Araştırma Makalesi
(Research Article)

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The Effect of Simulation-Based Neonatal Resuscitation Program Training on Clinical Stress and Stress Coping Behaviors among Nursing Students

Hemşirelik Öğrencilerine Verilen Simülasyonlu Neonatal Resüsitasyon Programı Eğitiminin Klinik Stres ve Stresle Baş Etme Davranışlarına Etkisi

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ABSTRACT

Objective: Clinical stress level and coping behaviors of nursing students are important for ensuring of quality of nursing care. Instructors can employ simulation-based teaching to enhance students' abilities to cope with stress. This study aims to evaluate the effect of simulation-based Neonatal Resuscitation Program training on clinical stress and stress coping behaviors among nursing students.
Methods: The research is a quasi-experimental study with a control group. The sample of the study consisted of 99 nursing students enrolled in the Pediatric Nursing program in the 2023-2024 academic year. Data were collection using Demographic Information Form, the Clinical Stress Questionnaire and the Coping Behaviors of Stress Scale for Nursing Students.
Results: The post-test mean scores of the Coping Behaviors of Stress Scale for Nursing Students between the groups, as well as the pre-test-post-test mean scores of the intervention group showed a statistically significant difference ($p<0.001$).
Conclusion: It was concluded that the simulation-based Neonatal Resuscitation Program training improved the stress coping behaviors of nursing students.

ÖZ

Amaç: Hemşirelik öğrencilerinin, hemşirelik temel becerilerini öğrenmelerinde klinik stres seviyeleri ve baş etme davranışları önemlidir. Öğretim elemanları öğrencilerin stresle baş etme davranışı geliştirebilmeleri için simülasyonlu öğretimi kullanabilir. Bu çalışmada hemşirelik öğrencilerine verilen simülasyonlu neonatal resüsitasyon programı eğitiminin klinik stres ve stresle baş etme davranışlarına etkisini değerlendirmek amaçlanmaktadır.
Yöntem: Araştırma kontrol gruplu yarı deneysel tipte bir araştırmadır. Araştırmanın örneklemini 2023-2024 eğitim öğretim yılında Çocuk Sağlığı ve Hastalıkları Hemşireliği dersini alan 99 hemşirelik öğrencisi oluşturdu. Araştırma verileri, öğrencilere ait Demografik Bilgi Formu, Klinik Stres Anketi ve Hemşirelik Öğrencileri İçin Stresle Baş Etme Davranışları ölçeği ile elde edilmiştir.
Bulgular: Gruplar arası son test Hemşirelik Öğrencileri İçin Stresle Baş Etme Davranışları Ölçeği puan ortalamaları ve eğitim grubunun Hemşirelik Öğrencileri İçin Stresle Baş Etme Davranışları Ölçeği ön test-son test puan ortalamaları istatistiksel olarak anlamlı farklılık göstermiştir($p<0,001$).
Sonuç: Simülasyonla verilen neonatal resüsitasyon programı eğitiminin hemşirelik öğrencilerinin stresle baş etme davranışlarını geliştirdiği sonucuna varılmıştır.

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INTRODUCTION

Stress in the daily life cycle is a complex response to stimuli that can be physiological, emotional, cognitive and behavioral (Gallego-Gómez et al., 2020; Yurdakul and Beydağ, 2023). This response can appear in nursing students' lives as financial problems, environmental changes, exam stress and clinical stress (Gallego-Gómez et al., 2020). Clinical stress is defined as a situation that affects the students' self-confidence and anxiety levels in decision-making in the clinical settings, thereby impairing their ability to recall information and translate knowledge into clinical skills. Factors such as witnessing patients' challenging processes, experiencing a lack of confidence during clinical practice, the potential for committing errors, feeling inadequate in answering patients' questions and performing professional skills, as well as difficulties in using advanced technological equipment, can all contribute to clinical stress among nursing students (Bektaş, Ayar, and Akdeniz Kudubeş 2020; Şenocak and Demirkıran, 2023). In particular, providing care to pediatric patients, communicating, administering pediatric medications or performing invasive procedures can cause clinical stress in nursing students (Menekşe et al., 2024). This stress can negatively affect learning outcomes, the quality of care provided by nursing students, and their professional identity development (Gallego-Gómez et al., 2020; Kahraman and Akgün, 2022).

