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Effects of Simulation-based Learning on Stress, Problem Solving Ability, Self-Efficacy, and Resilience of College Nursing Students

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Abstract

Objectives: The objective of this study was to explore the effects of the simulation-based learning program on stress, problem-solving ability, self-efficacy, and resilience of final-year nursing students in a college in South Korea.

Methods: The design of the study was a one-group pretest-posttest. The participants of this study were final-year nursing students in 2018. A total of 105 students completed it. The intervention was an 8-week simulation-based practice course. The primary and secondary outcome measures were baseline and follow-up questionnaires regarding demographic factors, stress, problem-solving ability, self-efficacy, and resilience.
Results: Problem-solving ability ($t=6.567$, $p<.001$), self-efficacy in four situations ($p<.001$) and resilience ($t=2.352$, $p=.021$) increased after simulation-based learning than before learning. Stress also increased after simulation-based learning compared to before learning ($t=5.960$, $p<.001$). The level of stress, self-efficacy, and resilience were mainly related to participants' satisfaction with their clinical placement, and interpersonal relationships ($p<.05$).

Conclusions: Simulation-based learning is expected to improve nursing students' problem-solving ability, self-efficacy, and resilience. This can lead to induce learning motivation of nursing students, improve their coping strategies for solving problems, and ultimately provide high-quality care.

Keywords: *Nursing students, Problem-solving, Resilience, Self-efficacy, Stress*

1. INTRODUCTION

For nursing students to learn core competencies of nursing, clinical placements alone may not be sufficient for comprehensive learning outcomes [1]. Although the number of nursing students has increased along with the demand for the nursing workforce, sufficient opportunities for clinical placements might not be guaranteed due to limited access to hospitals under COVID-19 circumstances [2]. In addition, opportunities for directly applying students' nursing skills to patients are likely to diminish due to the increased awareness of patients'

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rights [3]. Unlike in the past, now in hospitals where nursing students' clinical practice is mainly performed often experience very complex and diverse clinical situations, and as the demands of nursing consumers increase, effective nursing response demands improved professional nursing practice competency [4].

Also, due to increased awareness of patient's rights, where nurse training is being replaced by observation-centred practice rather than direct nursing practice [5], it is expected that nursing students will have difficulties in learning critical thinking, and problem-solving. Accordingly, to supplement the limitations of clinical practice, simulation-based learning can be used, and research on this has been recently being actively conducted [6].

Simulation-based learning is a widely proven effective pedagogical approach for students to participate in learning and developing real skills [7]. Practical education using simulation is becoming more and more integrated into nursing education [8] so that students are enabled to develop critical thinking and problem-solving abilities when implementing a scenario and at the debriefing stage [1]. In addition, it is reported that simulation-based learning makes it possible to acquire knowledge related to communication ability and clinical performance ability, and is also effective in enhancing satisfaction and confidence in practical education [9, 10].

Nursing students undergo greater stress, especially in new, unexpected situations, and the clinical practice itself can give rise to severe stress, anxiety, and dissatisfaction [11]. However, simulation-based learning is thought to reduce the perceived stress of nursing students as it focuses on real clinical situations to increase understanding of concepts and manage complex situations [12, 13]. Although there has been a study of perceived stress related to clinical practice [14], there have been few previous studies that examined the effects of perceived stress related to simulation-based learning in Korea.

For nursing students, self-efficacy is a measure of confidence in performing a given task and skill, and it is reported that the higher the self-efficacy, the higher the likelihood of successfully performing difficult tasks [15]. According to a previous study, simulation-based learning has a significant effect on the self-efficacy, self-resilience, and major satisfaction of nursing students [16], and another study showed improved self-efficacy when simulation-based professional resuscitation education was conducted for nursing students [17].

The problem-solving ability of nursing students is being emphasized in simulation-based learning [18] since it is an essential competency required of professional nurses as the ability to utilize knowledge to explore information and use it for one's own purpose in complex and unpredictable situations [19].

Therefore, this study aimed to investigate the changes in stress, problem-solving ability, self-efficacy, and resilience of nursing students when simulation-based learning was applied.

2. METHODS

2.1 Study Design

This study adopted a one-group pretest-posttest design for exploring the effects of simulation-based learning on stress, problem-solving ability, self-efficacy, and resilience of students in nursing.

