cross-sectional, quantitative design, one main research question with two sub-questions was investigated and is discussed below. The research questions for this study were as follows:

1. How does the maternal-child clinical learning environment impact undergraduate nursing students' obstetric nursing self-efficacy?
    a. What is the difference in obstetric nursing self-efficacy scores between undergraduate nursing students who complete in-person maternal-child clinical, those who complete maternal-child clinical with SBS, and those who complete a mixture of both?
    b. How does the amount of maternal-child clinical with SBS impact undergraduate nursing students' obstetric nursing self-efficacy scores?

Undergraduate pre-licensure nursing students who completed maternal-child clinical during the Fall 2020, Spring 2021, and Summer 2021 semesters were eligible to participate. Data was collected after the participants completed their maternal-child clinical nursing course. Participants who completed the online Qualtrics survey, including the 18-item ONSE scale, were included in the study. A total of 381 participants completed the survey who were eligible to participate. Four participants were excluded for not meeting the criteria as they identified as licensed practical nurses (LPNs).

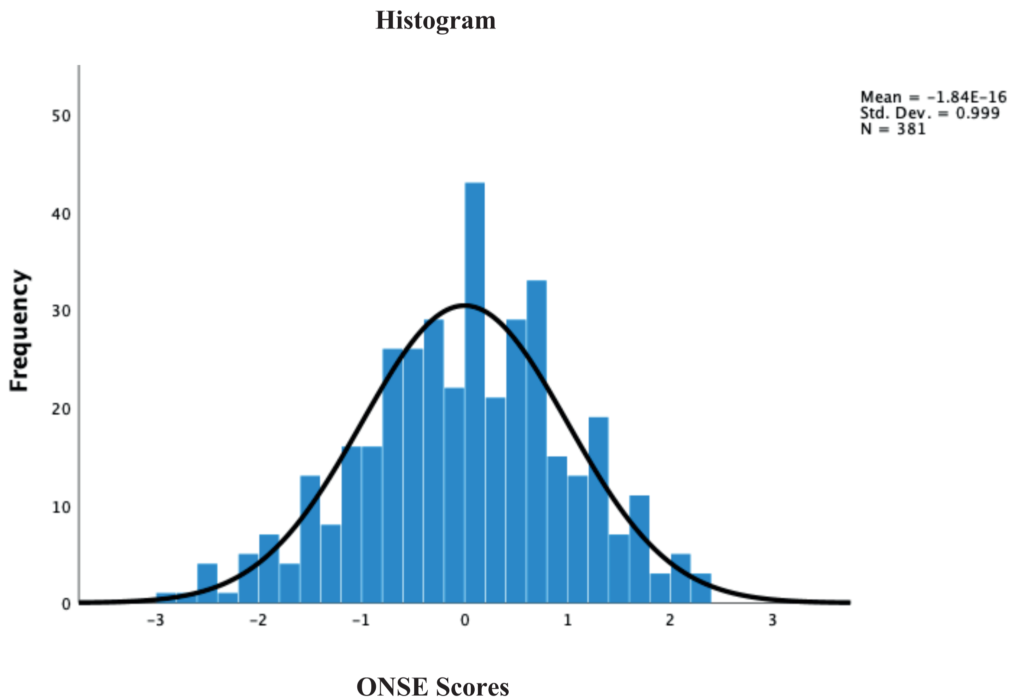
There were no outliers affecting data analysis identified on the box plot. The one-way ANOVA tests for assumptions of independence of observations and normality were met. The independence of observations assumption was met as the participants were only in one group, not both or neither. The histogram and normal P-P plot showed that the ONSE scores were normally distributed. Figures 1 and 2 show the histogram and normal P-P plot.

However, Levene's test statistic was significant ($F(2, 378) = 8.16$, $p < .001$), which indicated that the variances in scores reflecting the ONSE scores were significantly unequal among the three groups (in-person maternal-child clinical, mixed in-person and SBS, and SBS) (Bannon, 2013). In addition, the Welch test ($p = .002$) and Brown-Forsythe ($p = .003$) robust tests of equality of means were both significant, also indicating unequal variances in ONSE scores among the three groups. The SBS group ($n = 32$) had fewer participants than the in-person ($n = 181$) and mixed groups ($n = 168$), which caused unequal group sizes. Therefore, the equality of variances assumption was violated indicating that there was a greater probability of falsely rejecting the null hypothesis.

Therefore, the non-parametric and distribution free alternative to the one-way ANOVA test, Kruskal-Wallis, was conducted to answer research question 1a (Bannon, 2013). The Kruskal-Wallis test converted scores to ranks, and the mean rank for each group was compared (Pallant, 2016). Assumptions for the Kruskal-Wallis test included random samples and independent observations. The group variances did not need to be equal for the Kruskal-Wallis test (Pallant, 2016). These assumptions were met as discussed above.

Figure 1

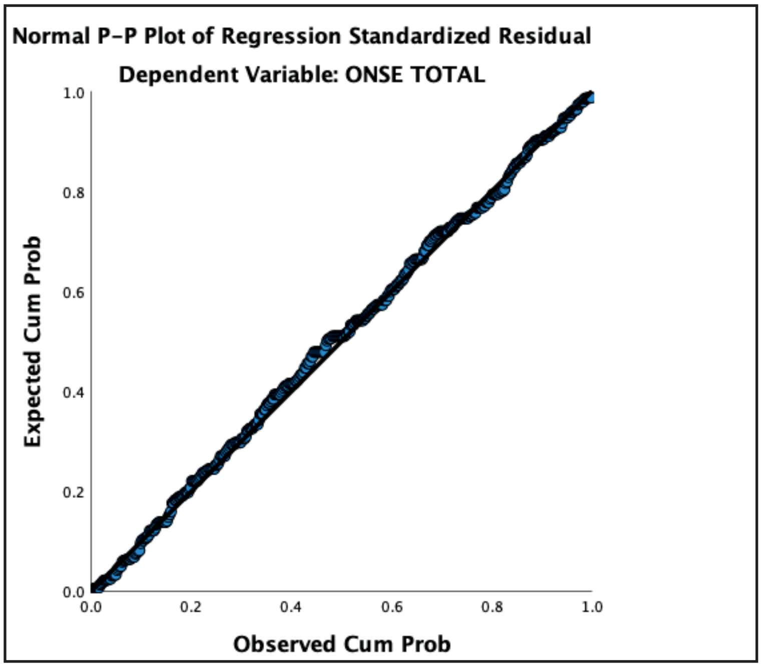
Histogram of ONSE Scores



Note. Obstetric Nursing Self-Efficacy (ONSE).

Figure 2

P-P Plot of ONSE Scores



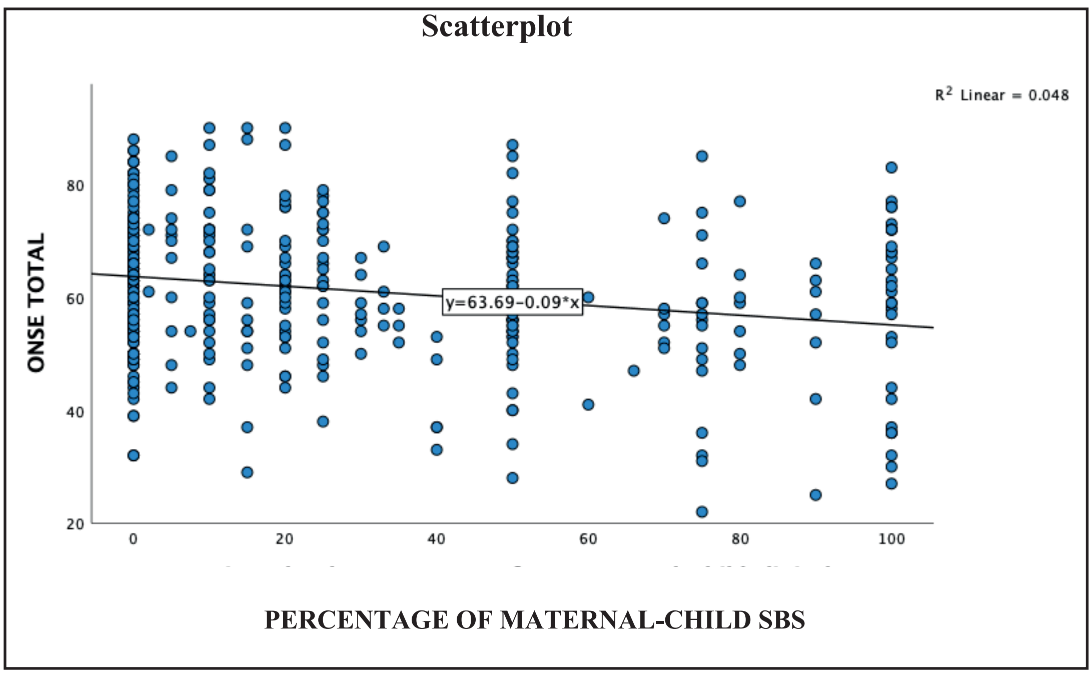
Note. Obstetric Nursing Self-Efficacy (ONSE). Cumulative (Cum). Probability (Prob).

Simple linear regression was conducted to answer research question 1b. Simple linear regression assumes linearity, independence of errors, normality of errors, and equal variances (The Pennsylvania State University, 2021). The assumptions reviewed indicated no violations. Linearity was assessed by analyzing the scatterplot (Figure 3). The relationship appeared linear, although it did not appear to show a very strong linear relationship. The scatterplot showed that, in general, as the percentage of maternal-child SBS increased, the ONSE score decreased. There did not appear to be any clear violation that the relationship was not linear (The Pennsylvania State University, 2021). The independence of errors was assessed by analyzing the residuals versus predicted values plot. Figure 4 shows the residuals versus predicted values plot. The points seemed somewhat randomly scattered, and it did not appear that there was a relationship (The

Pennsylvania State University, 2021). The normality of errors was assessed by analyzing the normal probability plot. Figure 5 shows the normal probability plot. Most data points were close to the line and appeared approximately normally distributed (The Pennsylvania State University, 2021). Equal variances were assessed by analyzing the residuals versus predicted values plot. As above, figure 4 shows the residuals versus predicted values plot. The residuals versus predicted values plot did not show a pattern. Therefore, the assumptions for simple linear regression were met (The Pennsylvania State University, 2021).

Figure 3

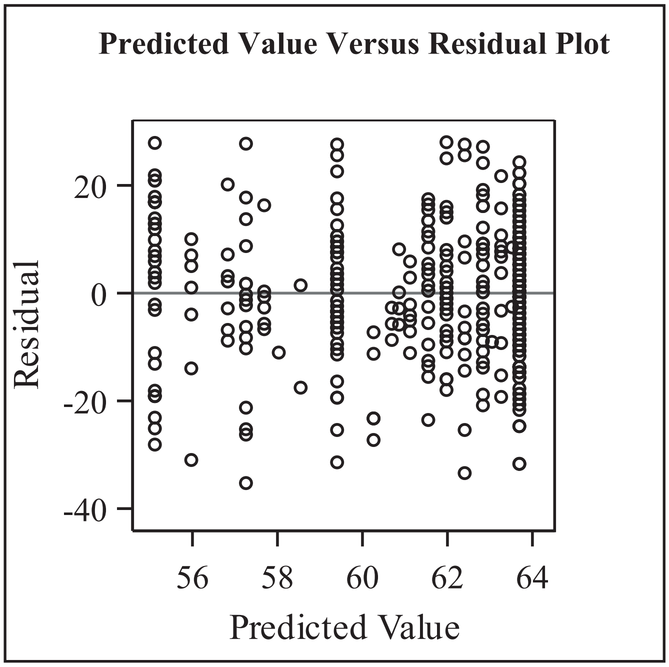
Association Between ONSE Scores and Percentage of Maternal-Child SBS



Note. Obstetric Nursing Self-Efficacy (ONSE). Screen-based simulation (SBS). Each dot represents a participant. Although it does not look like a very strong relationship, it appears linear. In general, as the percentage of maternal-child SBS increases, ONSE scores decrease.

Figure 4

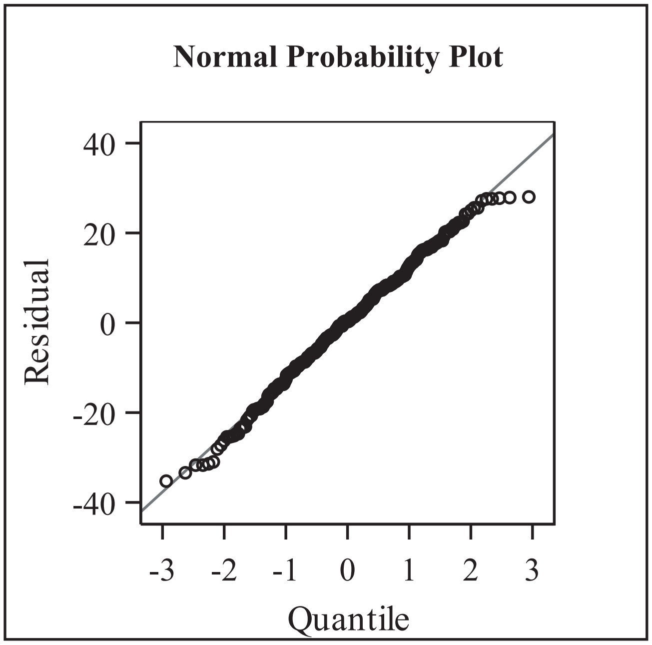
Predicted Value Versus Residual Plot (Response in ONSE Scores)



Note. Obstetric Nursing Self-Efficacy (ONSE).