Enhancing the management of clinical stress is among the strategies that will help alleviate these negative effects (Kahraman and Akgün, 2022). The ability of nursing students to effectively cope with clinical stress is an important condition that shows the effectiveness of the education they receive (Yurdakul & Beydağ, 2023). In a study conducted on nursing students in Turkey, it was stated that problem-solving was the most frequently exhibited coping behavior, followed by optimism (Ergin, Çevik and Çetin, 2018). Stress coping behaviors, a crucial factor in managing clinical stress, represent an essential concept that needs to be developed among nursing students.

Simulation, in the context of health and nursing education; It is a method that enhances students' theoretical knowledge and skills by preparing them for clinical practice through imitation and simulation (Oliveira Silva et al., 2023). Although clinical practice offers opportunities for learning and skill development, nursing students experience stress when caring for real patients in clinical settings (Sarvan and Efe; 2021). Simulating the clinical environment in nursing education helps students acquire clinical experience, thereby enabling them to cope more effectively with the stress encountered when caring for real patients (Sarvan and Efe, 2021). Simulation-based education in nursing has been reported to alleviate clinical stress caused by communication problems with other disciplines in the clinical setting facilitate nursing students' adaptation to the clinical environment post-graduation, and reduce their stress by promoting easier adjustment (Atakoğlu et al., 2020; Süha and Karagözoğlu, 2024). In a study, it was reported that pediatric clinical simulation with standardized patients increased self-efficacy and reduced anxiety levels in among nursing students (Weston et al., 2021). In another study conducted with a high-fidelity pediatric standardized patient simulation in a pediatric transplant team, the use of simulation was found to enhance intra-team communication skills (Peterson, Porter and Calhoun, 2020). A study using a pediatric simulation model in education indicated that nursing students in the simulation group experienced increased satisfaction and confidence (Dağ, Yayan, Yıldırım and Sülün, 2023). High-fidelity simulators are computer-controlled, full-body mannequins that can give realistic physiological responses to students' interventions and monitor vital signs (Atakoğlu et al., 2020; L'Her et al., 2020). Physiological parameters such as audible heart and lung sounds, observable lung movements, and assessable signs cyanosis can be adjusted via computer control during simulation to align with the performed intervention (Ayed et al., 2022). The repeatability of simulation without the risk of harming patients provides significant advantages in reducing students' stress and enhancing the overall effectiveness of the education. In addition, simulation that enables collaborative interventions in a simulated clinical environment supports the development of intra-team communication and teamwork skills. Team communication, another clinical stress factor, can also be improved through the use of simulation (Sarvan and Efe, 2021).

The neonatal resuscitation program (NRP) is a neonatal resuscitation procedure consisting of four steps: stabilization, ventilation, chest compressions, and epinephrine administration (American Heart Association Guidelines, 2020). NRP is inherently stressful, requiring rapid, practical, and calm demeanor. Therefore, NRP training was specifically selected to address students' clinical stress. Faculty members have a responsibility to support nursing students who experience clinical stress during emergencies like neonatal resuscitation and, at times, lack the understanding of how to effectively cope with it, through various educational methods and clinical orientation processes. However, no studies evaluating the effects of simulated NRP training on clinical stress and stress-coping behaviors were found in the nursing literature. This research is based on the assumption that simulation-based NRP training will also positively influence clinical stress and stress coping behaviors, thereby enhancing nursing education outcomes.

The present study is designed to investigate the influence of simulation-based NRP training on clinical stress and coping behaviors among nursing students, thereby contributing evidence to guide future nursing education and research. In line with this purpose, answers to the following research questions were sought:

1. Does simulation-based Neonatal Resuscitation Program (NRP) training affect students' clinical stress levels?

2. Does simulation-based Neonatal Resuscitation Program (NRP) training affect students' stress coping behaviors?

METHODS

Research Design

This research is a quasi-experimental study with a control group. There are two groups in the study: one receiving simulation-based education and a control group.