2.2 Study Subjects

The subjects of this study were final-year nursing students, who attended a simulation-based practice course for eight weeks from April to June 2018 in a college in South Korea. The students were included if they were 18 years old or over, studying undergraduate nursing in the final year, and willing to provide consent to take part in the study. The sample size was calculated using the G*power program at the significance level .05, effect size .5, and statistical power .95. The minimum number of subjects determined was 45 participants. A

total of 108 students completed both baseline and follow-up questionnaires, then three were excluded due to missing data. Finally, data of 105 students were included for analysis.

2.3 Instruments

2.3.1 Demographic factors

The demographic characteristics of the participants included age, gender, motivation for selecting the major, learning style preferences, interpersonal difficulties at placement, difficulties in expressing thoughts, satisfaction with the major, clinical placement, general school life, interpersonal relationships, and previous semester results.

2.3.2 Stress

The perceived stress of the participants was measured by the 10-item Korean Perceived Stress Scale (PSS), translated and validated by Park and Seo [20]. The items of the tool were asking participants' experience in the last month on a five-point Likert scale from 0 = "never" to 4 = "very often". The positively stated items 4, 5, 7, and 8 were reversely scored when calculated a total score of all 10 items. Higher total scores indicate higher stress perceived by respondents. In the original study by Cohen and Williamson [21], Cronbach's α was .78. In the study by Park and Seo [20], Cronbach's α of the positive perception subscale was .74 and of the negative perception subscale was .77. In this study, Cronbach's α was .74.

2.3.3 Problem-solving ability

To measure problem-solving ability, the tool revised by Woo [22] from the original by Lee [23], was used for this study. This instrument consisted of 25 items, comprising five subscales—problem finding (5 items), problem defining (6 items), developing solutions (4 items), applying solutions (5 items), and reviewing (5 items). Each item was scoring on a five-point Likert scale with higher total scores representing higher problem-solving ability. Cronbach's α of the revision [22] was .89. In this study, Cronbach's α was .90 for all 25 items, and the reliabilities of the subscales were .89 for problem finding, .92 for problem defining, .90 for developing solutions, .93 for applying solutions, and .91 for reviewing.

2.3.4 Self-efficacy

Self-efficacy of the nursing students in this study was measured by the revised Neuroscience Nursing Self-Efficacy Scale (NNSES). The tool was originally developed by DiIorio and Price [24], and Kim [25] revised to examine self-efficacy of nursing students who experienced the phased simulation modules—gestational hypertension, natural birth, induced labour, and postpartum. The instrument used in this study comprised 14 items, scoring on a five-point Likert scale with higher total scores representing higher self-efficacy. Cronbach's α of the study by Kim [25] was .97, and Cronbach' α of the current study was .97.

2.3.5 Resilience

To assess resilience of the participants, the Resilience Scale-14 (RS-14) was used. This instrument, developed by Wagnild and Young [26], included 14 items about personal competence and acceptance of self and life. A seven-point Likert scale was applied to each item, ranging between 1 (strongly disagree) and 7

(strongly agree). A total score can be calculated by summing up the 14 items with higher scores indicating higher resilience. The subtotal scores of personal competences (10 items) and acceptance of self and life (4 items) can be grouped as very low (14-56), low (57-64), moderately low (65-73), moderately high (74-81), high (82-90), and very high (91-98). The Cronbach's α was .93 in the study by Wagnild and Young [26], and .92 for this study.

2.4 Operation of Simulation-based Learning

Table 1 presents the simulation-based learning program of the current study. In this program, a total of 750 minutes of education was implemented for 8 weeks as the intensive semester operation. Prior to simulation-based learning, one of the authors in charge of women's health nursing conducted a 100-minute lecture, divided into 50 minutes twice. The lecture consisted of theoretical education for helping participants acquire relevant knowledge and the orientation, including explanation of the procedure of the program, team building, and distribution of roles.

Simulation-based learning had four modules, related to high-risk pregnancy and childbirth (gestational hypertension, natural birth, induced labour, and postpartum haemorrhage). Each module comprised a pre-class for 15 minutes, pre-briefing for 15 minutes, simulation for 75 minutes, debriefing for 25 minutes, evaluation and make-up for 20 minutes. The pre-class was to learn about high-risk pregnancy and childbirth situations and to complete the concept map for each group based on the shared information. In the pre-briefing, students shared clues, related factors, possible complications, and preventive management. The simulation was conducted according to the situation per team, while the other groups reviewed theory, practical skills, and team activities. The peer evaluation was also performed at this stage. In the debriefing session, colleagues and the instructor discussed good points, disappointing points, and complementary points about their performance in simulation. Evaluation and make-up were made as supplementary to individual and team activities.

