Journal for Re Attach Therapy and Developmental Diversities
eISSN: 2589-7799
2023 July; 6 (7s): 555-566

The Psychological Impact of High-Risk Newborn Care Simulation Training on the Critical Thinking Disposition, Self-Leadership, Problem-Solving Ability, and Clinical Competency of Nursing College Students

Gyung Park
Department of Nursing, Sehan University, South Korea

Received: 11-May-2023
Revised: 05-June-2023
Accepted:02-July-2023

Abstract

Introduction: Clinical competency is one of the core abilities that are required of nurses and emphasized by Korean Accreditation Board of Nursing Education. It refers to a nurse's ability to expertly use knowledge, skills, and attitude in clinical settings. Simulation-based training is a method to allow students to experience different clinical situations. Previous studies reported that critical thinking disposition, problem-solving ability, and self-leadership are variables related to nurses' clinical competency, albeit with somewhat conflicting results. This needs to be confirmed through further and repeated studies.

Objectives: This study utilizes a one-group pretest-posttest design to examine the impact of high-risk newborn care simulation training on nursing college students. The objective is to identify the factors that influence clinical competency and explore the correlation between the training and critical thinking disposition, self-leadership, problem-solving ability, and clinical competency of the students.

Methods: Data were collected both before and after the High-Risk Newborn Care Simulation-based training. The collected data were then analyzed using various statistical techniques, including SPSS/WIN 24.0 software. Descriptive statistics, paired t-tests, ANOVA, Pearson's correlation coefficients, and multiple regression analyses were employed to analyze the data.

Results: As a result, the mean score in critical thinking disposition, self-leadership, problem-solving ability and clinical competency increased a statistically significant level after Simulation-based training. And Clinical competency had statistically significant positive correlations with critical thinking disposition, problem-solving ability, and self-leadership. It was found that their clinical competency was affected by critical thinking disposition and self-leadership at statistically significant levels.

Conclusions: In order to help nursing college students, or future nurses, develop their clinical competency, attention needs to be paid to improving their critical thinking disposition and self-leadership. In addition, efforts need to be made to improve the quality of simulation-based training, which can supplement the limitations of clinical practice training.

Keywords: Clinical competency, critical thinking disposition, problem-solving ability, self-leadership, Simulation Training

1. Introduction

Nursing college students must complete theory courses and clinical practice courses (22 credits in total) in order to work as nurses after graduation. In the course of clinical practice, they can experience how nurses perform care and respond in different clinical situations, and develop their clinical competency and critical thinking disposition. The number of nursing students enrolled in colleges has recently increased. At the same time, there is a shortage of places available for clinical practice, which poses difficulties for clinical practice training [1]. In addition, medical consumers require increasingly higher-level services, with an increasing emphasis on the importance of patient safety management. In this current climate, it is becoming more difficult to have nursing students practice nursing skills themselves, and clinical practice largely centers on observation [2][3]. Furthermore, clinical practice is even more difficult in neonatal units, including neonatal intensive care units since newborns are vulnerable to infection and require stricter infection control [2]. Now, simulation

training is suggested as an effective alternative that can supplement the clinical practice training in a limited environment [4].

Simulation-based training is a method to allow students to experience different clinical situations. The method uses mannequins and scenarios in a safe training environment that is similar to actual clinical settings. It is an effective training method to help students perform nursing interventions that are suitable for certain patients. It also enables students to experience clinical situations first hand and receive feedback [5]. It has been reported that simulation training is effective in improving nursing students' ability to perform care for patients by combining knowledge of their major with nursing skills. It is a training method that improves their critical thinking disposition, which is required to make a clinical decision, along with the ability to solve problems for clients that can occur in clinical situations, as well as the ability to perform care required in such settings [6][7].

Clinical competency is one of the core abilities that are required of nurses and emphasized by Korean Accreditation Board of Nursing Education. It refers to a nurse's ability to expertly use knowledge, skills, and attitude in clinical settings [8][9]. The healthcare environment recently underwent rapid changes and has limitations as an environment in which nursing students can develop clinical competency. In contrast, clinical simulation training is widely used in nursing education. It is reported that through such simulation training, nursing students are able to perform care first-hand in a safe training environment. Moreover, by simulating clinical situations that students have few opportunities to experience, they can practice giving care and receive valuable debriefing sessions. Through the repeated process of this training, students' critical thinking is enhanced and their clinical competency is improved [10][11][12][13].

Critical thinking disposition is an important competency that should be nurtured in nursing students through nursing curriculums. It is also an essential factor for nurses to perform quality care [14]. This ability is reported to be a major factor influencing nurses' clinical competency [16] because nurses with critical thinking disposition can reason by using, analyzing, and integrating information in nursing practice, express opinions logically, make logical arguments, and efficiently make judgments [15]. A previous study that applied simulation-based training reported that nursing students with a higher critical thinking disposition demonstrated higher clinical competency [16]. Still, other studies reported that critical thinking disposition did not influence clinical competency [17][18][19]. This needs to be confirmed through further and repeated studies.