Population and Sample

The study population comprised 106 third-year nursing students enrolled in the Pediatric Nursing course at the Nursing Department of Balıkesir University Faculty of Health Sciences in the 2023-2024 academic year. In the study, randomization was performed through simple random sampling (drawing), ensuring that each student had an equal chance of participation. A number between 1 and 106 was assigned to each student in the computer environment, and the students were allocated to the experimental and control groups using Microsoft Excel software. Although the was to include the entire population, the final study sample consisted of 44 nursing students in the simulation group and 45 in the control group (a total of 89 students) due to four students in the simulation group having incomplete data forms, five students being absent from class, and eight students in the control group declining to participate in the survey.

Inclusion criteria for the study

Nursing students who were third-year nursing students and students of the child health and disease nursing department at the relevant institution, who were continuing their education at the time the study was conducted, and who agreed to participate in the study voluntarily were included in the study.

Implementation of the Simulation Training

Pediatric Nursing course has a total of 10 hours of clinical practice per week. Of these, eight hours are conducted in a hospital setting, while the remaining two hours take place in the classroom. During the two-hour in-class practice sessions, the instructors introduced and demonstrated the care of a newborn requiring NRP intervention in the delivery room through case-based scenarios during the first two weeks of the course. During the fourteen-week training period, students in the simulation group worked in groups of three and applied case-based scenarios to manage the care of a newborn requiring NRP in the delivery room. Their performance in managing the case during the simulation was observed by the course instructors. Following the simulation, instructors conducted an evaluation session with students, reviewing the skill checklists completed by the instructors and video recordings of students practicing in the simulation room. This provided students with the opportunity to monitor and evaluate themselves. It should be noted that the simulation-based NRP practice was solely for learning purposes and was not used for grading.

Simulation and Control Groups in the Study

1.Simulation Group: This group consisted of 44 nursing students enrolled in the Pediatric Nursing course. Prior to the intervention, students were informed about the study and completed the Demographic Information Form, the Clinical Stress Questionnaire and the Coping Behaviors of Stress Scale for Nursing Students through face-to-face interviews. To ensure participants completed the data form fully, verify their identity, and expedite the data collection process, data was collected in person. Students then entered the simulation room in groups of two. Researchers monitored the students in the observation room, which contained the simulation room's control panel. The students first performed an initial examination of the high-fidelity newborn and determined the need for resuscitation. During this phase, known as the golden minute, they performed the resuscitation steps. During this time, the newborn's characteristics, which were set to cyanotic, heart rate apex 60, and saturation 60%, were adjusted using the control panel in the observation room based on the students' correctness of the steps. These were then adjusted to healthy newborn parameters, and the newborn's crying was then audible. After the simulation applications, the Clinical Stress Questionnaire and the Coping Behaviors of Stress Scale for Nursing Students were applied to the students again.

2.Control group: This group consisted of 45 nursing students enrolled in the Pediatric Nursing course. During the first two weeks of the course, the instructors explained the care of a newborn requiring NRP intervention and demonstrated it practically using a conventional mannequin (non-simulator). Throughout the fourteen-week academic term, the students worked in groups of three to apply the care for a newborn requiring NRP on the conventional mannequin. Prior to the intervention, the Demographic Information Form, the Clinical Stress Questionnaire and the Coping Behaviors of Stress Scale for Nursing Students through face-to-face interviews. After the mannequin–based practice sessions, the Clinical Stress Questionnaire and the Coping Behaviors of Stress Scale for Nursing Students were re- administered.

Case example used in simulation

A 31-year-old mother with $G_2P_1A_1$ and regular follow-ups during pregnancy was taken to the delivery room upon the onset of labor at 38 weeks of gestation. It is known that the mother has gestational hypertension. When the fetus was monitored for fetal heart movements, several slowdowns were recorded in the fetal heart movements. The neonatal resuscitation team was also present in the delivery room due to the slowdown in fetal heart movements. When the birth event occurred, the baby appeared to be term, there was no muscle tone, the baby did not have spontaneous breathing or crying. The umbilical cord was clamped and cut immediately after birth.