Table 1. Simulation-based Learning

Sequence (min)		Total runtime (min)	Contents	Methods
Orientation		100	-Relevant theoretical education -Introduce: program, evaluation, role -Team building and role distribution	Lecture
Module X 4	Pre-class (15)	60	-Learn about a given situation -Create a concept map for each group	Guidebook
	Pre-briefing (15)	60	-Find clues to the problem	Discussion Guidebook
	Simulation (75)	300	-Simulation running -Theory and practical review -Peer evaluation	Team-play
	Debriefing (25)	100	-Discussion with colleagues and an instructor	Discussion Guidebook
	Evaluation & Make-up (20)	80	-Individual and group	Team-play Guidebook
Knowledge test		50	Selective or essay-type evaluation	
Total		750		

2.5 Data Collection and Human Subjects' Protections

Data for this study were collected from a college, located southern part of South Korea, between April 2018 and June 2018. Prior to commencement of the 8-week simulation-based practice course, the researcher explained the purpose and data collection process of this study. Only the participants who signed the consent answered the baseline and the follow-up questionnaires. The baseline questionnaire included questions for demographic factors, stress, problem-solving ability, and resilience, and the follow-up questionnaire included the same questions except for the demographic factors.

The consent explained that the participation was entirely voluntary, the questionnaires were anonymous, all the answers were confidential, the information obtained would only be considered for the purpose of the research, all scored measurements would be kept in a secure, private location, and that there would not be adverse effects, risks, or benefits in relation to participation in this study.

2.6 Data Analysis

The collected data were analysed with SPSS version 26.0 (SPSS Inc., Chicago, IL, USA). The statistical significance level was set at $p<.05$ (two-tailed). To analyse demographic factors of the participants, a descriptive analysis, including frequencies, percentages, means, and standard deviations (SD), was performed. Means and SDs were calculated with the total scores of the perceived stress scale, problem-solving ability, self-efficacy, and resilience. Paired-samples t-tests were performed to examine changes in the perceived stress, problem-solving ability, self-efficacy, and resilience of the participants. Independent samples t-test and one-way ANOVA for non-continuous variables were applied to analyse differences in the perceived stress, problem-solving ability, self-efficacy, and resilience.

3. RESULTS

3.1 Participants' Characteristics

The age range of the participants was between 20 and 48 with the mean age of 25.16±6.35. Female students were dominant at 93.3% (n=98), the majority of the participants chose the nursing major due to either future employability (n=43, 41.0%) or consideration of their aptitude (n=44, 41.9%). The participants preferred learning by lecture (n=47, 44.8%) or practice (n=25, 23.8%), discussion or problem-based learning (n=7, 6.7%) (Table 2).

Table 2. Participants' Characteristics at Baseline (N = 105)

Participants' characteristics		Mean ± SD	
Age (years)	Range: 20-48	25.16 ± 6.35	
		N	%
Gender	Male	7	6.7
	Female	98	93.3
Motivations for selecting the major	Future employability	43	41.0
	Aptitude	44	41.9
	Others	18	17.1
Learning style preferences	Lecture	47	44.8
	Practice	25	23.8
	Others	33	31.5

Interpersonal difficulties at placement	Nurses	44	41.9
	Doctors	16	15.2
	Patients	27	25.7
	Colleagues	18	17.1
Difficulties in expressing thoughts	Difficult	19	18.1
	Neutral	45	42.9
	Easy	41	39.0
Satisfaction with major	Satisfied	63	60.0
	Neutral	42	40.0
Satisfaction with clinical placement	Satisfied	71	67.6
	Neutral	34	32.4
Satisfaction with general school life	Satisfied	45	42.8
	Neutral	60	57.2
Satisfaction with interpersonal relationships	Satisfied	70	66.6
	Neutral	35	33.4
Satisfaction with previous semester results	Satisfied	14	13.3
	Neutral	51	48.6
	Unsatisfied	40	38.1

3.2 Changes in Stress, Problem-Solving Ability, Self-Efficacy, and Resilience

Table 3 shows the changes in the dependent variable—stress, problem-solving ability, self-efficacy, and resilience before and after simulation-based learning. Problem-solving ability ($t=6.567$, $p<.001$), self-efficacy in four situations ($p<.001$) and resilience ($t=2.352$, $p=.021$) increased after simulation-based learning than before learning. Stress also increased after simulation-based learning compared to before learning ($t=5.960$, $p<.001$).