Problem-solving ability is an intellectual and creative ability to recognize a gap between the current state and the goal state. It involves efforts to reduce the gap in order to reach the goal [20]. In clinical situations, it refers to the nurses' ability to rapidly and effectively solve health problems for clients [21]. It is reported that nurses with high problem-solving ability can think independently, make decisions, and provide quality care for patients with complex and various health problems. Moreover, problem-solving ability is a very important factor that influences the clinical competency of nurses [22].

Self-leadership pertains to the autonomous strength of an individual to set a personal goal and exert influence on their own thoughts and actions to achieve the goal [23]. Self-leadership is a core competency required of nurses since it affects their nursing work results, job satisfaction, and work performance [24], the Korean Accreditation Board of Nursing Education also suggests that it is one of the core competencies that should be nurtured through nursing curriculums [25].

As seen above, previous studies reported that critical thinking disposition, problem-solving ability, and self-leadership are variables related to nurses' clinical competency, albeit with somewhat conflicting results. This needs to be confirmed through further and repeated studies. Therefore, this study intends to find the correlations between variables related to clinical competency and identify factors affecting it. This study also intends to provide basic data for developing nursing practice training methods to help cultivate core competencies required of nurses in clinical settings through simulation-based training, which is adopted more vigorously in recent times. The detailed objectives of this study are as follows.

First, identify the subjects' levels of critical thinking disposition, problem-solving ability, self-leadership, and clinical competency.

Second, identify the subjects' levels of critical thinking disposition, problem-solving ability, self-leadership, and clinical competency in relation to their general characteristics.

Third, identify the differences in the subjects' levels of critical thinking disposition, problem-solving ability, self-leadership and clinical competency before and after training.

Fourth, after training, identify among the subjects the correlations between the critical thinking disposition, problem-solving ability, self-leadership, and clinical competency.

Fifth, identify the effects of the subjects' critical thinking disposition, problem-solving ability, and self-leadership on their clinical competency.

2. Research Methods

2.1. Research Design

This study intends to examine the effects of high-risk newborn care simulation training on nursing college students' critical thinking disposition, problem solving ability, self-leadership, and clinical competency. Additionally, it aims to identify the correlations between the variables, as well as the factors influencing clinical competency after training. This study used a one-group pretest-posttest design [Figure 1].

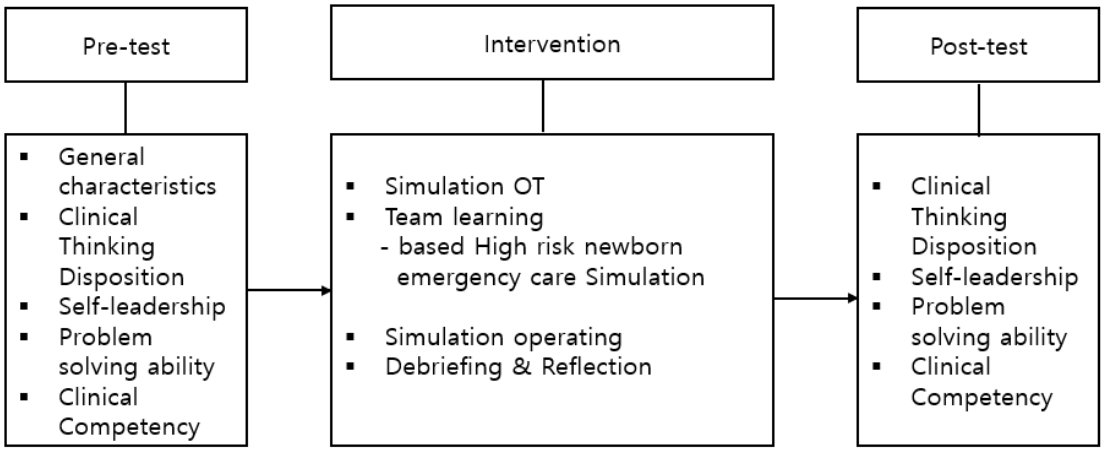

Figure 1. Research design of this study

2.2 Research Subjects

The participants in this study consisted of senior students enrolled in a clinical simulation training course at the Department of Nursing in a university located in J Province. The subjects were informed about the study's purpose and voluntarily agreed to participate. To determine the minimum sample size needed for the study, G*Power 3.1.9 software was used, considering an effect size of 0.05, a significance level of 0.05, and a power of 0.95. The calculation was based on a previous study [26], and a sample size of 45 students was obtained. A total of 94 questionnaires were distributed to students taking the course before and after the training. Of the 94 questionnaires, 93 were analyzed and one questionnaire was excluded due to its inadequate responses.

2.3 Research Instruments

2.3.1 Critical Thinking Ability

Critical thinking ability was measured, using a measurement tool developed by Yoon [27]. It consists of a total of 27 items and each item is measured on a five-point Likert scale, from 1 (Strongly disagree) to 5 (Strongly agree). There were two negatively worded items—Items 4 and 14—and the scores were processed through reverse conversion. With regard to the reliability of the measurement tool, the tool showed a Cronbach's α of .84 when developed; and a Cronbach's α of .85 in this study.