Figure 5

Normal Probability Plot (Response in ONSE Scores)



Note. Obstetric Nursing Self-Efficacy (ONSE).

Research Question 1a

Research question 1a investigated the difference in ONSE scores between undergraduate nursing students who completed in-person maternal-child clinical (n = 181), those who completed maternal-child clinical with SBS (n = 32), and those who completed a mixture of both (N = 168). ONSE scores ranged from 22 to 90. A score closer to 90 indicated greater obstetric nursing self-efficacy.

The hypotheses follow:

- H_0: There is no difference in ONSE scores between undergraduate nursing students who complete in-person maternal-child clinical, those who complete maternal-child clinical with SBS, and those who complete a mixture of both.

- H_1: There is a difference in ONSE scores between undergraduate nursing students who complete in-person maternal-child clinical, those who complete maternal-child clinical with SBS, and those who complete a mixture of both.

A Kruskal-Wallis test, a non-parametric alternative to a one-way ANOVA, with pairwise comparisons was conducted to examine if there was a difference in ONSE scores between undergraduate nursing students who completed in-person maternal-child clinical (n = 181), those who completed maternal-child clinical with SBS (n = 32), and those who completed a mixture of both (n = 168). The Kruskal-Wallis test is a nonparametric and distribution free method. The assumption of equal variances does not need to be met. Since the assumption of equal variances was not met, the Kruskal-Wallis test was selected. The Kruskal-Wallis test analyzes medians and quartile ranges instead of means and standard deviations.

A Kruskal-Wallis test revealed a statistically significant difference in ONSE scores between the three groups (Gp1, n = 181: in-person, Gp2, n = 32: SBS, Gp3, n = 168: mixture), χ^2 (2, n = 381) = 9.68, p = .008. Pairwise comparisons revealed a statistically significant relationship between two of the three group comparisons. Table 8 shows the pairwise comparisons. The p-values were adjusted in the statistical software for making a three-group comparison, so the p-values are compared at the .05 alpha level. The group that completed maternal-child clinical with SBS recorded a significantly lower (p = .04) ONSE median score (*Md* = 59) than the group that completed in-person clinical (*Md* = 64). The group that completed a mixture of maternal-child clinical experiences also had a significantly lower (p = .04) ONSE median score (*Md* = 59.5) than the group that completed in-person clinical (*Md* = 64). The group that completed maternal-child clinical with SBS did not have a significantly different (p = .42) ONSE median score (*Md* = 59) than the group that completed a mixture of both (59.5). Table 9 shows the medians and quartile ranges for the groups. Overall, these results indicated that undergraduate nursing students who completed in-person maternal-child clinical had significantly higher ONSE scores than those that completed maternal-child clinical with SBS or a mixture of both. However, there was no significant difference between students who completed maternal-child clinical with SBS and those who completed a mixture of both.

Table 8

Pairwise Comparisons for Obstetric Nursing Self-Efficacy Scores

Groups	p-value
In-person maternal-child clinical versus SBS	.04
In-person maternal-child clinical versus mixture of both	.04
Maternal-child clinical with SBS versus mixture of both	.42

Note. Screen-based simulation (SBS). p-value compared to .05 alpha level.

Table 9

Group Medians and Quartile Ranges for Obstetric Nursing Self-Efficacy Scores

Groups	n	Median	Quartile ranges
In-person maternal-child clinical	181	64	55, 71
Mixture of both	168	59.5	18, 52
Maternal-child clinical with SBS	32	59	36.5, 68

Note. Screen-based simulation (SBS).

Research Question 1b

Research question 1b investigated how the amount of maternal-child clinical with SBS impacted undergraduate nursing students' obstetric nursing self-efficacy scores. The hypotheses include:

- H_0: The amount of maternal-child clinical with SBS has no impact on undergraduate nursing students' ONSE scores.
- H_1: The amount of maternal-child clinical with SBS impacts undergraduate nursing students' ONSE scores.

A simple linear regression was conducted to investigate how well the amount of maternal-child screen-based simulation could predict obstetric nursing self-efficacy. A scatterplot (Figure 3) showed that the relationship between the amount of maternal-child SBS and obstetric nursing self-efficacy was negative and linear and did not reveal any bivariate outliers. The correlation between the amount of maternal-child SBS and obstetric nursing self-efficacy was statistically significant, $r(379) = -.22$, $p < .001$. This was a small effect size (Cohen, 1988). The regression equation for predicting obstetric nursing self-efficacy from the amount of maternal-child clinical with SBS was $\hat{y} = 63.69 - .09x$. The results indicated that as the percentage of maternal-child clinical completed by SBS increased by 1%, the ONSE score decreased by 0.09 (rounded, $p < .001$). The r^2 for this equation was .048; that was, 4.8% of the variance in obstetric nursing self-efficacy was predictable from the amount of maternal-child screen-based simulation. The bootstrapped 95% confidence interval for the slope to predict obstetric nursing self-efficacy from the amount of screen-based simulation ranged from -0.12 to -0.05. Thus, for each one unit of increase in the amount of maternal-child screen-based simulation, obstetric nursing self-efficacy decreased by about 0.05 to 0.12 points. Overall, the results indicated that the amount of maternal-child clinical with SBS impacted obstetric nursing self-efficacy.

Summary

This chapter presented a description of statistics for the demographic and research questions. Descriptive statistics were completed to describe the sample. The ONSE scale Cronbach's coefficient alpha and split-half reliability were reported to determine the scale's internal consistency reliability and homogeneity. A non-parametric alternative to one-way ANOVA, the Kruskal-Wallis test with pairwise comparisons, presented findings on the difference in ONSE scores between undergraduate nursing students who completed in-person maternal-child clinical, those who completed maternal-child clinical with SBS, and those who completed a mixture of both. Statistical significance was revealed between the in-person maternal-child clinical group and those who completed maternal-child clinical with SBS, and those who completed a mixture of both. However, no statistical significance was found between those who completed maternal-child clinical with SBS and those who completed a mixture of both. Simple linear regression presented statistically significant findings regarding the impact of the amount of maternal-child clinical with SBS and undergraduate nursing students' obstetric nursing self-efficacy. The next chapter will discuss the results, study limitations, implications for practice, and recommendations for future research.

CHAPTER FIVE

DISCUSSION AND IMPLICATIONS

This study used a non-experimental, cross-sectional, quantitative design to examine the impact of the maternal-child clinical learning environment on undergraduate nursing students' obstetric nursing self-efficacy. This chapter discusses the demographic characteristics, data analysis, and research question findings. The discussion will also focus on how the conceptual framework was used to guide this study and how it links to the results from this study. In addition, the limitations of the study are presented. This chapter concludes with implications and recommendations for nurse administrators, simulation experts, nurse educators, nursing students, and future research.

Discussion

This section includes a discussion of the study's findings. The demographic data and the reliability of the Obstetric Nursing Self-Efficacy (ONSE) scale are presented. Additionally, a discussion of the research question with two sub-research questions is included. Lastly, the study's findings are connected to Bandura's work on self-efficacy and Ericcson's deliberate practice.

Demographic Characteristics

A variety of demographic variables was assessed, including gender, age, race, and ethnicity. Some demographic item responses were missing, resulting in between 309 and 381 responses. All items with responses were included in data analysis. Items with missing data were only excluded from the specific analysis.

Participants were predominately female (91.3%), with the remainder male (8.1%), non-binary (0.3%), and preferred not to answer (0.3%). Ages ranged from 20 to 55 (M =

22.8), with 85.4% of the participants between 20 and 24 years. Most of the participants were Caucasian (88.7%) and non-Hispanic (94.2%).

The participant demographics of this sample were compared to the NLN Biennial Survey of Schools of Nursing 2019 – 2020 (National League for Nursing, 2021) to determine if the sample was representative of the national nursing population. The demographics differed from this study compared to the NLN Biennial Survey results. According to the NLN Biennial Survey, more males were represented in pre-licensure registered nurse programs (13%) than was evident in this sample (8.1%). This sample had more nursing students (n = 270/309) under the age of 25 (87.4%) than were represented in bachelor's degree nursing programs (75.8%) and associate degree nursing programs (38.9%). This sample consisted predominately of nursing students seeking baccalaureate and second-degrees (99.4%). There were only two associate degree-seeking nursing students (0.5%). Also, more minorities were represented in pre-licensure nursing programs (27.4%) than was evident in this sample (11.3%). However, the NLN Biennial Survey represented all United States nursing schools, while this study represented only Pennsylvania (National League for Nursing, 2021).

Other demographics assessed in this study included type of nursing degree program, previous experience in the medical field, previous degree, grade point average, previous military experience, year in nursing school during maternal-child clinical and at time of the survey, type of maternal-child clinical learning environment, amount of maternal-child screen-based simulation (SBS), type of maternal-child SBS debriefing experience, and type of maternal-child SBS software. The participants' grade point averages ranged from 2.50 – 4.00 on a 4.00 scale. The mean grade point average reported was 3.56. Only 13 (3.4%) participants had previous military experience. The majority of participants were in their third year of nursing school during maternal-child clinical (82.7%) and in their fourth year at the time of the survey (90.8%). Not all participants completed the survey at the same time or spot in their program or course of study. The participants' amount of maternal-child SBS ranged from 0% – 100% (*M* = 28.63, *SD* = 32.99). Most participants completed in-person maternal-child clinical (89%) and simulation (74.8%) experiences. Less than half (48.8%) of participants completed maternal-child clinical with SBS. There were 75 (19.7%) participants who had a previous degree. If participants answered "yes" to previous degree, they were given a free text question that asked what type of previous degree. Participants' answers for type of previous degree included high school (n = 1, 0.3%), associate (n = 2, 0.5%), bachelor's (n = 38, 10%), master's (n = 3, 0.8%), international medical (n = 3, 0.8%), and unspecified (major listed with no degree type) (n = 25, 6.6%).

The majority of participants reported previous experience in the medical field (84.8%). However, many participants listed nursing student or clinical as their previous experience (21.3%). This question was intended to capture the number of students with previous experience working in medical-related positions, such as nursing assistants, patient care technicians, and other healthcare experiences. The follow-up question was a free text entry question, allowing participants to type in their previous medical experience. There were 81 (21.3%) participants that provided answers, such as clinical, capstone, observations, nursing, or nursing school. These answers indicated that their previous experience in the medical field was predominantly as a student.

Two different demographic questions were used to gather the type of maternal-child clinical environment and the approximate amount of maternal-child clinical with SBS. The type of maternal-child clinical environment was collected to answer research question 1a, and the approximate amount of maternal-child clinical with SBS was collected to answer research question 1b. Sixty-five (17.1%) participants had conflicting answers between these two demographic questions. Three participants answered SBS for the type of maternal-child clinical learning environment but reported less than 100% for the amount of maternal-child clinical with SBS. Nine participants reported a mixed maternal-child clinical learning environment but reported either 0% or 100% for the amount of maternal-child clinical with SBS. In addition, 53 participants answered in-person for the type of maternal-child clinical, but they reported greater than 0% for the amount of maternal-child clinical with SBS. Therefore, as detailed in Chapter Three, the type of maternal-child clinical environment was used to answer research question 1a and the amount of SBS question was used for research question 1b.

The most common types of maternal-child SBS debriefing experiences reported were facilitator-led with video conferencing (31.2%) and computer-generated (26.8%). Facilitator-led in-person (16.8%) and self-debriefing (15.5%) were reported less frequently. vSim® for Nursing (20.5%) was the most common SBS software used.

In addition to the overall demographics, the group demographics were included to identify similarities and differences between the groups for research question 1a. The three groups consisted of 181 (47.5%) in-person, 168 (44.1%) mixed in-person and SBS, and 32 (8.4%) SBS maternal-child clinical participants. Due to missing data, there was between 146 – 181 responses for the in-person group, 137 – 168 for the mixed group, and

26 – 32 for the SBS group. The missing data was handled the same as the overall demographic sample characteristics. All items with responses were included in data analysis. Items with missing data were only excluded from the specific analysis. The participants' with missing items were still included in analysis for which they had the necessary information.

The three groups had similar ages and grade point averages. The mean age was 22.5 for the in-person group (n = 181), 23.2 for the mixed group (n = 168), and 23.4 for the SBS group (n = 32). The mean GPA was 3.55 for the in-person group (n = 146), 3.58 for the mixed group (n = 137), and 3.60 for the SBS group (n = 23).

The three groups had rather similar nursing degree representation to the overall demographics. The overall sample consisted predominately of nursing students seeking baccalaureate (n = 327, 85.8%) and second-degrees (n = 52, 13.6%). There were only two associate degree-seeking nursing students (0.5%). Similarly, the in-person (n = 161, 89%), mixed (n = 141, 83.9%) and SBS (n = 25, 78.1%) groups had the majority of participants seeking their baccalaureate degrees. In addition, the three groups had varied representation from second-degree accelerated programs. The mixed group (n = 27, 16.1%) had the most second-degree seeking students, and the SBS group had the least (n = 7, 21.9%). However, the only two associate degree seeking participants were in the in-person maternal-child clinical group. The associate degree program was underrepresented in the entire sample. Further, the mixed and SBS groups did not have representation from the associate degree program.