Data Collection Tools

Demographic Information Form: There are 11 questions in total regarding students' age, gender, place of residence, income perception, high school graduation, transcript score, people they live with, employment status, hospital experience and simulation application (Ayed et al., 2022; Costa et al., 2020).

*Clinical Stress Questionnaire***:** It was developed by Pagana in 1989 to measure students' stress levels. The Turkish validity and reliability of the scale was carried out by Şendir and Acaroğlu (2008). The Clinical Stress Questionnaire is a Likert-type self-assessment scale and the items of the survey are collected under 4 scales consisting of "Threat, Struggle, Harm and Benefit" emotion expressions. In the Clinical Stress Questionnaire, the threat scale is “6” (I was upset, worried, overwhelmed, touched, intimidated/intimidated, scared), the struggle scale is “7” (I was aroused, joyful, hopeful, liked, enthusiastic, excited, happy), the harm scale is “5” (I was angry, sad, guilty, disgusted/disgusted, disappointed), and the benefit scale is “2” (I was relieved, trusted). Each item is evaluated on a 5-point scale and it is requested to mark one of the following options: 0-“not at all”, 1-“a little”, 2-“moderate”, 3-“a lot”, 4-“a lot”. Based on the score given for each item, a minimum of “0” and a maximum of “80” points can be obtained from the survey. A low score indicates a low level of stress, while a high score indicates a high level of stress. The Cronbach's alpha coefficient of the scale was reported as 0.70.

The Coping Behaviors of Stress Scale for Nursing Students: The scale developed by Sheu et al. consists of 19 items (Sheu, Lin and Hwang,2002). The Turkish validity and reliability of the scale was conducted by Karaca et al.,2015. The Cronbach's alpha coefficient of the scale was reported as 0.76. The scale is a five-point Likert-type scale. The evaluation of the items of the scale is as follows; '4– I agree, 3, 2, 1, 0– I strongly disagree'. The scale consists of four sub-dimensions. These sub-dimensions are "1. Staying optimistic, 2. Transfer, 3. Problem solving and 4. Avoidance". A high score in a factor means that this coping style is used more frequently. The higher the score of the sub-dimension, the more frequently the student uses that coping strategy (Sub-dimension total scores: 16, 12, 24, 24).

Data Analysis

All data were recorded and analyzed using SPSS for Windows version 21. The Shapiro-Wilk test was employed to assess the normality of the distribution. Descriptive statistics (number, percentage, and mean) were used for the basic analysis of the data. Mann-Whitney U test and Pearson Chi-Square Test were used to determine the differences between the groups in demographic variables. Due to the non-normal distribution of the pre- and post-test scores, the Wilcoxon Signed-Rank test was used to analyze score differences within groups, and the Mann-Whitney U test was used to compare differences between groups. A significance level of 0.05 was set for all statistical tests.

Ethical Considerations

Before the study, ethical approval was obtained from the Non-Interventional Ethics Committee of Balıkesir University (Desicion No: 2023/127, Date: 5 December 2023). Before starting the research, institutional permission was obtained from the Balıkesir University Health Sciences Faculty Nursing Department. Students were informed about the study and their written consent was obtained. The research abided by the principles of the Helsinki Declaration (Turkish Medical Association, 2024).

RESULTS

Demographic characteristics of the participating students, along with their distribution by group, are presented in Table 1. When Table 1 is examined, no statistically significant differences were found between the groups in terms of age, gender, grade point average, high school graduation, previous simulation training, or case-based simulation training (p>0.05) (Table 1).

Table 1. Findings regarding comparison of demographic variables between groups.