2.3.2 Problem-solving Ability

Problem-solving ability was assessed using a measurement tool created by Lee et al. [20]. The tool comprised 45 items, each rated on a five-point Likert scale ranging from 1 (Very rarely) to 5 (Very frequently). A higher score indicated a greater level of problem-solving ability. The tool exhibited a Cronbach's α of .94 when initially developed and a Cronbach's α of .97 in the present study, indicating high internal consistency.

2.3.3 Self-leadership

Self-leadership was assessed using a measurement tool developed by Kim [30], which involved revising and supplementing the adapted version (by Shin et al. [29]) of the Revised Self-Leadership Questionnaire (RSLQ) originally developed by Hough & Neck [28]. The measurement tool consisted of a total of 35 items, and participants rated each item on a five-point Likert scale ranging from 1 (Strongly disagree) to 5 (Strongly agree). The tool demonstrated a Cronbach's α of .70-.87 in its original development, .945 in Kim's [30] study, and .97 in the present study, indicating strong internal consistency.

2.3.4 Clinical Competency

Clinical competency was assessed using a measurement tool developed by Choi [33], which involved revising and supplementing the tool created by Lee et al. [32]. The revised tool incorporated the six-dimension scale developed by Schwirian [31]. The measurement tool comprised a total of 45 items, and participants rated each item on a five-point Likert scale ranging from 1 (Very poor) to 5 (Very good). Higher scores indicated greater clinical competency. The tool exhibited a Cronbach's α of .92 in Choi's [33] study and a Cronbach's α of .98 in the present study, indicating excellent internal consistency.

2.4 Simulation Operation Process

The subjects of this study were seniors taking ‘Comprehensive Training,’ which is a 1-credit course with a 2-hour session each week of the academic term. Sessions of 4 hours in total for each group (Class divided into five groups) were assigned to pediatric nursing simulation in the course ‘Comprehensive Training,’ and the simulation used a high-risk newborn emergency care simulation module. The class was divided into five groups based on a practice instructor to student ratio of 1:20, which is recommended by Korean Accreditation Board of Nursing Education, and then each group was again divided into four teams of four to five students. The course began with class orientation, pre-class learning in teams, simulation running, and debriefing. To help operate simulations, two types of practice guidelines were developed: one for instructors and the other for students. The instructor of this study (or the author) revised and supplemented a scenario module of high-risk newborn emergency care [34] taken from the simulation practice standard draft, which was published by Korean Accreditation Board of Nursing Education. Then, the content was verified by a professor of nursing with more than a 10-year experience in simulation-based training and a nurse working at a children’s hospital.

Before using a simulation module, students in teams were instructed to obtain necessary prior knowledge to write scenario algorithms for problem-solving, taking into account expected situations in suggested cases, allot roles, and perform proper nursing interventions. Before simulation class, students attended a session in which they learned how to use a simulator, items, and equipment, had a debriefing session, and were instructed to learn and perform the key skills to be applied in simulation class. Each team submitted an advance report to verify the preparation status for the simulation class. The simulation class was conducted for 10-15 minutes for each team. For evaluation, the instructor made some changes to the scenario for each team and used a simulation checklist to evaluate the teams. After finished with the simulation, teams were asked to fill out the simulation analysis report worksheets. After the simulation class finished for all teams, each team had a 20-25 minute debriefing session in which a team watched their recorded video and all members were asked to talk about what they did well or poorly about their nursing interventions, taking turns. After the debriefing sessions of four teams, the teams had another debriefing session together for 20-30 minutes. Students thought and talked about what they found difficult, what needed to be improved individually, and how they felt while performing practice. They had a self-examination time, and then analyzed their strengths and weaknesses of each team. They were also asked to have an examination time for each team on what needed to be supplemented and write a reflective log. The instructor provided positive feedback so their nursing performance could improve in the next clinical training.

2.5 Data Collection and Analysis

2.5.1 Data Collection

Data was collected through surveys administered to senior students in the Department of Nursing at a university located in J Province. The survey was conducted between March 8 and May 31, 2023. Only those who understood the purpose of the study and willingly agreed to participate were included. Prior to the training session, a pre-training survey was administered, followed by a post-training survey after the class. The researcher provided a comprehensive explanation of the study's purpose and content beforehand. Students were assured that their responses would remain anonymous and solely used for the study's purposes. They were also informed of their right to withdraw their participation at any time. The completion of the questionnaires took approximately 20 minutes. Out of the 94 questionnaires submitted, 93 were included in the analysis, with one questionnaire containing inadequate responses being excluded.

2.5.2 Data Analysis

The data were analyzed using the SPSS/WIN 24.0 program. Descriptive statistics were employed to examine the general characteristics of the subjects and the levels of their critical thinking disposition, problem-solving ability, self-leadership, and clinical competency. The differences in these variables before and after training were evaluated using paired t-tests. Pearson's correlation coefficients were utilized to explore the correlations between critical thinking disposition, problem-solving ability, self-leadership, and clinical competency after training. Furthermore, a multiple regression analysis was conducted to identify the factors that influenced the subjects' clinical competency following the training.