The three groups' gender differed from the overall demographics (n = 381), which consisted of 31 (8.1%) male participants. The maternal-child clinical with SBS group was comprised of all (100%) female participants (n = 32) and no (0%) male participants (n = 0). While males were represented in the other two groups. The mixed group (n = 19, 11.3%) consisted of more males than the in-person group (n = 12, 6.6%) and the overall demographics (n = 31, 8.1%).

In addition, the SBS group was primarily Caucasian (n = 31) and non-Hispanic (n = 32). There was only one Asian (3.1%) represented in the SBS group. While the other two groups had more racially and ethnically diverse, they were still predominately Caucasian. For example, the in-person group had four (2.2%) African American or black and 12 (6.6%) Asian participants. While the mixed group had nine (5.4%) African American or black and six (3.6%) Asian participants. In addition, there was a slightly larger Hispanic population represented in the mixed group (n = 12, 7.1%) than the in-person group (n = 10, 5.5%).

The overall participants (n = 13, 3.4%) with past military experience were similar to the in-person (n = 6, 3.3%) and mixed groups (n = 7, 4.2%). The two groups were also similar to each other. The maternal-child clinical with SBS group did not have any participants with past military experience (n = 0, 0%).

There was a variation among the groups' previous medical experiences. The overall participants with previous medical experience (n = 323, 84.8%) was most similar to the in-person (n = 168, 92.8%) and mixed (n = 133, 79.2%) groups. The SBS group (n = 22, 68.8%) had less participants with previous medical experience than the other two groups and the overall group demographics.

The participants previous degree status' were similar to each other and the overall demographics (n = 75, 19.7%). The in-person (n = 26, 14.4%) and mixed (n = 40, 23.8%)

groups were most similar to the overall demographics. The SBS group (n = 9, 28.1%) was also rather similar to the other two groups and the overall demographics.

The three groups' participant demographics were also compared to the NLN Biennial Survey of Schools of Nursing 2019 – 2020 (National League for Nursing, 2021) to determine if the groups were representative of the national nursing population. The three group's demographics differed from this study compared to the NLN Biennial Survey results. Similar to the overall demographics, there were less males in all three groups than were represented in pre-licensure registered nurse programs (13%). There were more males represented in the mixed group (n = 19, 11.3%) than the in-person (n = 12, 6.6%) and SBS (n = 0, 0%) groups. The SBS group had no gender diversity with all female participants (n = 32, 100%). Also similar to the overall demographics, the in-person (n = 130/146, 89%), mixed (n = 118/137, 86.1%), and SBS (n = 22/26, 84.6%) groups had more nursing students under the age of 25 than were represented in baccalaureate (75.8%) and associate (38.9%) degree nursing programs. Also, more minorities were represented in pre-licensure nursing programs (27.4%) than was evident in this sample (11.3%). The in-person (11.8%) and mixed (12%) groups were similar to the overall sample. While the SBS group (3.1%) had less racial diversity than the other two groups and the NLN Biennial Survey. Even though the NLN Biennial Survey represented all United States nursing schools and this study represented only Pennsylvania, further research would benefit from more diverse groups (National League for Nursing, 2021).

Although the overall demographic variables for this sample were not an exact match to national data, they were similar. Two of the three groups for research question

1a were rather similar to the national data and each other. However, the SBS group lacked racial, ethnic, gender, and age diversity. The other demographics, such as type and amount of maternal-child clinical learning environment, previous medical experience, and grade point average, did not have national data to compare. Some of the demographics, including type and amount of maternal-child clinical learning environment, were unique to this study. Other demographics, including grade point average and previous medical experience, were compared to a previous study's findings.

As discussed in Chapter Two, Haerling (2018) compared associate degree nursing students from the United States in three simulation learning environments: SBS, high-fidelity simulation, and standardized patient simulation. Although the majority of the participants from this study's sample were seeking a bachelor's degree, the three groups from this sample (in-person $M = 3.55$; mixed $M = 3.58$; SBS $M = 3.60$) had similar grade point averages to the three groups in Haerling's (2018) study (high-fidelity simulation $M = 3.68$; standardized patient simulation $M = 3.71$; SBS $M = 3.71$). The overall grade point averages were also somewhat similar between this study ($M = 3.56$) and Haerling's (2018) study ($M = 3.69$). In addition, the three groups in this study (in-person = 92.8%; mixed = 79.2%; SBS = 68.8%) reported more past medical experience than the three groups in Haerling's (2018) study (high-fidelity simulation = 59%; standardized patient simulation = 46%; SBS = 41%). Overall, this study (84.8%) had a larger number of participants report previous medical experience than Haerling's (2018) study (59%). However, as discussed previously, this study had participants include being a nursing student as previous medical experience when the question was intended to capture the number of participants with medical experience, including nursing assistants or emergency clinicians. The following section discusses the ONSE scale reliability.

Obstetric Nursing Self-Efficacy Scale Reliability

As reported in Chapter Four, the 18-item ONSE scale was completed by 381 pre-licensure undergraduate nursing students. The Cronbach's coefficient alpha was $\alpha = .95$, indicating excellent internal consistency reliability for the scale with this sample. Cronbach coefficient alpha values above .7 are considered acceptable, above .8 are preferable, and above .9 are excellent (Pallant, 2016). There were limited studies found in the literature that assessed the ONSE scale's internal consistency reliability. These findings were consistent with a study that measured the ONSE scale's Cronbach's coefficient alpha at three different times with the same sample of undergraduate maternal-child nursing students ($\alpha = .95, .95, .94$) (Guimond et al., 2019), indicating excellent internal consistency reliability.

In addition, this study's split-half reliability coefficients (.87, .94, and .97) were consistent with Guimond and Simonelli's (2012) findings (.96, .95, and .85). The split-half reliability coefficients for this study were calculated using the simple, quarter, and odd-even split methods while Guimond and Simonelli (2012) used odd-even and random split twice. Thus, similar to Guimond and Simonelli (2012), the ONSE scale demonstrated homogeneity and reliability with this sample. The research question is discussed next.

This study investigated the impact of the maternal-child clinical learning environment on pre-licensure undergraduate nursing students' obstetric nursing self-efficacy. A non-experimental, cross-sectional, quantitative design was used; one main research question with two sub-questions was answered and is discussed below. A discussion of Bandura's works on self-efficacy and Ericsson's works on deliberate practice and how they related to this study are also included.

The main research question was: How does the maternal-child clinical learning environment impact undergraduate nursing students' obstetric nursing self-efficacy? The main research question was answered using two research sub-questions. The sub-questions and how they related to Bandura's work on self-efficacy and Ericsson's work on deliberate practice are discussed below.

Research Question 1a

Research question 1a investigated the difference in obstetric nursing self-efficacy scores between undergraduate nursing students who completed in-person maternal-child clinical, maternal-child clinical with SBS, and completed a mixture of both. The hypothesis for this sub-question stated that there was a difference in ONSE scores between undergraduate nursing students who completed in-person maternal-child clinical, those who completed maternal-child clinical with SBS, and those who completed a mixture of both. The null hypothesis stated that there was no difference in ONSE scores between undergraduate nursing students who completed in-person maternal-child clinical, maternal-child clinical with SBS, and completed a mixture of both.

Since the assumption of the equality of variances was violated for the one-way ANOVA, the non-parametric alternative, Kruskal-Wallis, was conducted to answer research question 1a (Bannon, 2013). The SBS group ($n = 32$) size was small compared to the in-person ($n = 181$) and mixed ($n = 168$) groups, which caused unequal group sizes and an ANOVA test assumption violation. The null hypothesis was rejected using the

Kruskal-Wallis test with pairwise group comparisons. As reported in Chapter Four, the Kruskal-Wallis test revealed a statistically significant difference in ONSE scores between the three groups (Gp1, n = 181: in-person, Gp2, n = 32: SBS, Gp3, n = 168: mixture), χ^2 (2, n = 381) = 9.68, p = .008. Pairwise comparisons revealed a statistically significant relationship between two of the three group comparisons.

Overall, the results indicated that prelicensure undergraduate nursing students that completed in-person maternal-child clinical (n = 181) had significantly higher ONSE scores (*Md* = 64) than those that completed maternal-child clinical with SBS (n = 32, *Md* = 59) and a mixture of both (n = 168, *Md* = 59.5). This was an expected finding, which is supported by best-practices as noted in the Healthcare Simulation Standards of Best Practice™ (INACSL, 2021a-g). However, there was no significant difference between students who completed maternal-child clinical with SBS (*Md* = 59) and those who completed a mixture of both (*Md* = 59.5). Therefore, the results indicate that in-person maternal-child clinical increases obstetric nursing self-efficacy more than both maternal-child clinical with SBS and a mixture of in-person and SBS.

The was limited literature found to compare this study's findings. This study's findings were consistent with a study published during this study's data collection period in July 2021. As discussed in Chapter Two, Leighton et al.'s (2021) study investigated prelicensure undergraduate nursing students' (n=113) perceptions of how well they learned in three clinical learning environments: in-person traditional clinical, in-person simulation, and SBS. This study was not specified to any course subject and included nursing students at any educational level from three countries: the United States, Japan, and Canada. Snowball sampling was used to recruit participants. Leighton et al.'s (2021) findings are similar to the findings of this study. Both studies found that undergraduate nursing students had significantly higher self-efficacy following traditional clinical experiences than SBS. This study investigated the maternal-child clinical learning environment, while Leighton et al. (2021) explored clinical nursing environments overall. There were no other studies found in the literature that compared SBS to in-person traditional clinical. Research question 1b is discussed next.

Research Question 1b

Research question 1b investigated how the amount of maternal-child clinical with SBS impacted undergraduate nursing students' obstetric nursing self-efficacy scores. The predictor variable was the amount of maternal-child clinical with SBS, and the response variable was obstetric nursing self-efficacy. The hypothesis for this sub-question stated that the amount of maternal-child clinical with SBS impacted undergraduate nursing students' ONSE scores. The null hypothesis for this sub-question stated that the amount of maternal-child clinical with SBS had no impact on undergraduate nursing students' ONSE scores. Using simple linear regression, the null hypothesis was rejected.

As reported in Chapter Four, the correlation between the amount of maternal-child SBS and obstetric nursing self-efficacy was statistically significant, $r(379) = -.22$, $p < .001$. This was a small effect size as a value of zero indicates no relationship at all, one a perfect positive relationship, and -1 a perfect negative relationship (Cohen, 1988). Cohen (1988) suggested that an *r* value between .10 and .29 is a small effect size, between .30 and .49 is a medium effect size, and between .50 and 1 is a large effect size (Pallant, 2016). The *r* was a negative value, which indicated a negative correlation (Pallant, 2016). Thus, as the amount of maternal-child clinical with SBS increased, the participants obstetric nursing self-efficacy decreased. These results inform maternal-child clinical SBS policy as nursing administrators and educators should ensure in-person maternal-child clinical experiences when possible.

The regression equation for predicting obstetric nursing self-efficacy from the amount of maternal-child clinical with SBS was $\hat{y}$ = 63.69 - .09x (p <.001). The results indicated that as the percentage of maternal-child clinical completed by SBS increased by 1%, the ONSE score decreased by 0.09 (p <.001). In addition, 4.8% of the variance in obstetric nursing self-efficacy was predictable from the amount of maternal-child SBS (r^2 = .048). The r^2 value reflects the proportion of the variance in one variable explained by another variable (Pallant, 2016). Thus, the relationship between the amount of maternal-child clinical with SBS and obstetric nursing self-efficacy was weak.

No other studies were found in the literature to compare the proportion of the variance between the amount of maternal-child clinical with SBS and obstetric nursing self-efficacy. The bootstrapped 95% confidence interval for the slope to predict obstetric nursing self-efficacy from the amount of screen-based simulation ranged from -0.12 to -0.05. Thus, with 95% confidence, participants' obstetric nursing self-efficacy decreased by 0.05 to 0.12 points for each one percent increase in maternal-child clinical with SBS.

Overall, the results indicated a statistically significant minimal negative relationship between the amount of maternal-child clinical with SBS and obstetric nursing self-efficacy. Similar to research question 1a, these findings are consistent with a study that found pre-licensure undergraduate nursing students perceived the SBS clinical learning environment as less beneficial than in-person simulation and traditional clinical (Leighton et al., 2021). In addition, this study and Leighton et al. (2021) found that undergraduate nursing students have significantly higher self-efficacy following in-person traditional clinical than SBS.

Results of this research relate to many core concepts of nursing, such as clinical judgement, communication, teamwork, leadership, time management, and situational awareness (American Association of Colleges of Nursing, 2021). Self-efficacy influences nearly every aspect of a nurse's practice, including the nurse's ability to think optimistically, persevere through difficulties, complete tasks (Bandura, 1977; Pajares, 2002), and advance in their nursing career (Tanner, 2006). Nursing students with high self-efficacy are more likely to attain goals and engage in clinical and cognitive skills, which are essential to thinking and acting appropriately to provide safe patient care. SBS allows nursing students to practice nursing care in a safe learning environment. Ideally SBS improves nursing students' self-efficacy, validates positive self-efficacy beliefs, and corrects overconfidence (Bandura, 1980; Bandura, 2004; Mabry et al., 2020). However, this study and previous SBS studies' findings vary, which makes it hard to conclude if SBS is an appropriate alternative to in-person traditional clinical.