Table 3. Changes in Stress, Problem-Solving Ability, Self-Efficacy, and Resilience (N = 105)

Variables (range)	Baseline		Follow-up		Mean difference (95% CI)	t	p
	Mean	SD	Mean	SD			
Stress	21.82	5.26	24.66	5.43	2.84 (1.89, 3.78)	5.960	.000
Problem solving ability	84.10	10.41	90.43	11.50	6.32 (4.41, 8.23)	6.567	.000
Self-efficacy							
Gestational HT	44.32	7.06	57.00	6.46	12.68 (11.15, 14.20)	16.459	.000
Natural birth	43.60	7.09	55.71	6.51	12.11 (10.64, 13.59)	16.326	.000
Induced labour	43.04	6.84	56.23	6.67	13.19 (11.79, 14.59)	18.654	.000
Postpartum	43.39	6.97	26.46	6.30	13.07 (11.65, 14.48)	18.275	.000
Resilience	70.90	12.76	73.26	13.70	2.35 (0.37, 4.34)	2.352	.021

HT=hypertension; SD=Standard Deviation

3.3 Differences in Stress, Problem-Solving Ability, Self-Efficacy, and Resilience

Table 4-1 and Table 4-2 presented differences in stress, problem-solving ability, self-efficacy, and resilience by participants' characteristics, including age, expressing thoughts, satisfaction, motivations, interpersonal difficulties, and learning style.

The level of stress was higher in students who felt neutral in general to school life than those satisfied (t=6.96, p=.010). Self-efficacy in gestational hypertension was higher in participants who were satisfied in their major (t=4.69, p=.033) and in their clinical placement (t=6.34, p=.013) than those neutral. Scores of self-efficacy in natural birth, in induced labour, and in postpartum were higher among the students who were satisfied with their clinical placement (t=11.33, p=.001; t=11.11, p=.001; t=4.88, p=.029, respectively) and with their interpersonal relationships (t=4.27, p=.041; t=6.84, p=.010; t=5.36, p=.023, respectively). Higher scores of participants' resilience was associated with older age (t=4.38, p=.015) and satisfaction with their clinical placement (t=9.19, p=.003), general school life (t=14.97, p<.001), and interpersonal relationships (t=15.05, p<.001). The participants' expressing of thoughts, motivations for selecting the major, interpersonal difficulties at placement, and learning style preference was insignificantly related to levels of stress, problem-solving ability, self-efficacy, and resilience (p>.05).

Table 4-1. Differences in stress, problem solving ability, and resilience (n =105)

Participants' characteristics		Stress		Problem Solving		Resilience	
		M±SD	t / F (p)	M±SD	t / F (p)	M±SD	t / F (p)
Age (years)	20~21	24.45±4.95	1.43 (.244)	94.42±10.89	3.02 (.053)	71.85±13.11	4.38 (.015)
	22~29	25.24±5.73		88.61±11.12		71.80±13.94	
	30~48	22.46±4.91		88.54±13.01		83.46±10.07	
Expressing thoughts	difficult	26.11±5.00	1.87 (.167)	87.32±11.11	2.38 (.124)	64.74±16.33	7.89 (.144)
	neutral	25.13±5.28		89.09±10.71		72.00±13.76	
	easy	23.46±5.65		93.34±12.13		78.59±9.72	
Satis. with major	satisfied	24.63±5.61	0.00 (.959)	91.57±11.97	1.56 (.214)	75.37±12.91	3.83 (.053)
	neutral	24.69±5.21		88.71±10.68		70.10±14.39	
Satis. with clinical placement	satisfied	24.15±5.52	1.90 (.172)	91.90±11.69	3.69 (.058)	75.96±10.96	9.19 (.003)
	neutral	25.70±5.15		87.35±10.62		67.62±16.99	
Satis. with general school life	satisfied	23.09±5.67	6.96 (.010)	91.33±12.41	0.49 (.488)	78.86±9.63	14.97 (.000)
	neutral	25.83±4.96		89.75±10.83		69.05±14.82	
Satis. with interpersonal relationships	satisfied	23.94±5.26	3.74 (.056)	91.61±11.48	2.26 (.136)	76.70±11.66	15.05 (.000)
	neutral	26.08±5.54		88.05±11.35		66.37±15.00	
Satis. with previous sem. results	satisfied	23.78±6.35	0.14 (.521)	89.50±13.61	0.10 (.747)	73.21±11.43	0.00 (.990)
	neutral	24.79±5.30		90.57±11.22		73.26±14.07	
Motivations for selecting the major	Emp. rate	24.86±5.30	0.73 (.457)	89.53±11.19	0.52 (.710)	72.33±13.51	6.74 (.284)
	aptitude	24.00±6.07		91.77±11.99		77.73±12.08	
	others	25.78±3.88		89.28±11.32		64.56±13.94	
Interpersonal difficulties at placement	nurses	25.23±5.04	0.92 (.606)	89.89±11.72	0.70 (.546)	74.70±14.28	1.46 (.243)
	doctors	23.81±6.51		87.81±12.30		75.75±12.80	
	patients	23.52±5.18		92.85±8.25		73.33±12.11	
	Co.	25.72±5.72		90.43±14.41		67.39±14.69	
Learning style preferences	lecture	25.36±5.57	2.16 (.143)	91.87±11.91	0.71 (.544)	74.32±14.34	0.27 (.808)
	practice	22.72±4.92		88.72±10.20		72.80±14.92	
	others	25.21±5.39		89.67±11.92		72.09±12.02	