3. Research Results

3.1 General Characteristics of the Study Subjects

There were 67 females (72.0%) and 26 males (28.0%) among the subjects. Twenty-five persons (26.9%) were religious and 68 (73.1%) were not religious. As for the grade point average (GPA), 17 persons (18.3%) had a GPA of 4.0-4.5; 39 persons (41.9%) had a GPA of 3.5-3.9; 31 persons (33.3%) had a GPA of 3.0-3.4; and 6 persons (6.5%) had a GPA of 3.0 or lower. Regarding major satisfaction, 2 persons (2.2%) were ‘very unsatisfied’; 3 persons (3.2%) were ‘unsatisfied’; 35 persons (37.6%) had a ‘moderate’ satisfaction; 45 persons (48.4%) were ‘satisfied’; and 8 persons (8.6%) were ‘very satisfied.’ In terms of application motivation, 51 persons (54.8%) responded ‘employment guarantee’; 21 persons (22.6%) ‘aptitude’; 1 person (1.1%) ‘high school record’; 14 persons (15.1%) ‘recommendation of parent or others’; and 6 persons (6.4%) ‘service to others’ [Table 1].

[Table 1] General Characteristics of the Study Subjects(N=93)

Characteristics	Categories	n	%
Sex	Female	67	72.0
	Male	26	28.0
Religion	Yes	25	26.9
	No	68	73.1
GPA	4.0~4.5	17	18.3
	3.5~3.9	39	41.9
	3.0~3.4	31	33.3
	3.0 or lower	6	6.5

	Very unsatisfied	2	2.2
	Unsatisfied	3	3.2
Major satisfaction	Moderate	35	37.6
	Satisfied	45	48.4
	Very satisfied	8	8.6
	Employment guarantee	51	54.8
	Aptitude	21	22.6
Application motivation	High school record	1	1.1
	Recommendation of parent or others	14	15.1
	Service to others	6	6.4

3.2 Differences in Critical Thinking Disposition (CTC), Problem-solving Ability (PSA), Self-Leadership (SL), and Clinical Competency (CC) of the Subjects Before and After Simulation Training

Table 2 shows the mean scores of the subjects in the four criteria—critical thinking disposition, problem-solving ability, self-leadership, and clinical competency—before and after the simulation-based training. The mean score in critical thinking disposition rose from 3.69 to 4.03 at a statistically significant level (t=-3.061, *p*=.003). The mean score in self-leadership increased from 3.70 to 3.96 at a statistically significant level (t=-2.888, *p*=.005). The mean score in problem-solving ability rose from 3.70 to 3.89 at a statistically significant level (t=-2.422, *p*=.018). The mean score in clinical competency rose from 3.73 to 4.05 at a statistically significant level (t=-4.164, *p*=<.001) [Table 2].

[Table 2] Differences in Critical Thinking Disposition (CTC), Problem-solving Ability (PSA), Self-Leadership (SL), and Clinical Competency (CC) of the Subjects Before and After Simulation Training (N=93)

Variables	Mean±SD		paired-t	*p*
	Pre-test	Post-test		
Critical Thinking Disposition	3.69±0.45	4.03±0.47	-3.061	.003
Problem-solving Ability	3.70±0.57	3.89±0.53	-2.422	.018
Self-leadership	3.70±0.59	3.96±0.57	-2.888	.005
Clinical Competency	3.73±0.59	4.05±0.55	-4.164	<.001

3.3 Correlations between Critical Thinking Disposition (CTC), Problem-solving Ability (PSA), Self-Leadership (SL), and Clinical Competency (CC) of the Subjects

The relationships between the critical thinking disposition, problem-solving ability, self-leadership, and clinical competency of the subjects were examined. The results indicated that clinical competency exhibited statistically significant positive correlations with critical thinking disposition ($r = .718$, $p < .001$), problem-solving ability ($r = .710$, $p < .001$), and self-leadership ($r = .693$, $p < .001$). Furthermore, problem-solving ability demonstrated statistically significant positive correlations with critical thinking disposition ($r = .809$, $p < .001$) and self-leadership ($r = .786$, $p < .001$). Additionally, self-leadership displayed statistically significant positive

correlations with critical thinking disposition (r = .646, p < .001) [see Table 3].

[**Table** 3] **Correlations between Critical Thinking Disposition (CTC), Problem-solving Ability (PSA), Self-Leadership (SL), and Clinical Competency (CC) of the Subjects**(N=93)

Variables	Critical Thinking Disposition r*(p)*	Problem-solving Ability *r(p)*	Self-leadership r*(p)*	Clinical Competency r*(p)*
Critical Thinking Disposition	1			
Problem-solving Ability	.809(<.001)	1		
Self-leadership	.646(<.001)	.786(<.001)	1	
Clinical Competency	.718(<.001)	.710(<.001)	.693(<.001)	1

3.4 Factors Influencing the Clinical Competency of the Subjects

Factors influencing the subjects' clinical competency were analyzed. It was found that their clinical competency was affected by critical thinking disposition (β=.404, t=3.369, p=.001) and self-leadership (β=.342, t=2.999, p=.004) at statistically significant levels. It was checked whether there was multicollinearity between independent variables. The variance inflation factor (VIF) was in the range between 2.617 and 4.413. The VIF was smaller than 10, which indicates no multicollinearity. The tolerance limit was in the range between .227 and .382 and thus larger than 0.1. The residual analysis found a Durbin-Watson of 1.969, which is close to 2 and indicates no autocorrelation. Consequently, the assumption for the regression analysis was satisfied. The regression model was statistically significant (F=40.876, p<.001) with an explanatory power of 59.3% [Table 4].