There were studies conducted that investigated the SBS clinical learning environment as a supplement (Gu et al., 2017) and as an alternative to traditional lecture (Leflore et al., 2012), skills lab (Durmaz et al., 2012), and a self-study module (Menzel et al., 2014). Both Gu et al. (2017) and Leflore et al. (2012) found that SBS significantly increased nursing students' knowledge scores but did not use SBS to replace traditional clinical. There were varying results regarding clinical performance (Durmaz et al., 2012; Gu et al., 2017; Leflore et al., 2012). In addition, there were no significant differences found in cognitive skills between SBS and other learning environments (Durmaz et al., 2012; Menzel et al., 2014). However, this study found nursing students who completed in-person maternal-child clinical had significantly higher self-efficacy than those who completed maternal-child clinical with SBS and a mixture of both in-person clinical and SBS.

Based on the results of this study, in-person maternal-child clinical should be provided to nursing students. SBS should be used cautiously, sparingly, and implemented using evidence-based guidelines. If the in-person maternal-child nursing clinical environment is interrupted in the future and SBS is used as a replacement, nursing educators should encourage students to use alternative learning strategies such as deliberate practice. In addition, nurse educators' should provide support before, during, and after SBS. Further, SBS development, facilitation, and debriefing should follow evidence-based simulation guidelines. Simulation experts are encouraged to develop evidence-based guidelines for SBS.

Hayden et al. (2014) found that prelicensure undergraduate nursing students who had 25% and 50% of traditional clinical hours replaced with high-quality simulation had similar knowledge, clinical competency, and NCLEX pass rates to those who completed in-person traditional clinical in the seven core nursing courses, including maternal-child clinical. However, Hayden et al. (2014) did not investigate the SBS clinical learning environment. In contrast to SBS research, in-person simulation research using manikins or standardized patients had positive outcomes.

There was limited research found in the literature that compared replacing traditional clinical hours with SBS. A study was found that was published during this study's data collection. Leighton et al. (2021) found that prelicensure undergraduate nursing students perceived in-person simulation better at meeting their learning needs than SBS. Although different tools and techniques were used, comparisons can be made. Both studies found that prelicensure undergraduate nursing students' self-efficacy was significantly higher following in-person traditional clinical than SBS.

Together, this study and Leighton et al.'s (2021) study findings challenge previous studies that suggested high-fidelity simulation may have limited educational advantages over SBS (Bonnetain et al., 2010; Bracq et al., 2019). Further inquiry is suggested as SBS may have significant cost savings as well as allow students to practice multiple times such as deliberate practice, which may be optimal for teaching and learning in pandemic situations.

Furthermore, no research reports were found that replace prelicensure undergraduate nursing students' traditional maternal-child clinical hours with SBS experiences. This is concerning as SBS continues to be used throughout the nursing program. The impact of the maternal-child clinical learning environment is needed to guide best practices. Specifically, there is a need to develop best practices related to maternal-child clinical with SBS. Therefore, this study contributes to empirical evidence on self-efficacy, the impact of the maternal-child clinical learning environment, and SBS.

Self-Efficacy and Deliberate Practice

The conceptual framework used for this study involved Bandura's work on self-efficacy and Ericsson's work on deliberate practice. According to this conceptual model, self-efficacy is influenced by physiological feedback, verbal persuasion, vicarious learning, and performance outcomes (Bandura, 1977). Self-efficacy may increase as an individual engages in deliberate practice. Although, deliberate practice relies on a motivated learner to define a goal, practice, receive immediate feedback, engage in self-reflection, redefine the goal, and repeat the cycle to move from novice to mastery performance (Ericsson, 2008; Ericsson et al., 1993; Mabry et al., 2020). The goal is to build nursing students' self-efficacy for applying quality nursing care to patients by improving knowledge, skills, and attitude through deliberate practice using SBS.

There were 200 participants in this study who had the opportunity to increase self-efficacy through deliberate practice using SBS. Specifically, 32 participants reported completing maternal-child clinical with 100% SBS, and 168 participants completed a mixture of SBS and in-person traditional clinical. The participants had varying amounts of maternal-child clinical with SBS ranging from 0% to 100%.

Participants were also categorized into three maternal-child clinical learning environments, including in-person traditional clinical, SBS, and a mixture of both. Although SBS increased nursing students' self-efficacy through hands-on experience, immediate feedback, peer modeling, and deliberate practice in a psychologically safe environment (Bandura, 1977; Franklin & Lee, 2014; Lundberg, 2008; Mabry et al., 2020), the findings from this study suggest that nursing students gain less self-efficacy from maternal-child clinical with SBS than in-person clinical experiences. This is concerning considering SBS is being used increasingly as a replacement or supplement for in-person traditional clinical, and self-efficacy is expected to transfer into the nurse's future clinical nursing practice.

This study was non-experimental with an uncontrolled environment; therefore, there were unknown clinical environment variables. These unknown variables included the quality of both the SBS experience and debriefing, amount and quality of deliberate practice, and level of student engagement. SBS should follow evidence-based guidelines for simulation and debriefing. This study did not collect data on SBS quality and debriefing and how much students engaged in deliberate practice during SBS. In addition, this study did not collect data on whether SBS was used as a supplement to clinical learning, a graded activity, or pass or fail. The results could be impacted by whether or not SBS affected the participants' clinical grade. Also, data collection occurred during pandemic conditions. Therefore, nursing faculty and simulation specialists may not have been adequately prepared to deliver high-quality SBS experiences. Further, nursing students may have felt isolated due to pandemic conditions. These unknown variables may have impacted nursing students' self-efficacy.

While SBS provides many opportunities to build self-efficacy through deliberate practice, there are also many hands-on nursing skills that traditional in-person clinical gives students real-life experiences. The in-person traditional clinical environment provides many hands-on learning opportunities for nursing students, which offers the opportunity to develop self-efficacy through deliberate practice. Students can experience routine maternal-child nursing care. For example, students experience activities of daily living, including newborn baths and feeding, medication administration, newborn and maternal assessments, including vital signs, and cognitive skills, such as teamwork and communication. The hands-on experience gained with traditional in-person experiences is irreplaceable.

Unfortunately, many factors affect nursing students' ability to provide continuity of care in traditional clinical settings. These factors include lack of clinical hours, patient census, and discharges. In addition, students experience a lack of exposure to rare or emergent maternal, fetal, and newborn situations, such as uterine abruption, umbilical cord prolapse, shoulder dystocia, neonatal resuscitation, and postpartum hemorrhage. Also, the COVID-19 pandemic is a barrier to the in-person traditional clinical environment that continues to impact the clinical learning environment. The pandemic can restrict students from attending the in-person clinical setting through government mandates and individual healthcare facility or nursing school restrictions. This is concerning as the findings from this study challenge the conceptual model's goal of increasing self-efficacy through deliberate practice using SBS.

Three studies in the literature were related to self-efficacy and the maternal-child SBS environment. None of these studies investigated replacing in-person traditional clinical with SBS. Instead, these studies investigated self-efficacy and the debriefing method with SBS (Michelet et al., 2020), high-fidelity simulation versus SBS (Cobbett & Snelgrove-Clarke, 2016), and deliberate practice with SBS (Barre et al., 2020). Cobbett & Snelgrove-Clark (2016) found no difference in self-efficacy between obstetric SBS and high-fidelity simulation; Barre et al. (2020) found SBS with deliberate practice increased self-efficacy; Michelet et al. (2020) found computer debriefing was better than no debriefing. The practice of no debriefing is not following evidence-based practice for simulation in nursing education. While the above studies examined self-efficacy following maternal-child SBS, none specifically examined obstetric nursing self-efficacy following SBS. Furthermore, none of these studies examined self-efficacy after replacing traditional clinical hours with SBS. In addition, only one study examined self-efficacy in prelicensure undergraduate nursing students.

This study, similar to Leighton et al. (2021), found that prelicensure undergraduate nursing students had significantly lower obstetric nursing self-efficacy following maternal-child SBS than students who completed in-person traditional clinical. In addition, this study found a significantly weak, negative, or inverse relationship between obstetric nursing self-efficacy and the amount of SBS. As the amount of SBS increased, obstetric nursing self-efficacy decreased. These findings are concerning considering self-efficacy is an expected outcome of simulation in nursing education, and simulation outcomes are expected to transfer into the nurse's future clinical nursing practice.

Overall, Bandura's work on self-efficacy and Ericsson's deliberate practice guided this study. Participants who completed maternal-child clinical with SBS had the opportunity to increase their self-efficacy through deliberate practice with SBS. However, the students who completed in-person traditional clinical had the opportunity to increase self-efficacy through deliberate practice in real-life settings. The findings from this study challenge the conceptual model and the ability to adequately increase nursing students' obstetric nursing self-efficacy through deliberate practice using SBS. This study found that participants who completed in-person maternal-child clinical had significantly higher obstetric nursing self-efficacy scores than those who completed maternal-child clinical with SBS. Although, the study environment was not controlled as this was a non-experimental study.

The pandemic continues to impact clinical education, leaving nursing faculty and simulation experts reliant on SBS. Maternal-child clinical with SBS is a newer clinical learning environment. Thus, attention should be given to improving the maternal-child

SBS clinical learning environment. This study adds to the body of literature relating to self-efficacy, SBS, and the maternal-child clinical learning environment; however, limitations were identified and are discussed below.

Limitations

The findings of this study contribute to the literature, but some limitations were evident. The first limitation involves the generalizability of the study. Data was collected from nursing schools solely in Pennsylvania, limiting the generalizability at the national and international levels. Another influence on the generalizability of the findings was the sample's demographic characteristics. When compared to the NLN Biennial Survey of Nursing Schools (National League for Nursing, 2021), the demographics of this study varied. In addition, the demographics between the maternal-child clinical groups for research question 1a varied between each other and when compared to the NLN Biennial Survey. These differences may influence the results and the ability to generalize the findings.

Additionally, this was a non-experimental study design with no control group or randomization. Experimental studies with control groups provide more robust support for or against the tested intervention. Studies that use a more rigorous design can better solidify the evidence that the clinical learning environment impacts self-efficacy.

The next limitation involved the time frame of the study. During summer break, data collection began in June 2021 for many nursing students. This may have resulted in a lower response rate from program coordinators, course coordinators, and nursing students. To help with this limitation, data collection was extended until November 2021. Also, there was difficulty recruiting students from associate degree nursing programs due to graduation timing. Many associate degree nursing programs, otherwise eligible, graduated students in May 2021, a month before this study's data collection period. Further, many participants completed maternal-child clinical during their third year of study and the survey during their fourth year of study. However, not all participants completed the study's survey at the same time or spot in their program or course of study. In addition, time elapsed between the actual maternal-child clinical experience to the completion of the survey. This may have impacted participants ability to accurately think back to the maternal-child clinical experience. The results may have been impacted differently if participants were able to complete the survey immediately after finishing maternal-child clinical. The participants had different lengths of time between the end of their maternal-child clinical experience and completing the survey. Also, participants could have experienced other educational activities between the end of maternal-child clinical and completing the survey and previous educational experiences were unknown, which could have influenced the results of this study.

An additional limitation involved the sample size of the SBS group. While the overall sample (n = 381) was sufficient and from multiple sites, there were only 32 participants in the SBS group. The small group size resulted in a violation of the ANOVA assumptions for research question 1a. Thus, the Kruskal-Wallis test, an alternative non-parametric method, answered research question 1a. This small group sample size also affected the results of research question 1b. However, the small group sample size did not violate the assumptions for the simple linear regression test used to answer the question. Both research questions 1a and 1b would benefit from a larger SBS group sample size.

In addition to the small sample size, the SBS group lacked diversity as the group was entirely female (n = 32), non-Hispanic (n = 32), and mostly Caucasian (n = 31). There was only one Asian participant represented. Thus, a more diverse SBS group would benefit future research. Further, demographic characteristics that are more representative to the national data and consistent between groups would be beneficial.

Another limitation involved missing data points. There were several demographic items with missing data points. The online survey controls were used for this study to prevent missing data on the ONSE scale, amount of SBS, and type of clinical learning environment. This can be prevented in future studies by setting survey controls that require participants to answer the questions before proceeding or submitting the survey.

The final limitation noted involved unknown clinical environment variables. This study had a non-experimental study design. Data was collected in an uncontrolled environment during a pandemic. Therefore, nursing faculty and simulation specialists may not have been adequately prepared to deliver high-quality SBS experiences. Some educators had to adapt quickly with little or no training or background on this type of learning environment. Further, nursing students may have felt isolated due to pandemic conditions. In addition, there were other unknown variables, including the quality of both the SBS experience and debriefing, the amount and quality and standardization of students' deliberate practice, the level of student engagement, and if the SBS was a graded activity, pass or fail, or used as a learning supplement. SBS should follow evidence-based guidelines for simulation and debriefing. This study did not collect data on the SBS quality, debriefing quality, how much students were engaged in deliberate practice during SBS, and if SBS was graded. These unknown variables may have impacted nursing students' self-efficacy. A study design that provides an experimental design with a control group may help eliminate some unknown clinical learning environment variables. Even though there are some limitations, the findings offer essential considerations for nursing education.