Satis.=Satisfaction; Emp.=employment; Co.=colleagues; Sem.=semester.

Table 4-2. Differences in self-efficacy (n =105)

Participants' characteristics		Self-efficacy							
		Gestational HT		Natural birth		Induced labour		postpartum	
		M±SD	t / F (p)	M±SD	t / F (p)	M±SD	t / F (p)	M±SD	t / F (p)
Age (years)	20~21	58.12±6.53	0.75 (.473)	57.24±6.43	1.35 (.263)	57.88±6.36	1.50 (.229)	57.91±7.02	1.39 (.262)
	22~29	56.58±5.97		55.08±6.06		55.42±6.58		55.66±5.66	
	30~48	56.08±8.39		54.69±8.40		55.69±7.60		56.38±6.98	
Expressing thoughts	difficult	53.16±6.58	4.57 (.883)	51.89±6.81	5.22 (.529)	51.26±7.44	7.34 (.915)	53.16±6.06	3.97 (.651)
	neutral	57.47±6.45		55.69±5.83		57.00±5.85		56.49±5.99	
	easy	58.27±5.86		57.51±6.47		57.68±6.21		57.95±6.30	
Satis. with major	satisfied	58.09±6.57	4.69 (.033)	56.47±6.75	2.18 (.143)	57.22±6.26	3.58 (.061)	57.39±6.38	3.59 (.061)
	neutral	55.36±5.99		54.57±6.04		54.74±7.06		55.05±5.97	
Satis. with clinical placement	satisfied	58.07±6.41	6.34 (.013)	57.12±6.48	11.33 (.001)	57.66±6.49	11.11 (.001)	57.38±6.41	4.88 (.029)
	neutral	54.76±6.04		52.76±5.61		53.23±6.10		54.52±5.67	
Satis. with general school life	satisfied	57.71±6.79	0.96 (.331)	56.62±7.07	1.54 (.218)	57.57±6.32	3.29 (.072)	57.68±6.59	3.07 (.083)
	neutral	56.46±6.20		55.03±6.03		55.21±6.79		55.53±5.96	
Satis. with interpersonal relationships	satisfied	57.60±6.47	1.83 (.179)	56.62±6.62	4.27 (.041)	57.40±6.03	6.84 (.010)	57.44±6.42	5.36 (.023)
	neutral	55.80±6.36		53.88±5.96		53.89±7.33		54.49±5.64	
Satis. with previous sem. results	satisfied	57.57±5.94	0.13 (.724)	54.50±7.04	0.56 (.456)	54.71±6.92	0.83 (.364)	56.57±5.02	0.01 (.942)
	neutral	56.91±6.56		55.90±6.45		56.46±6.64		56.43±6.50	
Motivations for selecting the major	Emp. rate	57.47±5.64	3.18 (.961)	55.84±5.90	2.72 (.835)	56.30±6.08	2.88 (.796)	57.21±5.99	3.43 (.999)
	aptitude	57.93±6.18		56.84±6.13		57.45±5.96		57.14±5.86	
	others	53.16±8.06		52.71±8.08		53.06±8.73		53.00±7.19	
Interpersonal difficulties at placement	nurses	55.70±7.17	1.20 (.533)	54.86±6.89	1.23 (.486)	55.52±6.59	0.83 (.684)	55.64±7.19	1.04 (.584)
	doctors	57.12±5.51		56.50±6.50		55.63±7.19		55.88±5.33	
	patients	58.56±5.47		57.48±5.98		57.96±6.19		58.26±5.37	
	Co.	57.72±6.60		54.44±6.19		55.89±7.19		56.28±5.98	
Learning style preferences	lecture	56.36±7.03	0.43 (.719)	55.55±6.87	0.04 (.963)	55.45±7.35	0.61 (.601)	55.96±6.59	0.57 (.645)
	practice	57.32±5.68		56.00±6.30		57.12±5.90		56.12±5.87	
	others	57.67±6.26		55.73±6.34		56.67±6.26		57.42±6.27	