[Table 4] Factors Influencing Clinical Competency of the Subjects (N=93)

Variables	B	SE	β	t*(p)*	Tolerance	VIF
Constant	20.051	14.976		1.339(.184)		
Critical Thinking Disposition	.790	.235	.404	3.369(.001)	.345	2.898
Problem-solving Ability	.119	.153	.115	.776(.440)	.227	4.413
Self-leadership	.421	.141	.342	2.999(.004)	.382	2.617

F*(p)* =40.876(<.001), R2=.608, Adj R2=.593, Durbin-Watson=1.969

4. Discussion

This study focused on seniors in the Department of Nursing who participated in practice training using a pediatric nursing simulation. The primary objective was to examine the correlations between critical thinking disposition, problem-solving ability, self-leadership, and clinical competency, as well as to identify any

differences in these variables before and after the practice training. The findings aimed to provide foundational data for the development of effective simulation-based training programs.

Analyzing the differences in variables before and after the training revealed statistically significant variations in critical thinking disposition and self-leadership. Notably, the results demonstrated a significant improvement in the subjects' critical thinking disposition following the high-risk newborn emergency care simulation, with the mean score increasing from 3.69 to 4.03. This aligns with previous studies conducted by Kim and Song, Park and Kim, Kwon and Kim, Song, Kwon, and Ahn, Kim, and Hwang, which also reported enhanced critical thinking disposition among nursing students after practice training. The findings were consistent with Min's study, which applied simulation for the nursing care of children with fever. However, other studies by Kim and Lee, Kim, and Lee did not find statistically significant differences in nursing students' critical thinking disposition before and after training. Therefore, further repeated studies are necessary to confirm the effectiveness of simulation-based training on critical thinking disposition.

Furthermore, some studies by Kim, Ha, and Park, Lim, and Lim and Yeom, utilizing virtual simulation for practice training, reported a statistically significant difference in nursing college students' critical thinking disposition before and after training. In contrast, Kwon's study, which employed virtual simulation, did not observe a significant difference in nursing students' critical thinking disposition. These findings highlight the effectiveness of virtual simulation-based training, prompting the need for comparative analysis to ascertain the efficacy of practice training that utilizes cost-effective virtual simulations and mannequin simulators.

In this study, the subjects' mean score in problem-solving ability rose from 3.70 to 3.89 at a statistically significant level after they had simulation-based training. This is in line with the results of the study by Song [35] that used the same tools as in this study, along with a simulator like in this study; and the results of the studies by Ahn, Kim and Hwang [38], Chae and Yang [43], and Yun and Song [44] that used tools different from the ones used in this study yet used a mannequin simulator. On the other hand, the study by Kim, Ha, Park [18] in which a virtual simulation was applied but used the same measurement tools as in this study reported no statistically significant difference before and after the practice training. Therefore, it needs to be confirmed through further and repeated studies.

According to the results of this study, the mean self-leadership score rose from 3.70 to 3.96 at a statistically significant level, after practice training. This is in line with the results of the studies performed by Kim and Song [12], Kwon and Kim [26], and Kwon [36]. There were very few studies that measured self-leadership after simulation-based training and therefore, it was unable to make comparison between this study and other studies regarding self-leadership. This variable will need to measured repeatedly in further research.

In this study, the subjects' mean score in clinical competency increased from 3.73 to 4.05 after practice training, at a statistically significant level. This is in line with the results of the studies by Sim, Kim and Kim [10], Lee [39], and Kwon and Kwon [45] that used the same measurement tools as this study. Other studies by Park and Kim [16], Kim and Lee [17], Chae and Yang [43], Yun and Song [44], and Kim and Song [46] also reported that clinical competency improved after simulation-based training, although the tools used in those studies are different from those used in this study. Thus, it is somewhat difficult to make a comparison. As seen here, simulation-based practice training has been found to be effective in improving nursing college students' clinical competency and therefore, it is necessary to operate simulation-based nursing practice training more actively to help them develop clinical competency.

In this study, the analysis of correlations between variables after simulation-based training found that there were strong positive correlations between clinical competency and the other variables—critical thinking disposition, problem-solving ability, and self-leadership. This is partially in line with the results of some previous studies by Park and Kim [16] and Lee [39] that reported a high correlation between clinical competency and critical thinking disposition. Such high correlations between variables suggest the need for a training program that can be developed by considering the variables in providing simulation-based practice training. After the simulation-based training, the analysis of factors influencing clinical competency found that critical thinking disposition and self-leadership are the factors influencing clinical competency. Consequently, in order to help nursing college students, or future nurses, develop their clinical competency, attention needs to be

paid to improving their critical thinking disposition and self-leadership. In addition, efforts need to be made to improve the quality of simulation-based training, which can supplement the limitations of clinical practice training.