Implications

The purpose of this study was to investigate the impact of the maternal-child clinical learning environment on prelicensure undergraduate nursing students' obstetric nursing self-efficacy. This study's results suggest that the maternal-child clinical learning environment impacts prelicensure undergraduate nursing students' obstetric nursing self-efficacy. Results from sub-research question 1a indicate that prelicensure undergraduate nursing students' obstetric nursing self-efficacy is significantly higher with in-person maternal-child clinical than with SBS and a mixture of both clinical learning environments. Results from sub-research question 1b indicate a statistically significant minimal negative relationship between the amount of maternal-child SBS and obstetric nursing self-efficacy. While these findings are supported with current standards of best-practice, this study informs and demonstrates the value of measuring SBS quantity to inform best teaching and learning strategies. Based on these findings, providing nursing students with in-person maternal-child clinical experiences, and improving maternal-child clinical with SBS is essential. These findings are meaningful for nurse administrators, simulation experts, and nurse educators and are discussed below.

Nurse administrators, simulation experts, and nursing faculty need to ensure high-quality maternal-child clinical learning experiences. Since in-person maternal-child clinical increases obstetric self-efficacy more than SBS and mixed experiences, opportunities for in-person maternal-child clinical should be included. There are barriers that administrators and faculty face in coordinating in-person maternal-child clinical. The obstacles include limited access to clinical sites and competition with other schools. Recently, nursing administrators, faculty, and simulation experts have faced restrictions due to the COVID-19 pandemic. Next, further recommendations for nurse administrators, simulation experts, nursing faculty, and nursing students are discussed.

Recommendations

According to the study's findings, the maternal-child clinical learning environment impacts undergraduate nursing students' obstetric nursing self-efficacy. Specifically, this study found that prelicensure undergraduate nursing students who completed in-person traditional maternal-child clinical had significantly higher obstetric nursing self-efficacy than students who completed SBS or a mixture of both. Further, there was no significant difference between students who completed maternal-child clinical with SBS and those who completed a combination of both. In addition, this study found a significantly weak negative relationship between obstetric nursing self-efficacy and the amount of SBS. As the amount of SBS increased, obstetric nursing self-efficacy decreased. These findings point to a need to investigate the amount of SBS to be included in high-quality nursing education.

Supported by the findings of this study, in-person care experiences with actual patients are the most important component of clinical education (American Association of Colleges of Nursing, 2021). This study's results differed from the NCSBN landmark study (Hayden et al., 2014), which found up to 50% of clinical experiences can be replaced with high-quality simulation. Although, the NCSBN study did not investigate the SBS clinical learning environment. All direct care experiences should not be replaced with SBS. Thus, maternal-child clinical with SBS needs further research and is recommended only when it meets standards for high-quality simulation. Regulatory agency and simulation guidelines should be used to guide the quality and amount of SBS appropriate to use in nursing education. Further, SBS should only be used to replace in-person traditional clinical when operationally necessary.

While SBS offers nursing students the opportunity to deliberate practice in a safe learning environment, in-person traditional clinical provides students with hands-on experience with daily routine nursing care. In-person traditional maternal-child clinical provides nursing students with experience assessing antepartum, laboring, postpartum, and neonatal patients, assisting with infant nutrition, administering adult and infant medications, and providing patient education. There is also the opportunity to experience handling, diapering, swaddling, and bathing infants. Further, in-person traditional clinical provide the chance to build teamwork and communication skills. The hands-on experience provided in the traditional maternal-child clinical is irreplaceable and provides clinical decision-making and judgement opportunities.

Recommendations emerging from the results of this study were formulated and are congruent with several vital documents related to simulation. These suggestions are of utmost importance since nursing programs continue to use an increasing amount of SBS. Unfortunately, COVID-19 continues to impact the clinical learning environment. Pandemic occurrences are increasing as viewed through a trended lens. Thus, nursing faculty are encouraged to explore alternatives to traditional in-person clinical learning environments in case nursing is negatively impacted in the future. However, SBS may need to be used in various amounts by nursing faculty to meet clinical learning needs. The following section includes recommendations for nurse administrators, simulation experts, nursing faculty, and nursing students. The need for future research is also indicated at the conclusion of this section.

Nurse Administrators

The findings from this study offer nurse administrators several recommendations. Nurse administrators are leaders and at the forefront of ensuring high-quality nursing education. Nurse administrators should collaborate with faculty and simulation experts to develop strategies to enhance educational practices. The quality of SBS was not determined in this study but could impact the student experience outcome, therefore, SBS polices and practice guidelines should be considered. Nurse administrators and simulation experts should work together to develop SBS policies, which are needed to guide regulatory bodies decisions. Further, nurse administrators should ensure that the simulation expert(s) and faculty work together to ensure students' high-quality SBS experiences. SBS is a newer clinical learning environment. Thus, there were no specific evidence-based guidelines found in SBS literature. However, the Healthcare Simulation Standards of Best Practice™ provide evidence-based practice guidelines for all simulation-based experiences, including SBS (INACSL Standards Committee et al., 2021a-g). The guidelines are living documents that are updated based on research findings.

According to the Healthcare Simulation Standards of Best Practice™ guidelines (INACSL Standards Committee et al., 2021a), the nurse administrator should support and maintain SBS system operations. A strategic plan should be implemented that coordinates and aligns SBS to achieve program goals. In addition, nurse administrators should ensure that simulation experts and nursing faculty work together to improve maternal-child clinical with SBS experiences. Nurse administrators should ensure that simulation experts and nursing faculty are provided with the appropriate expertise to support and sustain SBS. This includes budgeting and providing funding for attending conferences and training to ensure that simulation experts and nursing faculty can meet the expectations to deliver high-quality SBS. Nurse administrators should ensure that simulation experts and nursing faculty develop and use a formal process for integrating SBS into nursing courses. Ideally, SBS should be used when it is the best learning environment to meet the learning objectives and outcomes. Also, SBS may be used when there are barriers to in-person clinical opportunities such as a make-up assignment or limited number of students permitted on the clinical unit.

According to the INACSL Healthcare Simulation Standards of Best Practice™, modalities, such as low- or high-fidelity, standardized patient, or SBS, should be selected to meet the learning objectives and outcomes. In addition, the guidelines state that fidelity, including the physical environment, and facilitation should be chosen based on meeting the learning objectives and outcomes of the simulation. Thus, SBS should be used when it best meets the learning objectives and outcomes (INACSL Standards Committee et al., 2021e). This is concerning due to the potential uncontrollable barriers that may impact the in-person traditional clinical learning environment, such as the COVID-19 pandemic.

Further, this study's results indicate SBS may be better suited as a supplement to maternal-child traditional clinical experiences rather than as a replacement to increasing obstetric nursing self-efficacy. Therefore, in-person maternal-child clinical experiences remain essential for nursing students' self-efficacy. Nurse administrators should do their best to continue in-person maternal-child clinical experiences for nursing students when possible and encourage nursing faculty to seek in-person clinical experiences when barriers do exist.

Also, nurse administrators should ensure that simulation experts and nursing faculty are establishing and following clear policies and procedures that support and sustain SBS and align with program goals and outcomes. The policies and procedures should include contingency plans for unanticipated events, such as a pandemic, individual learner accommodations, and connectivity issues (INACSL Standards Committee et al., 2021a).

Simulation Experts

Simulation experts play an essential role in ensuring high-quality SBS experiences for students. Thus, recommendations were also formulated for simulation experts. The results of this study suggest in-person maternal-child clinical is best but there is limited data on the SBS specifics that the literature supports these practices, including the prebrief and debrief. Simulation experts should ensure that SBS design follows best practice standards and is developed in consultation between nursing faculty and simulation experts. A needs assessment should be conducted to provide evidence requiring the SBS experience. Also, simulation experts should be part of curricular changes to help identify integration of simulation-based activities. Measurable objectives should be developed that build upon the nursing student's knowledge. SBS is best used when it aligns with learning objectives and not when needed to be used due to in-person traditional clinical barriers, such as the COVID-19 pandemic.

The learning objectives and outcomes, as well as the nursing students' level of knowledge, experience, and competency, should drive a learner-centered facilitative approach (INACSL Standards Committee et al., 2021d; INACSL Standards Committee et al., 2021f). A structure should be developed that guides nursing students to work together, understand the learning objectives, and develop a plan to achieve the desired outcomes. In addition, the simulation expert should be a competent facilitator, an individual responsible for managing simulation experiences. Further, simulation experts should assist nursing faculty with becoming competent facilitators. Simulation experts and nursing faculty as facilitators are responsible for obtaining skills and knowledge in SBS pedagogy.

Also, the facilitator should include prebriefing to prepare nursing students for the SBS experience (INACSL Standards Committee et al., 2021f). Prebriefing is essential for nursing students' success and may enhance debriefing and reflection. Simulation experts should be knowledgeable about the SBS scenario and competent in prebriefing. Prebriefing should be developed according to the learning objectives and outcomes of the SBS and nursing students' experience and level of knowledge (INACSL Standards Committee et al., 2021d). Simulation experts should assist nursing faculty in developing a prebriefing plan that includes preparation materials and guiding participants' success in the SBS (INACSL Standards Committee et al., 2021d). The facilitator should be available during the SBS experience to provide nursing students with cues aimed to assist them in achieving the expected outcomes.

In addition to prebriefing, facilitation should include a debriefing session to support nursing students in achieving the expected learning objectives and outcomes (INACSL Standards Committee et al., 2021b; INACSL Standards Committee et al., 2021f). The prebriefing and debriefing process promotes and enhances the learning process and supports the transfer of knowledge, skills, and attitudes while promoting self-efficacy (INACSL Standards Committee et al., 2021b). Prebriefing and debriefing should be designed and facilitated by an individual or system competent in providing appropriate debriefing and should be purposefully structured based on theoretical frameworks or evidence-based concepts. Further, prebriefing and debriefing should be conducted in a manner that promotes analysis of the self, team, or systems while promoting reflection in a safe and confidential learning environment (INACSL Standards Committee et al., 2021b).

The simulation expert should assist nursing faculty with learning and following evidence-based SBS facilitation methods, including developing and implementing a debriefing plan. Simulation experts and/or nursing faculty should support students before, during, and after the SBS experience as they may need support following the debriefing (INACSL et al., 2021f). Further, simulation experts should ensure that SBS is pilot tested before implementation. A plan needs to be developed for nursing students to evaluate the SBS experience allowing for quality improvement (INACSL Standards Committee et al., 2021g).

Initial and ongoing SBS professional development activities should be completed to stay current with new knowledge, provide high-quality simulation experiences, and meet nursing students' educational needs (INACSL Standards Committee et al., 2021c).

This includes completing a professional educational needs assessment with a gap analysis, participating in professional development activities, and regularly reevaluating the professional development plan using formative and summative methods by the individual and their organization (INACSL Standards Committee et al., 2021c). Simulation experts should develop an individualized plan to increase competencies related to SBS, such as attending local, regional, national, or international simulation conferences, completing online or in-person training, and participating in regional networks (INACSL et al., 2021a). Further, simulation experts should share their resources and skills with other members of the simulation community and nursing faculty (INACSL Standards Committee et al., 2021a).

Simulation experts should assist nursing faculty in implementing best practices for SBS. A plan should be developed to provide regularly scheduled SBS competency-based training to nursing faculty using SBS. Simulation experts should maintain the SBS competency-based training to assist nursing faculty in providing students with high-quality SBS experiences by following best practices for prebriefing, facilitation, and debriefing (INACSL et al., 2021a).

Students should be engaged in deliberate practice when using SBS. Simulation experts should encourage nursing faculty to engage students in deliberate practice. SBS increases nursing students' self-efficacy and level of mastery through deliberate practice (Mabry et al., 2020). Deliberate practice is a model that can structure effective practice and the learning needs necessary to meet an individual's desired outcomes (Ericsson, 2009; Ericsson et al., 1993). SBS allows students to learn and practice essential concepts and experience rare, limited, or not available to practice in maternal-child clinical cases.

In addition, through SBS, students can practice and master cognitive skills that teach them how to "think like a nurse" (Li et al., 2019; Mitchell & Boyer, 2020; Turkelson et al., 2020; Yeh et al., 2019). Deliberate practice with SBS increases learners' psychomotor and cognitive nursing skills, which are necessary for individuals to become successful, competent nurses (Ericsson, 2004; Ericsson, 2015; Issenberg et al., 2005; McGaghie, 2008).

Simulation experts and nursing faculty should provide purposeful, repetitive, and extended practice with instructor feedback to motivate nursing students, increase their performance, and help prevent skill growth stagnation ((Ericsson, 2004; Ericsson, 2008; Ericsson et al., 1993). Further, simulation experts should teach deliberate practice techniques to nursing faculty, who then teach students. Nursing students should be provided with real-time, immediate feedback and debriefing with time for reflection in a low-stakes environment (Mitchell & Boyer, 2020). Immediate feedback allows nursing students to process problem-solving, reevaluate, and set goals to improve performance. Then students repeat the SBS to enhance their performance. In addition, real-time feedback during the SBS experience provides an external driver for nursing students to perform well. Formative and summative assessments should be used to motivate nursing students through external drivers to improve their performance. Deliberate practice provides nursing students with opportunities to develop and reinforce cognitive muscle memory for knowledge, skills, and attitudes to transfer high-quality, safe patient care into future clinical practice.