Variable		Group				Z	P
		Simulation group		Control group			
		mean±Sd		mean±sd			
Age		21.47±1.13		21.68±1.10		-1.266	0,206
Variable	**Group**	**Group**				**X^2**	**p**
		Simulation group		**Control group**			
		n	**%**	**n**	**%**		
Gender	Female	37	84.1	31	68.9	2.852	0,091
	Male	7	15.9	14	31.1		
Transcript score	2.00 and below	6	13.6	4	8.9	0.780	0,677
	2.01-2.99	28	63.6	28	62.2		
	3.00 and above	10	22.8	13	28.9		
Graduated high school	Science/Anatolian High School	42	95.5	39	86.7	1.163	0,281
	Health Vocational High School	2	5.5	6	13.3		
Previous experience with simulation training	Yes	8	18.2	9	20.0	0.048	0,827
	No	36	81.8	36	80.0		
Previous experience with case-based simulation training	Yes	7	15.9	3	6.7	1.905	0,167
	No	37	84.1	42	93.3		

Abbreviation: n= number, %= percentage, Z=Mann- Whitney U test, X^2= Pearson Chi-Square Test, sd=standart deviation, p<0.05.

This result indicates that the groups were similar to each other.When the clinical stress questionnaire mean scores were examined between groups, the control group's pre-test mean score was 32.17±14.17 (Median=29.00) and the post-test mean score was 30.55±11.96 (Median=29.00). In the simulation group, the pre-test mean score was 33.54±14.30 (Median=30.00), and the post-test mean score was 33.93±14.15 (Median=32.50) (Table 2).

Table 2. Mean scores of the sub-dimensions of the clinical stress and the coping behaviors of stress scale for nursing students

Scale	Group	Min-Max*	Median (1st Quartile – 3rd Quartile)	M±SD
Clinical Stress Questionnaire Pretest	Control group(n=45)	10-80	29.00(23.50-39.50)	32.17±14.17
	Simulation group(n=44)	15-76	30.00(21.50-40.00)	33.54±14.30
Clinical Stress Questionnaire Posttest	Control group(n=45)	0-61	29.00(24.50-37.50)	30.55±11.96
	Simulation group(n=44)	14-80	32.50(25.75-40.00)	33.93±14.15
Sub-dimensions of the Coping with Stress Scale for nursing students				
Optimistic Attitude Pretest	Control group(n=45)	4-16	7.00(5.50-8.50)	7.11±2.39
	Simulation group(n=44)	3-16	6.50(5.00-9.00)	7.04±2.68
Optimistic Attitude Posttest	Control group(n=45)	0-13	6.00(5.00-8.00)	6.57±2.22
	Simulation group(n=44)	3-16	8.00(6.00-8.75)	7.63±2.70
Transfer Pretest	Control group(n=45)	4-12	7.00(5.00-8.00)	7.02±2.08
	Simulation group(n=44)	2-11	6.00(4.25-8.00)	6.27±2.21
Transfer Posttest	Control group(n=45)	0-12	7.00(5.00-8.00)	6.55±2.20
	Simulation group(n=44)	5-12	7.00(6.00-8.00)	7.63±1.88
Problem-Solving Pretest	Control group(n=45)	4-24	11.00(8.00-12.00)	10.37±3.47
	Simulation group(n=44)	6-18	10.00(9.25-13.00)	10.97±2.89
Problem-Solving Posttest	Control group(n=45)	0-16	11.00(9.00-13.00)	10.68±2.76
	Simulation group(n=44)	6-24	11.00(10.00-12.00)	11.88±3.69
Avoidance Pretest	Control group(n=45)	9-24	14.00(11.50-16.50)	14.17±3.41
	Simulation group(n=44)	2-24	12.00(10.00-16.00)	12.75±4.68

Avoidance Posttest	Control group(n=45)	0-21	14.00(12.50-16.00)	13.95±4.09
	Simulation group(n=44)	10-24	15.50(13.00-17.00)	15.52±3.32

Abbreviations: M, mean; Sd, standard deviation ** These are the lowest and highest values obtained in this study.*