Since this study was performed with nursing students from one university, using a one-group pretest-posttest design, it is difficult to generalize the results of this study. Furthermore, it is difficult to determine the continuity of the effectiveness of the simulation-based training because one module of simulation scenarios was used and students were exposed to simulation-based training for a short time and for the first time in their lives. Identifying the period of continuity will require repeated longitudinal studies. This study has its significance in that it has found that simulation-based training is effective in improving critical thinking disposition, problem-solving ability, self-leadership, and clinical competency.

5. Conclusion

This study identified that high-risk newborn care simulation training helped improve the critical thinking disposition, problem-solving ability, self-leadership, and clinical competency of senior nursing students. Based on the results of this study, the researcher of this study suggests the following for simulation-based training aimed at nursing college students and for further studies.

First, it is difficult to generalize the results of this study, which was performed with senior nursing students from a university and used a one-group pretest-posttest design. Therefore, this study suggests a longitudinal study for measuring the continuity of the effectiveness of simulation-based training.

Second, a comparative study on the level of satisfaction between training that uses a mannequin simulator and training that uses a virtual simulator needs to be conducted in proving the effectiveness of simulation-based training.

Third, efforts need to be made to improve nursing curriculums, with the ultimate aim to increase the use of simulation-based training.

ACKNOWLEDGEMENTS

This study was accomplished by research funds from Sehan University, 2023.

References

[1] S. J. Park, “A structural model on the nursing competencies of nursing simulation learners,” Unpublished master’s thesis, Konkuk University, Seoul, 2018.

[2] S. H. Lee, Y. L. Chun, K. M. Kim, and H. J. Park, “Effects of integrated simulation (delivery-operation-newborn care) practice program for nursing students,” Journal of Learner-Centered Curriculum and Instruction, vol. 15, no. 9, pp. 577-599, 2015.

[3] S. J. Park and E. S. Ji, “Clinical competence according to experience on the neonatal nursing care in nursing students and educational needs of the nursing simulation,” Journal of Learner-Centered Curriculum and Instruction, vol. 16, no. 7, pp. 97-112, 2016.

[4] H. G. Son, Y. S. Kim, S. H. Kwon, and K. S. Jeong, “The effects of simulation-based practice program on self-efficacy, critical thinking disposition, and problem-solving process of the nursing students,” Korean Academy on Communication in Healthcare, vol. 13, no. 1, pp. 63-69, 2018. doi:10.15715/kjhcom.2018.13.1.63

[5] H. J. Lee, “Development and evaluation of a therapeutic communication learning scenario using standardized patient for nursing students”, Unpublished Doctor’s dissertation, Yonsei University, Seoul, 2015.

[6] M. Y. Moon, “Effects of convergence based integrated simulation practice program on the clinical decision-making, problem- solving process, clinical competence and confidence of core fundamental nursing skill performance for nursing students,” Journal of Digital Convergence, vol. 15, no. 7, pp. 271-284, 2017. DOI: 10.14400/JDC.2017.15.7.271

[7] S. J. Park and E. S. Ji, “A structural model on the nursing competence of nursing simulation learners,” J Korean Acad Nurs, vol. 48, no. 5, pp. 588-600, 2018. DOI: 10.4040/jkan.2018.48.5.588

[8] Korean Accreditation Board of Nursing, "Certification criteria and handbook," Available from: http://www.kabone.or.kr/kabon02/index04.php (Accessed on 26 October 2022)

[9] C. Barrett and F. Myrick, "Job satisfaction in preceptorship and its effect on the clinical performance of the preceptee," Journal of Advanced Nursing, vol. 27, no. 2, pp. 364-371. DOI :10.1046/j.1365-2648.1998.00511.x

[10] M. K. Sim, S. H. Kim and K. H. Kim, "Effects of simulation-based neonatal nursing care education on communication competence, self-efficacy and clinical competency in nursing students," Journal of Digital Convergence, vol. 20, no. 2, pp. 563-571, 2022. DOI: 10.14400/JDC.2022.20.2.563

[11] K. S. Baek and J. Y. Kim, "The Effect of Team based Child care Simulation Learning on Critical thinking and Problem solving ability," Journal of the Korean Society for Multicultural Health, vol. 6, no. 2, pp. 9-15, September 2016.

[12] J. K. Kim and M. S. Song, "Effects of Respiratory Infectious Disease Simulation-based Education on Nursing Student's of Clinical Competency, Self-leadership and Critical Thinking," Journal of the Korea Academia-Industrial cooperation Society, vol. 20, no. 8, pp. 93-101, 2019. https://doi.org/10.5762/KAIS.2019.20.8.93

[13] Y. E. Kim and H. Y. Kang, "Effects of a Nursing Simulation Learning Module on Clinical Reasoning Competence, Clinical Competence, Performance Confidence, and Anxiety in COVID-19 Patient-Care for Nursing Students," J Korean Acad Nurs, vol. 53, no.1, pp. 87-100, 2023. https://doi.org/10.4040/jkan.22130

[14] J. Yoon, "A Study on the Critical Thinking Disposition of Nursing Students - Focusing on a School Applying Integrated Nursing Curriculum -," J Korean Acad Nurs Admin, vol. 14, no. 2, pp. 159-166, June 2008.