This study's findings suggest that in-person traditional clinical experiences increase maternal-child nursing students' obstetric self-efficacy significantly better than

SBS or a mixture of both clinical learning environments. This is similar to previous studies that found SBS was recommended as preparation for high-fidelity simulation and in-person traditional clinical experiences but not as a replacement (Bracq et al., 2019; Bonnetain et al., 2010; National League for Nursing, n.d.). SBS with deliberate practice was used to learn procedural knowledge (Bonnetain et al., 2010; Mitchell & Boyer, 2020), but not to necessarily improve nursing students' hands-on skill performance (Gu et al., 2017). Thus, SBS is recommended for use in maternal-child nursing education when it is the best learning environment to meet the learning objectives and outcomes.

Finally, simulation experts are challenged to develop best practice guidelines to guide SBS further. While INACSL Healthcare Simulation Standards of Best Practice™ provide guidelines for all simulation-based experiences, simulation experts, nursing faculty, nursing students, and patient outcomes would benefit from further evidence-based SBS guidance. This is especially true considering the increasing use of SBS in maternal-child clinical nursing education and the findings from this study.

Nursing Faculty

Further recommendations were formulated for nursing faculty. As mentioned in the previous section, nursing faculty should also follow evidence-based guidelines for SBS. Nursing faculty should seek in-person learning opportunities and only implement SBS as needed. Considerations are needed when integrating SBS to ensure a high-quality experience that will enhance learning. INACSL Healthcare Simulation Standards of Best Practice™ provide evidence-based guidelines for simulation experiences, including SBS (INACSL Standards Committee et al., 2021d; INACSL Standards Committee et al., 2021f). In addition, nursing faculty should support nursing students before, during, and after SBS to support expected learning objectives and outcomes. Also, nursing faculty should develop skills for being competent facilitators, including competencies in prebriefing and debriefing (INACSL Standards Committee et al., 2021b; INACSL Standards Committee et al., 2021d). The facilitator's role is to assist participants in developing their clinical and cognitive skills and explore thought processes in problem-solving, critical thinking, clinical reasoning, and clinical judgment (INACSL Standards Committee et al., 2021f). A psychologically safe SBS environment should be created for nursing students, and they should be encouraged to engage in deliberate practice. For example, nursing faculty may require students to repeat the SBS until a minimum or set score is achieved as a prerequisite for other skills, such as in-person skills or simulation, patient care, clinical remediation, and other activities. The goal is for nursing students to apply their learned knowledge, skills, and attitudes to future patient care encounters to provide high-quality, safe care.

Nursing Students

Several recommendations were formulated for nursing students. SBS provides nursing students with the opportunity to practice rare or difficult skills for students to practice in a clinical setting due to low occurrences. Nursing students should be provided with SBS software training, including orientation for first time users. Students should be self-motivated and engage in a cycle of deliberate practice towards a well-defined goal, receive immediate feedback, self-reflect on their performance to reset practice goals, and continue to engage in deliberate practice while focusing on achieving the revised goals (Ericsson, 2008; Ericsson et al., 1993; McGaghie et al., 2011; Yeh et al., 2019). Nursing students should be encouraged by simulation experts and nursing faculty to engage in deliberate practice, but students should also be self-motivated. SBS provides opportunities for deliberate practice, which provides nursing students with the opportunity to improve performance and apply their knowledge to provide high-quality, safe patient care (Mabry et al., 2020).

Future Research

Research regarding the impact of the clinical learning environment on nursing students' self-efficacy has varied regarding the clinical learning environment, the course or subject, and the program level examined. Studies examining SBS and obstetric self-efficacy have focused on computer debriefing versus no debriefing, improvement between first and second attempts, and comparing SBS to other clinical learning environments. The research related to this topic is sparse; therefore, suggestions for future research are provided.

Replicated studies are warranted to confirm or refute these findings. By utilizing different sampling techniques, such as a regional, national, or international sample, generalizability can be enhanced. Furthermore, an experimental design using random sampling and a control group could provide more evidence on this topic. Also, further research is needed regarding examining other program levels, including additional subjects, to determine if the findings are consistent across the course and program levels. Furthermore, more research is needed with a larger SBS sample size. In other words, a larger number of participants in the SBS group is recommended. The maternal-child clinical SBS group in this study only had 32 participants. Thus, more participants in the SBS group would add to the literature. In addition, research would benefit from a more diverse SBS group as the SBS group in this study was entirely female ($n = 32$), non-

Hispanic (n = 32), and mostly Caucasian (n = 31). The literature would benefit from larger group sizes that have more racial, ethnic, gender, and age diversity, especially among the SBS group.

Additionally, the amount of SBS that is appropriate in maternal-child clinical education needs explored further. This study found that the in-person maternal-child clinical learning environment increased obstetric nursing self-efficacy more than SBS and a mixture of both learning environments. Thus, the quantity or amount of SBS that is appropriate for high-quality maternal-child clinical nursing education should be further investigated. This research would inform regulatory bodies decisions regarding the amount of SBS appropriate to include in high-quality nursing education.

Further research is recommended to include additional nursing courses and compare them regarding the impact on the clinical learning environment. It would be beneficial to include students from multiple nursing courses to see if other subjects are similar to the maternal-child clinical learning environment. Also, nursing students in different courses may rate self-efficacy following SBS clinical learning environment differently than maternal-child clinical.

Therefore, additional research is needed using a random, large sample size from multiple sites, including a regional, national, or international sample that examines the impact of the maternal-child clinical learning environment, particularly SBS, on nursing students' obstetric nursing self-efficacy. Additional research should include experimental studies similar to the NCSBN landmark study. Therefore, further studies are needed that, like this study, examine the impact of the maternal-child clinical learning environment on prelicensure undergraduate nursing students' self-efficacy.

In addition, further research is needed to investigate additional outcomes. For example, nursing students' knowledge, clinical skills, NCLEX pass rates, teamwork, and the long-term effects of using SBS for the clinical learning environment need further exploration. Also, areas identified in *the Essentials: Core Competencies for Professional Nursing Education* should be explored as they relate to SBS, including communication, clinical judgement, safety, professionalism, quality, person centered care, informatics, health policy, leadership development, and evidence-based practice.

Other essential research involves the personal variables that may influence the impact of the maternal-child clinical learning environment. Future studies should explore the effects of previous healthcare experience on the maternal-child clinical learning environment. Further, the type of prior healthcare experience and the impact on the maternal-child clinical learning environment should be investigated. Also, personal variables, such as age, previous degree, type of the previous degree, past military experience, grade point average, year in nursing school during maternal-child clinical, and type of nursing degree being sought should be researched regarding the impact on the maternal-child clinical learning environment.

Finally, other unknown variables need to be studied further. The SBS maternal-child clinical learning environment should be compared to both the in-person traditional and high-fidelity simulation clinical learning environments. Further research is recommended on the type of SBS software used and nursing students' self-efficacy. Research on self-debriefing, computer debriefing, and debriefing with and without a facilitator during SBS will add to the literature. Also, SBS debriefing following evidence-based practice methods should be investigated.

Overall, several gaps remain in this area. Conclusions on the impact of the maternal-child clinical learning environment on undergraduate nursing students' obstetric nursing self-efficacy are preliminary. Further research using rigorous study methods would ensure confidence in this study's findings. Future research will add to the literature on SBS and the maternal-child clinical learning environment.

Conclusions

In conclusion, this study adds to the literature regarding the maternal-child clinical learning environment and SBS. The implications and recommendations were discussed. Results revealed that obstetric nursing self-efficacy might be impacted by the maternal-child clinical learning environment and the amount of maternal-child clinical with SBS. Further, results indicated that in-person maternal-child clinical increased undergraduate nursing students' obstetric self-efficacy significantly more than maternal-child clinical with SBS or a mixture of both clinical learning environments. Also, results indicated that undergraduate nursing students' obstetric self-efficacy decreased as the amount of maternal-child clinical with SBS increased. These findings lead to questions on not only SBS quality but on the amount of SBS appropriate in high-quality nursing education. Future research is recommended on exploring SBS. Specifically, more exploration on SBS quantity to inform nursing faculty and regulatory bodies' decisions on the amount of SBS appropriate in high-quality nursing education. Future research would be enhanced by exploring communication, clinical judgement, professionalism, person center care, leadership development, and informatics (American Association of Colleges of Nursing, 2021). Many gaps in the maternal-child clinical learning environment remain and need to be studied to formulate best practices for high-quality maternal-child clinical with SBS experiences.

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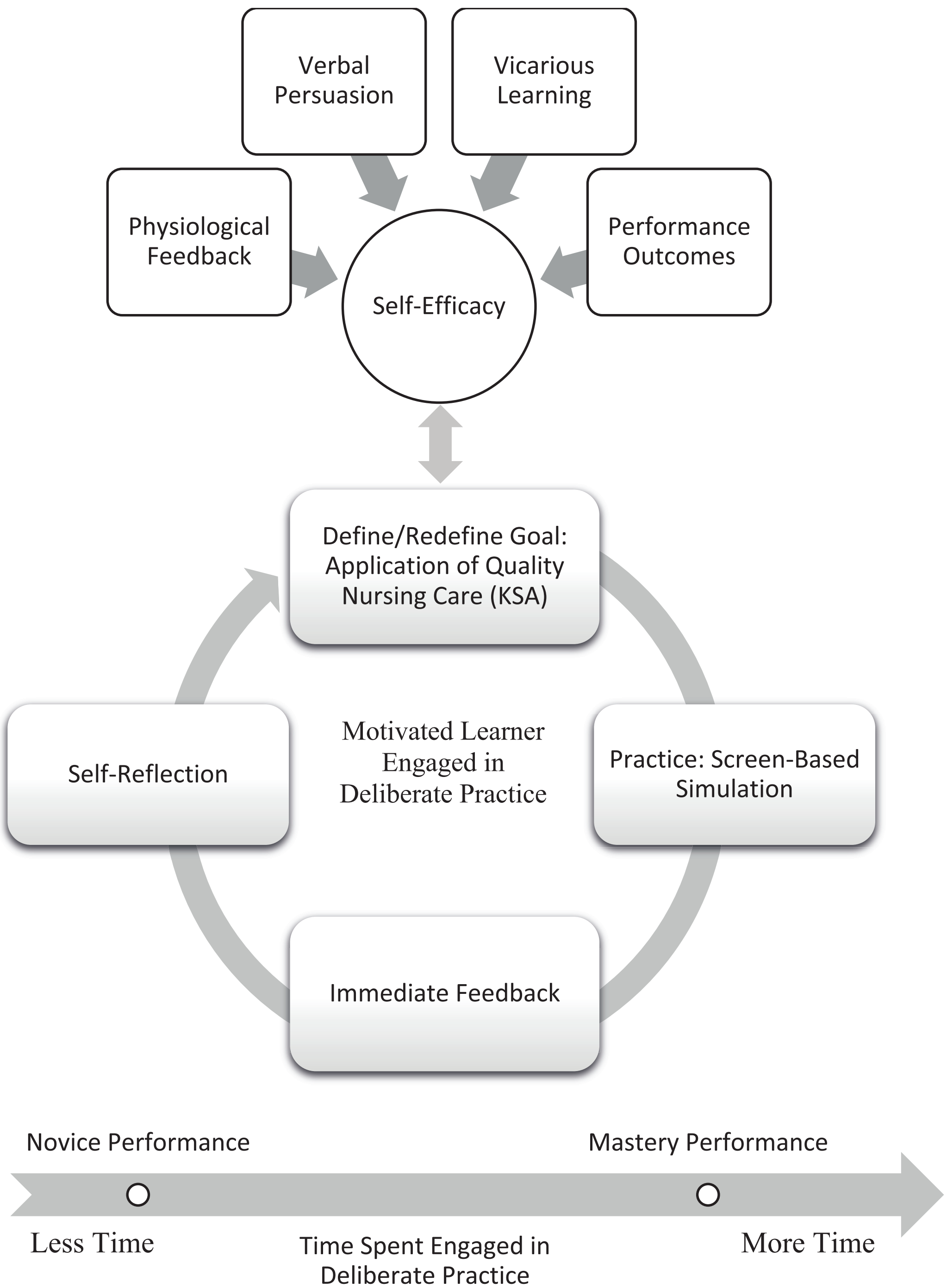
Appendix A

Conceptual Model to Guide Screen-Based Simulation



Note: This model shows self-efficacy and deliberate practice frameworks combined to guide the study. Self-efficacy is influenced by physiological feedback, verbal persuasion, vicarious learning, and performance outcomes (Bandura, 1977). Self-efficacy may increase as an individual engages in deliberate practice. Deliberate practice relies on a motivated learner to define a goal, practice, receive immediate feedback, engage in self-reflection, redefine the goal, and repeat the cycle to move from novice to mastery performance (Ericsson, 2008; Ericsson et al., 1993; Mabry et al., 2020). The goal is to build nursing students' self-efficacy for applying quality nursing care to patients by improving knowledge, skills, and attitude (KSA) through deliberate practice using screen-based simulation.