HT=hypertension; Satis.=Satisfaction; Emp.=employment; Co.=colleagues; Sem.=semester.

4. DISCUSSION

This study was carried out to investigate nursing students' perceived stress, problem-solving ability, self-efficacy, and resilience after application of simulation-based learning.

In the present study, the overall level of stress showed a statistically significant increase after simulation-based learning. This result is in line with findings of an integrative review [8] and a study by Ha & Jung [27]. It can be assumed that the psychological burden of nursing students increased when experiencing simulation-based nursing education. Also, the fact that students might be unfamiliar with high-fidelity simulation can be one of the reasons [8]. However, as shown in the integrative review study [8], students were aware that simulation was valuable for improving their competency. In addition, in the study by Oh & Han [28], experiencing simulation-based learning seemed to reduce anxiety, and the appropriate amount of stress might give rise to optimal performance by nursing students [29].

The problem-solving ability of the participants in this study significantly improved after experiencing simulation-based learning. A similar result was also found in the studies by Lee et al. [30], whose subjects were junior nursing students, and by Lee et al. [31], whose subjects were senior nursing students. Being placed

in the situations close to actual clinical ones might have helped individuals in handling information regarding circumstances and problematic situations, as well as in improving their performance skills, which could affect their problem- solving ability [32].

The participants' self-efficacy also increased after experiencing simulation-based learning in all four scenarios—gestational hypertension, natural birth, induced labour and postpartum. The result was in line with the previous study which applied simulation-based learning to the 2nd-year nursing students [28]. Self-efficacy consists not only confidence and belief in one's values and abilities, but also in self-regulation, indicating how much individuals can control their actions to achieve a goal [15]. It is believed that attempting to solve the patient's problems could increase nursing students' self-efficacy by actually planning and implementing interventions in scenarios close to the actual situation.

This study's findings revealed that participants' resilience increased after simulation-based learning. Resilience can be referred to as one of the important abilities for nursing students to overcome difficult situations, such as a stressful experience during clinical practice [33]. Nursing students with high resilience would be able to adapt well to the clinical practice [34], so simulation-based learning can be considered to increase adaptability in their clinical practice.

The limitations of this study were as follows. First, it is difficult to rule out the possibility that personal factors were involved in the subjects' answers because the tool measurement method relied on self-reporting. Second, since the study was conducted in only one educational institution, there is a concern about generalisation of the study findings. There is a limit to the results' interpretation because a single group pretest-posttest design was applied without a control group.

Nevertheless, this study was meaningful for confirming that simulation-based learning in women's health nursing was effective in improving the problem-solving ability, self-efficacy, and resilience of nursing students. The opportunities for nursing students may be limited for practising gestational hypertension, natural birth, induced labour and postpartum in the clinical situation due to patients' demands for their privacy and rights. Thus, simulation-based programs would be the effective replacement for nursing students. In addition, resilience was also measured in the present study, which could be as important as coping with stress for adapting to difficulties. Based on the main findings of the study, future studies are suggested as follows. First, planning simulation-based learning programs with appropriate consideration should be prepared to control the causes of stress and to reduce them. Second, studies with a large number of samples would be recommended to generalise the results of this study.

5. CONCLUSIONS

In this study, simulation-based learning, applied various scenarios related to women's health nursing, is expected to improve nursing students' problem-solving ability, self-efficacy, and resilience. This can lead to induce learning motivation of nursing students, to improve their coping strategies for solving problems, and ultimately provide high quality care. The placement of nursing students in a ward for women's health might be sensitive and reluctant for patients, therefore, it would be meaningful and effective for nursing students to take part in a simulation-based learning program including various scenarios related to women's health nursing. Additionally, considering that stress of the nursing students increased after the simulation-based learning, appropriate strategies such as thorough pre-briefing should be contemplated.

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