[15] I. S. Kwon, G. E. Lee, G. D. Kim, Y.h. Kim, K. M. Park, H. S. Park, S. K. Sohn, W. S. Lee, K. S. Jang,and B. Y. Chung, "Development of a Critical Thinking Disposition Scale for Nursing Students," J Korean Acad Nurs, vol. 36, no. 6, pp. 950-958, October 2006.

[16] D. H. Park and H. J. Kim, "Effects of a Simulation-based Training on Nursing Students' Knowledge, Confidence, Clinical Competence and Clinical Competence to Advanced Cardiovascular Life Support," Journal of Convergence for Information Technology, vol. 9. no. 1, pp. 61-67, 2019. DOI: https://doi.org/10.22156/CS4SMB.2019.9.1.061

[17] B. Y. Kim and E. S. Lee, "Effects of a Simulation Practicum using Standardized Patients on Communication Skills, Critical Thinking Disposition and Clinical Competency in Nursing Students: Diabetic Care," Journal of East-West Nursing Research, vol. 24, no. 2, pp. 91-100, 2018. https://doi.org/10.14370/jewnr.2018.24.2.91

[18] K. J. Kim, Y. S. Ha, and Y. K. Park, "The Effects of Virtual Simulation Program based Convergence Action Learning on Problem-Solving, Critical Thinking, Communication Skills, and Clinical Competency of the Nursing students," Journal of The Korea Convergence Society, vol. 13. no. 5, pp. 489-499, 2022. DOI: https://doi.org/10.15207/JKCS.2022.13.05.489

[19] E. J. Kim, "The Influencing Factors on Clinical competence in Simulation-based Education among Nursing Students," Journal of Learner-Centered Curriculum and Instruction, vol. 21, no. 14, pp. 711-720, 2021. https://doi.org/10.22251/jlcci.2021.21.14.711

[20] S. J. Lee, Y. K. Chang, H. N. Lee, and K. Y. Park, "A study of the development of life-skills: communication, problem solving, and self-directed learning," Korean Educational Developmental Institute, 1-145. Report No.: RR 2003-15-3, 2003 October.

[21] Y. J. Ju, "Effect of Self-Leadership and Self-Efficacy on Problem Solving Ability among Nursing Students," Journal of Learner-Centered Curriculum and Instruction, vol. 20, no. 4, pp. 745-762, 2020. http://dx.doi.org/10.22251/jlcci.2020.20.4.745

[22] Cevik, A. B and Olgun, N. "Do problem-solving skills affect success in nursing process applications? An application among Turkish nursing students," International Journal of Nursing Knowledge, vol. 26, no. 2, pp. 90-95, 2015. DOI: 10.1111/2047-3095.12043

[23] C. C. Manz, "The art of self-leadership: strategies for personal effectiveness in your life and work," Hoboken: Prentice-Hall, 1983.

[24] J. Y. Yoo, Y. H. Lee, and Y. K. Ha, "A Convergence Study on the Effects of Self-leadership and Job Satisfaction on Nursing Performance in General Hospital Nurses," Journal of Convergence for Information Technology, vol. 9. no. 10, pp. 28-38, 2019. DOI: https://doi.org/10.22156/CS4SMB.2019.9.10.028

[25] S. H. Lee and J. S. Kim, "The Influence of Nursing Student's Creativity, Compassionate Competence, Self-Leadership upon Problem-solving Ability," The Society of Convergence Knowledge Transactions, vol. 8, no. 4, pp. 71-80, 2020. https://doi.org/10.22716/sckt.2020.8.4.037

[26] S. J. Kwon and Y. H. Kim, "Effects of Simulation-based Education for High-risk Maternity on Problem-solving Process, Self-leadership, Critical Thinking Disposition, and Self-efficacy in Nursing Students," Journal of Korean Society for Simulation in Nursing, vol. 8, no. 1, pp. 43-55, June 2020.

[27] J. Yoon, "Development of an instrument for the measurement of critical thinking disposition: In nursing. Unpublished doctoral dissertation," Catholic University, Seoul, 2004.

[28] J. D. Houghton and C. P. Neck, "The revised self-leadership questionnaire: Testing a hierarchical factor structure for self- leadership," Journal of Managerial Psychology, vol. 17, no. 7, pp. 672-691, 2002.

[29] Y. K. Shin, M. S. Kim, and Y. S. Han, "A Study on the Validation of the Korean Version of the Revised Self-Leadership Questionnaire(RSLQ) for Korean College Students," Korean J Sch Psychol, vol.6, no. 3, pp. 313–340, 2009.

[30] W. G. Kim, "Effects of Korean Enneagram Program on the Ego-identity, Interpersonal relationship and Self-ledership of Nursing College Students," Unpublished master's thesis, Chonnam National University, 2013.