Appendix B

Non-Simulation Learning Methods Versus SBS Literature Review Matrix

Citation	Purpose and Design	Sample and Instrument	Results	Knowledge, Skills, and Attitude Gaps/Notes
Durmaz et al., 2012)	To examine the effect of SBS on knowledge, skill, and the clinical decision-making process in teaching pre-operative and postoperative care management Randomized controlled trial SBS developed by researchers	N=82 2nd year undergraduate nursing students Control group: Skill lab (n=41) Experimental group: SBS (n=41) Preoperative and postoperative care management cognitive level assessment test Skill Control lists of preoperative and postoperative care management cognitive level assessment test Clinical Decision-making in Nursing Scale	No significant difference between post-education knowledge levels ($P = .421$), practical deep breathing and coughing exercise education skills ($P = .867$), or clinical decision-making scale total and subscale scores ($P = .065$). Significant difference found between the admission of the patient in surgical clinic after surgery skill scores ($P = .04$).	Assessed preop and postop knowledge, skills, and clinical decision-making Sampling losses occurred during the study. No computer lab due to technical difficulty, and a limited number of the students had a personal computer. Interaction risk due to the fact that the students of the experimental and control groups were in contact.
Gu et al., 2017	To report the effectiveness of SBS as a supplemental teaching strategy on performance	N=27 2nd year BSN Undergraduate nursing students	Knowledge test scores in experimental group ($M=73.31$, $SD=9.27$) were significantly	Assessed medical-surgical knowledge and skills

Citation	Purpose and Design	Sample and Instrument	Results	Knowledge, Skills, and Attitude Gaps/Notes
	of undergraduate students in a Fundamentals of Nursing course. Randomized controlled post-test vSim® Ten SBS cases: aseptic technique, medication administration, and Foley catheter insertion. One week before each lecture, students in the experimental group completed the designated SBS case that corresponded with the lecture. Deliberate practice used to earn a score of at least 80.	Central city in China Control (n=14): regular course procedure only Experimental (n=13): regular course procedure plus 10 SBS cases A knowledge test with a maximum of 100 points Two nursing skill performances of medication administration and aseptic technique on nonhuman models	higher than that the control group (M=65.36, SD =8.93), t=2.27, p=.032. Nursing skills performance scores in experimental group were greater than control group without statistical significance.	vSim® is developed in English which is a second-language for Chinese students. Small sample size limits the generalization of the results
LeFlore et al., 2012	To compare SBS to a traditional lecture for the achievement of learning outcomes for pediatric	N=93 Senior undergraduate baccalaureate nursing students	Significant difference in knowledge acquisition between the control and experimental groups (mean 75+/-12 vs. 83.9	Assessed pediatric respiratory knowledge Further research is needed to understand

Citation	Purpose and Design	Sample and Instrument	Results	Knowledge, Skills, and Attitude Gaps/Notes
	respiratory content Randomized, controlled, post-test design Researcher-developed Virtual Pediatric Patients (VPP) and Virtual Pediatric Unit (VPU)	Southern university in United States OSCEs 10-item multiple-choice written test Control group: traditional lecture Experimental group: Two experiences with SBS	+/- 15, *P* = 0.004). Significant differences in times between the groups for all critical elements Experimental group demonstrated more timely performance of critical nursing tasks (*P*=0.001 for both scenarios).	how to best integrate an SBS into undergrad nursing education
Menzel et al., 2014	To examine whether an interactive poverty SBS would improve nursing students' empathy with and attributions for living in poverty compared to a self-study module Randomized control trial Second Life	N=51 baccalaureate nursing students United States Attitude Toward Poverty Scale Control group: Self-study module Experimental group: 2.5-hour SBS offered 3 times in 1 year	No difference between control and intervention groups. SBS produced more positive changes in attitudes toward poverty than self-study module SBS did not significantly increase student recognition of the association between poverty and health compared to self-study module	Assessed attitude toward patients experiencing poverty Faculty must incorporate social justice concepts throughout the curriculum to produce lasting change.

Note. Screen-based simulation (SBS).

Appendix C

LFS and HFS Versus SBS Literature Review Matrix

Citation	Purpose and Design	Sample and Instrument	Results	Knowledge, Skills, and Attitude Gaps/Notes
Cobbett & Snelgrove-Clarke, 2016	To compare effectiveness of SBS to HFS in relation to maternal-newborn nursing students' knowledge, anxiety, self-confidence with decision-making, and preference Randomized pre-test-post-test vSim® SBS completed in computer lab in 2 groups with a 42-inch projector screen Group 1: preeclampsia SBS first followed by GBS HFS Group 2: preeclampsia HFS first followed by GBS SBS	N=56 3rd year BSN students Canadian public research university Pre/post sim: Nursing Anxiety and Self-Confidence with Clinical Decision-Making Scale (White, 2011) Knowledge test related to preeclampsia and GBS Post sim: Simulation Completion Questionnaire	No statistically significant difference in student knowledge and self-confidence between groups. Anxiety scores higher for SBS than HFS Students reported preferring HFS in a real setting and the immediate debrief. Students who reported not liking SBS most often due to technological issues.	Assessed knowledge, anxiety, self-confidence with decision-making Did not evaluate replacing traditional maternal-child clinical experiences with SBS or HFS One university
Erlinger et al., 2019	To compare the use of HFS to SBS for recognition of intraoperative myocardial	N=39 2nd year (n=19) and 3rd year (n=20) SRNA	2nd year students recognized intraoperative MI faster with	Assessed recognition time of

Citation	Purpose and Design	Sample and Instrument	Results	Knowledge, Skills, and Attitude Gaps/Notes
	infarction (MI) by student registered nurse anesthetists (SRNA) Within-subjects counterbalance design with random assignment Anesoft anesthesia accessed individually by computer Group 1: SBS first followed by HFS Group 2: HFS first followed by SBS	Master's degree program Data collection form used to record the time to verbal recognition of the critical event	HFS than with SBS. No significant difference among 3rd year students in the time it took to recognize a critical event when using HFS versus SBS	critical event Small sample size One university
Haerling, 2018	To compare cognitive, affective, and psychomotor learning outcomes between students using HFS and students using SBS; to describe a cost-utility analysis comparing the two types of simulation Mixed-methods - Quasi-experimental nonequivalent comparison group	N=84 Associate degree nursing students United States Knowledge exam about simulation content NLN Student Satisfaction and Self- Confidence Learning (SSC) survey Random sample	Post-intervention knowledge scores in both groups significantly improved (p <.05) SSC scores were significantly higher post-intervention for both groups No significant difference in SP performance	Assessed knowledge and self-confidence One university SBS group reflected technology troubles and HFS group expressed frustration with finding materials

Citation	Purpose and Design	Sample and Instrument	Results	Knowledge, Skills, and Attitude Gaps/Notes
	design and qualitative Convenience sample vSim® The simulation scenario was the same for both groups: Inpatient chronic obstructive pulmonary disease exacerbation A random sample of participants from each group completed a post-simulation performance assessment during which they interacted one on one with an SP.	Documentation of assessment, written hand-off report Reflection questions– scored using the Lasater Clinical Judgment Rubric (LCJR) and the Creighton Simulation Evaluation Instrument (C-SEI)	scores between groups 3 themes emerged: safety, communication, and prioritization/ time management SBS group expressed intent to focus on safety if they repeated the simulation and HFS group to focus on communication HFS instrumental costs \$36.55/student and SBS costs \$10.89/student; overall cost/utility ratio for HFS was \$3.62 vs. \$1.08 for SBS.	
Liaw et al., 2014	To describe the development of managing patients with clinical deterioration with SBS and evaluate its efficacy by comparing to HFS	N=57 3rd year BSN undergraduate nursing students Singapore	Both groups demonstrated significant improvements (*P*<.001) in first and second post-test scores.	Assessed knowledge and clinical skills Challenging to account for all the

Citation	Purpose and Design	Sample and Instrument	Results	Knowledge, Skills, and Attitude Gaps/Notes
	Randomized controlled trial e-RAPIDS Control group: 2-hour HFS Experimental group: 2-hour SBS	Pre-test: baseline testing related to patient deterioration using HFS assessment Immediately post SBS: 19-item questionnaire with four subscales (system quality, information quality, user satisfaction, and net benefit) (Cronbach alpha=.904). Post-test one day after intervention: same as pre-test Post-test 2.5 months after intervention: same as pre-test	SBS group had significantly lower (P<.05) second post-test scores compared with the first post-test scores, and no significant difference (P=.94) was found between these two scores for the HFS group. Scores between groups did not differ significantly over time (P=.17). SBS was rated positively.	differences between SBS and HFS Control group simulation experience NOT evaluated SBS was not superior to HFS; however, both types of simulation increased students' ability to assess and manage care for a deteriorating patient.
Padhila et al., 2019	Evaluate SBS in regard to knowledge retention, clinical reasoning, self-efficacy, and learner satisfaction Randomized controlled trail	N=42 nursing students Portuguese versions Pre-test and post-test immediately and 2 months later: knowledge and	SBS group made more significant improvements in knowledge after the intervention (P=.001; d=1.13) and 2 months later	Assessed knowledge, clinical reasoning, and self-efficacy SBS combined with other

Citation	Purpose and Design	Sample and Instrument	Results	Knowledge, Skills, and Attitude Gaps/Notes
	with pre-test/post-test Control group n=21: case-based learning with LFS & realistic environment Experimental group n=21: case-based learning with SBS (Body Interact)	clinical reasoning with true/false, multiple-choice test Post-test: Learner Satisfaction with Simulation Tool Post-test: The General Self-Efficacy Scale	(*P*=.02; *d*=0.75), and also showed higher levels of learning satisfaction (*P*<.001; *d*=1.33). No statistical difference in self-efficacy perceptions (*P*=.9; *d*=0.054).	strategies, such as briefing, simulation, and debriefing, improves both initial knowledge retention and knowledge retention overtime.
Verkuyl et al., 2017	To compare SBS to HFS in respect to students' pediatric nursing care knowledge, self-efficacy, and satisfaction Randomized controlled trial Experimental group: 60-90 minute SBS Control group: two-hour HFS	N=47 2nd year baccalaureate nursing students or practical nurse bridging program Canada Pediatric Skills Self Efficacy Survey 10-item multiple choice pediatric nursing care knowledge test Adapted Simulation Satisfaction Survey	Pediatric knowledge: Only SBS group demonstrated statistically significant learning on the post-test (t=-2.12, df=22, p = 0.045). Pediatric skill self-efficacy: SBS group made statistically significant greater gains (t=-2.1, df = 22, p = .045) Both groups satisfied with no difference between groups.	Assessed knowledge and self-efficacy SBS combined with HFS may become best practice Small sample size Self-reported data for self-efficacy and satisfaction surveys

Note. Group Beta Strep (GBS); low-fidelity simulation (LFS); high-fidelity simulation (HFS); screen-based simulation (SBS).

Appendix D

SP Versus SBS Literature Review Matrix

Citation	Purpose and Design	Sample and Instrument	Results	Knowledge, Skills, and Attitude Gaps/Notes
Cooper et al., 2015	Evaluate performance outcomes and participant evaluations in relation to the feasibility of SP and SBS Mixed methods: Quasi-experimental and descriptive qualitative SBS program: FIRST^{2}ACTWeb^{TM} SBS group (2013): Three cases related to patient deterioration accessed by personal computer (n = 330) SP group (2012): Three cases related to patient deterioration completed in small groups: cardiac, shock, respiratory (n = 97)	N=427 final year nursing students in three universities and 45 vocational college students) Australian Knowledge test, OSCE checklist, skill ratings using a 5-point scale and a course quality evaluation from 1-5 with open-ended questions	Clinical knowledge improved in both groups. Clinical performance was moderate for both groups. Knowledge, confidence, and competence significantly improved for both groups (*p*=.000). SBS had a small to medium effect on knowledge improvement and skill gain was perceived as highly valuable. Both rated positively but SP more positive (*p*=.000) due to reflective debriefing. Themes: Translation of theory into practice, be systematic, a	Assessed knowledge, clinical performance, skills, and self-confidence Data collected over different years for groups No randomization

Citation	Purpose and Design	Sample and Instrument	Results	Knowledge, Skills, and Attitude Gaps/Notes
			good way to learn, teamwork, collaboration, simulating a real emergency, practice builds confidence, and the simulation model.	
Claudius et al., 2015	To compare the triage accuracy, time, and fidelity between SBS pediatric mass casualty incident patients to SP moulaged, adult actors portraying children in a mass casualty incident simulation Comparison study All students triaged four SP and seven SBS cases representing a spectrum of minor, immediate, delayed, and expectant pediatric victims. SBS: Individual laptop using Moodle learning management software	N=33 1st and 2nd year pre-clinical medical students Child version of the Simple Triage and Rapid Treatment (JumpSTART) triage algorithm	SP cases given 92.4% accurate triage designations versus 81.8% for the SBS cases (P = .005). The median time to triage SP was 57 seconds versus 80 seconds for SBS (P <.0001). SP offered a more realistic encounter by 88% of participants, with a higher associated stress level.	Assessed clinical skills and time to treat One university Small sample Technical problems with SBS resulted in losing data collection for one case No feedback during SBS scenarios
Triola et al., 2006	To determine the effectiveness of	N=55 healthcare providers (45%	Both groups equivalent with	Assessed knowledge

Citation	Purpose and Design	Sample and Instrument	Results	Knowledge, Skills, and Attitude Gaps/Notes
	SBS cases when compared with SP cases in improving clinical skills and knowledge Randomized trial Continued Medical Education to teach clinical skills related to stress and anxiety disorders following a disaster Cases: Posttraumatic stress disorder, acute stress disorder, sub-diagnostic distress, and bereavement Control group: four SP cases Experimental group: two SP cases and two SBS cases	registered nurses, 15% physicians, 40% other provider types) Knowledge pre-test and post-test Effectiveness survey	pre-post workshop improvement in comfort level (P = .66) and preparedness to respond (P = .61), to screen (P = .79), and to care (P = .055) for patients using the skills taught. No difference in effectiveness of SBS and SP by participants who experienced both (P=.79).	and clinical skills (comfort or reluctance in providing care) Further research to determine if SBS cases can be used to replace SP cases Small sample size Experimental group exposed to both types of simulation and control group only SP cases

Note. Screen-based simulation (SBS); standardized patient (SP); Objective structured clinical examination (OSCE).

Appendix E

Obstetric Nursing Self-Efficacy Scale

Please rate your level of obstetric nursing care self-efficacy. Self-efficacy is the belief you have in your ability to perform specific behaviors in an obstetric setting. Use the scale below to answer the questions.

A = Not sure at all

B = Slightly sure

C = Moderately sure

D = Very sure

E = Completely sure

How sure are you that you can:

1. Obtain an obstetric history?
2. Recognize critical elements of an obstetric history?
3. Perform a comprehensive obstetric assessment?
4. Identify signs of fetal well-being (or status) on a fetal heart monitor tracing?
5. Recognize changes in maternal vital signs that require intervention (hypo/hypertension, fever, tachycardia)?
6. Recognize changes in maternal physical assessment that require intervention (edema, reflexes, epigastric distress, decreased urinary output, etc.)?
7. Implement measures to maximize fetal oxygenation status (positioning, maternal oxygenation, etc.)?
8. Implement measures to reduce uterine activity (fluids, Pitocin d/c, etc.)?
9. Implement measures to stimulate uterine activity?

10. Collaborate with other members of the team to stabilize maternal vital signs?
11. Collaborate with other members of the team to stabilize fetal well-being?
12. Make timely contact (before the occurrence of an adverse event) with the physician or nurse midwife to report critical changes in maternal or fetal status?
13. *Document* an obstetric history?
14. Thoroughly *communicate* the patient situation (condition or status) during consultation or handoffs?
15. Report relevant elements of the patient background during consultation or handoffs?
16. Anticipate and/or recommend course of action to physician or nurse midwife when seeking consultation when feeling *stressed* or *rushed*?
17. Accurately communicate planned course of action during a consultation or handoff?
18. Accurately communicate plan of care or change in plan of care to patient and family?

Guimond, M., & Simonelli, M. (2012). Development of the Obstetric Nursing Self-Efficacy Scale instrument. *Clinical Simulation in Nursing, 8*, e227-e232. https://www.doi.org/10.1016/j.ecns.2011.01.007

Appendix F

Permission to Use Obstetric Nursing Self-Efficacy Scale

July 2, 2020

Dear Christina,

You have my permission to use the instrument for your study. If you need any additional information, I am happy to help.

Let me know how it goes!

Betsy

Betsy Guimond, PhD, WHNP-BC

Associate Professor of Nursing

412-397-6806 (office)

Robert Morris University

137 Scaife Hall

Appendix G

Electronic Correspondence to Program and/or Course Coordinator

Dear ___________________:

I am requesting your assistance in the recruitment of participants for a research study titled, "The Impact of the Maternal-Child Clinical Environment on Undergraduate Nursing Students' Self-Efficacy." There is limited research found in the literature regarding the impact of the maternal-child clinical learning environment, and I anticipate that this research will offer insight on the impact of the maternal-child clinical learning environment on nursing students' obstetric self-efficacy.

The nursing students at your institution have been identified as potential participants. This study has IRB approval from Indiana University of Pennsylvania. Inclusion criteria for this research study includes 1) prelicensure nursing student, 2) currently enrolled in a nursing program, 3) completed a maternal-child clinical nursing course during Fall 2020, Spring 2021, or Summer 2021 semester and passed the course on the first attempt, and 4) willingness to answer questions and complete an online survey taking approximately 3 to 5 minutes. Exclusion criteria for this research study includes 1) students who did not complete any in-person clinical and only completed distance learning with no screen-based simulation, and 2) individuals who are graduated at the time of the survey. Participants will be offered a chance to win one of ten $25 Visa gift cards.

Will you please forward the attached invitation to eligible nursing students via email? Please use the following subject line for the email: Please Complete a Maternal-Child Clinical Learning Environment Survey: Chance to Win $25 Visa Gift Card. If you have any questions or concerns, please contact me by email at cdbw@iup.edu.

I appreciate your anticipated assistance in this research endeavor. Thank you for your time and consideration.

Sincerely,

Christina Lightner, MSN, WHNP-BC, RN
Doctoral Student, Indiana University of Pennsylvania

Faculty Sponsor:
Julia Greenawalt, PhD, RN
email: jgreen@iup.edu

THIS PROJECT HAS BEEN APPROVED BY THE INDIANA UNIVERSITY OF PENNSYLVANIA INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN SUBJECTS (PHONE 724.357.7730).

Appendix H

Electronic Correspondence: Invitation for Participation in a Research Study

Hello, my name is Christina Lightner. I am a doctoral student and the principal investigator of a quantitative research study. The purpose of the study is to explore the impact of the maternal-child clinical learning environment on undergraduate, prelicensure nursing students' self-efficacy.

There is a lack of research related to the maternal-child clinical learning environment. I anticipate that the information gained from this study will provide insight on the impact of the maternal-child clinical learning environment on nursing students' obstetric self-efficacy.

You are identified as someone who is in a prelicensure undergraduate accredited nursing program. Your participation in this research study is vital to understanding this experience.

To be considered for participation, you must meet the following criteria:

1. Prelicensure nursing student
2. Currently enrolled in a nursing program
3. Completed a maternal-child clinical nursing course during Fall 2020, Spring 2021, or Summer 2021 semester and passed the course on the first attempt
4. Willingness to answer questions and complete an online survey taking approximately 5 minutes

Exclusion criteria for this research study includes:

1. Students who did not complete any in-person clinical and only completed distance learning with no screen-based simulation (completed using a computer screen and input device, such as a keyboard and mouse and is similar to the popular online gaming format)
2. Individuals who are graduated at the time of the survey

If you meet the study criteria and are willing to participate, you will be asked to complete an online informed consent, an anonymous survey using the web-based survey platform Qualtrics, and an optional incentive survey to enter for a chance to win one of ten $25 Visa gift cards. The incentive survey will collect your email address. If you are randomly selected as a Visa gift card winner, your email address will only be used to send you a digital gift card code. Your email address will be kept confidential and will not be linked to your demographic and survey answers. This study will involve an online questionnaire and self-efficacy scale taking approximately 5 minutes to complete. The survey link is as follows:

https://iup.co1.qualtrics.com/jfe/form/SV_6fiO4odUggKzrfM

Please contact me if you have any questions or concerns via email at cdbw@iup.edu.

Thank you very much for your time and consideration.

Sincerely,
Christina Lightner, MSN, WHNP-BC, RN
Doctoral Student, Indiana University of Pennsylvania

Faculty Sponsor:
Julia Greenawalt, PhD, RN
email: jgreen@iup.edu

THIS PROJECT HAS BEEN APPROVED BY THE INDIANA UNIVERSITY OF PENNSYLVANIA INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN SUBJECTS (PHONE 724.357.7730).

Appendix I

Informed Consent

Title: The Impact of the Maternal-Child Clinical Environment on Undergraduate Nursing Students' Self-Efficacy

Principal investigator: Christina Lightner, MSN, WHNP, RN, 717-279-1952

You are invited to participate in this research study. The following information is provided in order to help you make an informed decision on whether or not to participate. Please do not hesitate to ask questions. You are eligible to participate because you are/were enrolled in a maternal-child undergraduate nursing course during Fall 2020, Spring 2021, or Summer 2021 semester.

The purpose of this study is to gain insight on the impact of the maternal-child clinical learning environment on nursing students' self-efficacy. Participation in this study will include completing an anonymous online questionnaire and Obstetric Nursing Self-Efficacy scale using the web-based platform Qualtrics. The participation time is approximately 5 minutes.

There are no known risks or discomforts associated with this research. The results of this study will hopefully provide evidence on the impact of the maternal-child clinical environment on nursing students' obstetric self-efficacy.

Your participation in this study is voluntary. You may withdraw from the study at any time by ending the survey or closing the web-page without any adverse effects. If you choose to participate, your survey answers including demographic questions and Obstetric Nursing Self-Efficacy scale will be kept anonymous. No identifying information will be collected on this survey. The information obtained in the study may be published in scholarly journals or presented to nursing education professionals, but your identity will remain anonymous. There will be an optional chance to enter to win one of ten $25 Visa gift cards. An additional incentive survey will be used to collect your email address. Following data collection, ten winners will be randomly selected from the participants who chose to enter their email address on the incentive survey. Your email address will be kept confidential, stored on a password-protected computer, and not connected to your demographic and survey answers.

The inclusion criteria are as follow:

1. Undergraduate prelicensure nursing student at an accredited nursing school in Pennsylvania
2. Completed a maternal-child nursing course during Fall 2020, Spring 2021, or Summer 2021 semester
3. First-time enrollment in a maternal-child course and passed the course on the first attempt

The exclusion criteria are as follow for students who:

1. Did not complete any in-person clinical and only completed distance learning with no screen-based simulation (completed using a computer screen and input device, such as a keyboard and mouse and is similar to the popular online gaming format)
2. Are graduated at the time of the survey

You have the right to ask the researcher questions regarding the study.

Project Director:
Christina Lightner
Doctoral Candidate
Nursing and Allied Health Professions
Indiana, PA 15705
email: cdbw@iup.edu

Faculty Sponsor:
Julia Greenawalt
Professor
Nursing and Allied Health Professions
Indiana, PA 15705
email: jgreen@iup.edu

THIS PROJECT HAS BEEN APPROVED BY THE INDIANA UNIVERSITY OF PENNSYLVANIA INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN SUBJECTS (PHONE 724.357.7730).

Please indicate whether you are willing to participate in this study by making your selection below. If you choose to participate in this study, you will be taken to the survey after agreeing to participate. If you choose not to participate in this study, the survey will end.

☐ **I consent to participate in the study. (survey will start)**
☐ **I do not consent to participate in the study. (survey will end)**

Appendix J

Demographic Data Survey

1. Age: Free text

2. Sex: male, female, non-binary/third gender, prefer not to answer

3. Race

    a. African American or Black

    b. American Indian or Alaska Native

    c. Asian

    d. Caucasian or White

    e. Hispanic or Latino

    f. Native Hawaiian or Other Pacific Islander

    g. Other – free text

4. Ethnicity: Hispanic/Non-Hispanic

5. Past/current experience in the medical field: yes/no

    a. If yes, free text medical field type

6. Previous degree: yes/no

    a. If yes, free text for degree type

7. Military experience: yes/no

    a. If yes, free text for branch

8. What type of nursing degree are you seeking?

    a. Associate degree

    b. Bachelor's degree

    c. Second-degree accelerated

    d. Other – free text

9. What year in nursing school are you now?
    a. First-year
    b. Second-year
    c. Third-year
    d. Fourth-year
10. What year in nursing school were you when you completed maternal-child clinical?
    a. First-year
    b. Second-year
    c. Third-year
    d. Fourth-year

Screen-based simulation is completed using a computer screen and input device, such as a keyboard and mouse and is similar to the popular online gaming format. Examples of screen-based simulation include vSim® for Nursing and Ryerson University. (added to questions 11, 12, 13, and 14)

11. What clinical learning environments did you participate in during your maternal-child nursing course? (Select all that apply)
    a. In-person clinical (birthing center, hospital, or outpatient setting)
    b. In-person simulation (laboratory setting)
    c. Distance learning with screen-based simulation (at home using computer simulation software or online simulations, such as vSim® or Ryerson)

    d. Distance learning with no screen-based simulation (at home using NO computer simulation software or online simulations, such as vSim® or Ryerson)
    e. Other – Free text
12. Approximately what percentage of your maternal-child clinical was completed in a distance learning environment with screen-based simulation? Enter a number between 0 and 100 where 0 means 0% in other words, none and 100% means all. Free text: force whole number between 0-100 in Qualtrics with percent sign after box
13. For students who used screen-based simulation, what screen-based simulation software was used? Free text
14. What type of debriefing experiences did you participate in during screen-based simulation? Select all that apply
    a. Computer-generated feedback and debriefing
    b. Facilitator-led debriefing using video conferencing
    c. Facilitator-led debriefing in-person
    d. Self-debriefing
    e. Other – Free text
15. Current grade point average: free text number