[31] P. M. Schwirian, "Evaluating the performance of nurse: a multidimensional approach, Nursing Research," vol. 27, no. 6, pp. 347-351. DOI: http://dx.doi.org/10.1097/00006199-197811000-00004

[32] W. H. Lee, C. J. Kim, J. S. Yoo, H .K. Hur, K. S. Kim, and S. M. Lim, "Development of clinical competency measurement tool for student," Journal Nursing Science, vol. 13, no. 1, pp. 17-29, 1990.

[33] M. S. Choi, "A study on the relationship between teaching effectiveness of clinical nursing education and clinical competency in nursing students," Unpublished master's thesis, Ewha Womans University, Seoul, 2005.

[34] Korean Accreditation Board of Nursing Education, "Simulation practice standard draft," pp. 31-42. Febuary 2017.

[35] Y. A. Song, "Effects of integrative simulation practice on nursing knowledge, critical thinking, problem-solving ability, and immersion in problem-based learning among nursing students," Korean J Women Health Nurs, vol. 26, no. 1, pp. 61-71, 2020. https://doi.org/10.4069/kjwhn.2020.03.15.1

[36] S. J. Kwon, "The Effect of Simulation Integrated with Problem Based Learning(S-PBL) on Self-leadership, Critical Thinking Disposition, Goal Commitment," Journal of the Korea Convergence Society, vol. 11. no. 12, pp. 373-381, 2020. https://doi.org/10.15207/JKCS.2020.11.12.373

[37] J. H. Ahn, J. Y. Kim, and E. S. Hwang, "The Effect of Simulation-Based education on critical thinking disposition, problem solving skills and nursing process confidence in college nursing students," Asia-pacific Journal of Multimedia Services Convergent with Art, Humanities, and Sociology, vol. 9, no. 7, pp. 187-197, July 2019. http://dx.doi.org/10.35873/ajmahs.2019.9.7.017

[38] H. Y. Min, "The Effect of Simulation-based Learning in the Nursing Care of Children with Fever on Critical Thinking Disposition, Communication Confidence and Nursing Performance Confidence," Journal of Korean Society for Simulation in Nursing, vol. 7, no. 1, pp. 57-68, June 2019. https://doi.org/10.17333/JKSSN.2019.7.1.57

[39] O. S. Lee, "The Effects of Simulation-Based Practice on Critical Thinking Disposition, Communication Skill, and Clinical Performance for Nursing Students," Journal of the Korea Academia-Industrial cooperation Society, vol. 18, no. 4, pp. 93-100, 2017. https://doi.org/10.5762/KAIS.2017.18.4.93

[40] J. H. Lim, "The Effect of Virtual Reality Simulation Education on Nursing Process Competency," Journal of Digital Convergence, vol. 19. no. 9, pp. 401-409, 2021. https://doi.org/10.14400/JDC.2021.19.9.401

[41] S. M. Lim and Y. R. Yeom, "The Effect of Education Integrating Virtual Reality Simulation Training and Outside School Clinical Practice for Nursing Students," Journal of Convergence for Information Technology, vol. 10. no. 10, pp. 100-108, 2020. DOI: https://doi.org/10.22156/CS4SMB.2020.10.10.100

[42] Y. S. Kwon, “Effects of Virtual Simulation Education on Clinical Competency, Knowledge, Self-efficacy and Critical Thinking Disposition of Nursing Students,” Asia-pacific Journal of Convergent Research Interchange, vol. 9, no. 2, pp. 237-246, February 28, 2023. http://dx.doi.org/10.47116/apjcri.2023.02.19

[43] M. J. Chae and S. J. Yang, “Effect of Simulation Practice Education for Postoperative Pain Patient Nursing on Clinical Decision-making Ability, Problem-solving Process, Clinical Competency, and Self-confidence of Nursing Students,” The Journal of Humanities and Social science, vol. 13, no. 6, pp. 4721-4736, 2022. http://www.riss.kr/link?id=S50003027

[44] S. Y. Yun and J. E. Song, “Changes in Problem Solving Ability, Clinical Competency and Self-Confidence in Learning of Nursing Students in Simulation Integrated with Problem Based Learning: Focusing on Cancer Care Scenarios,” Journal of the Korea Academia-Industrial cooperation Society, vol. 22, no. 8, pp. 312-319, 2021. DOI: 10.5762/KAIS.2021.22.8.312

[45] S. M. Kwon and R. W. Kwon, “Effects of Simulation Learning on Clinical Reasoning Competence, Clinical Competence, and Academic Self-efficacy of Nursing Students,” Journal of Next-generation Convergence Technology Association, vol.7, no.2, pp. 254-262, 2023. https://doi.org/10.33097/JNCTA.2023.07.02.254

[46] S. K. Kim and U. R. Song, “Effect of Integrated Simulation Education on Nursing students’ Knowledge, Clinical performance, and Clinical reasoning competency,” Journal of Learner-Centered Curriculum and Instruction, vol. 23, no. 6, pp. 15-26, 2023. https://doi.org/10.22251/jlcci.2023.23.6.15