Regarding the subdimensions of the Coping Behaviors of Stress Scale for Nursing Students, the following mean scores were observed between the groups; Optimism: The control group had a pre-test mean score of 7.11 ± 2.39 (Median = 7.00) and a post-test mean score of 6.57 ± 2.22 (Median = 6.00), whereas the simulation group had a pre-test mean score of 7.04 ± 2.68 (Median = 6.50) and a post-test mean score of 7.63 ± 2.70 (Median = 8.00). Transfer: The control group's pre-test mean score was 7.02 ± 2.08 (Median = 7.00) with a post-test mean score of 6.55 ± 2.20 (Median = 7.00), while the simulation group's pre-test mean score was 6.27 ± 2.21 (Median = 6.00) and the post-test mean score was 7.63 ± 1.88 (Median = 7.00). Problem Solving: The control group recorded a pre-test mean score of 10.37 ± 3.47 (Median = 11.00) and a post-test mean score of 10.68 ± 2.76 (Median = 11.00), compared to the simulation group's pre-test mean score of 10.97 ± 2.89 (Median = 10.00) and post-test mean score of 11.88 ± 3.69 (Median = 11.00). Avoidance: The control group's pre-test mean score was 14.17 ± 3.41 (Median = 14.00) and the post-test mean score was 13.95 ± 4.09 (Median = 14.00), whereas the simulation group's pre-test mean score was 12.75 ± 4.68 (Median = 12.00) and the post-test mean score was 15.52 ± 3.32 (Median = 15.50) (Table 2).

When the clinical stress questionnaire and perceived stress scale for nursing students were compared between groups, it was found that the "Optimism" and "Transfer" subdimensions of the Coping Behaviors Scale for Nursing Students exhibited statistically significant differences in post-test mean scores between the simulation and control groups ($p < 0.05$).

In both subdimensions, the post-test mean ranks in the simulation group were higher than those in the control group (Table 3). However, the pre-test and post-test mean scores of the clinical stress scale did not show a statistically significant difference between the simulation and control groups ($p>0.05$) (Table 3).

Table 3. Comparison of the clinical stress and the coping behaviors of stress scale among nursing students across groups.

Groups	**Simulation grop (n=44)**		**Control group (n=45)**				
	Mean rank	**Sum of rank**	**Mean rank**	**Sum of rank**	**U***	**Z**	**p**
Clinical Stress Questionnaire Pretest	46.36	2040.00	43.67	1965.00	930.000	-0.493	0.622
Clinical Stress Questionnaire Posttest	47.95	2110.00	42.11	1895.00	860.000	-1.068	0.286
Sub-dimensions of the Coping with Stress Scale for nursing students							
Optimistic Attitude Pretest	44.18	1944.00	45.80	2061.00	954.000	-0.298	0.766
Optimistic Attitude Posttest	50.32	2214.00	39.80	1791.00	756.000	-1.947	**0.050***
Transfer Pretest	40.91	1800.00	49.00	2205.00	810.00	-1.492	0.136
Transfer Posttest	50.67	2229.50	39.46	1775.50			
Problem-Solving Pretest	47.83	2104.50	42.23	1900.50	865.500	-1.029	0.303
Problem-Solving Posttest	47.60	2094.50	42.46	1910.50	740.500	-2.087	**0.037***
Avoidance Pretest	40.66	1789.00	49.24	2216.00	799.00	-1.574	0.115
Avoidance Posttest	49.14	2162.00	40.96	1843.00	808.000	-1.503	0.133

*Abbreviation: n= number, sd=standart deviation, *Mann- Whitney U*

Within the simulation group, a statistically significant difference was observed between the pre-test and post-test scores for the "Transfer" and "Avoidance" subdimensions of the Coping Behaviors Scale for Nursing Students ($p < 0.05$), whereas no significant difference was found for the clinical stress scale scores ($p>0.05$) (Table 4).

Table 4. Comparison of the clinical stress and the coping behaviors of stress scale within the simulation group of nursing students.

Grops	**Pretest-posttest**	**n**	**Mean rank**	**Sum of ranks**	**z**	**p**
Clinical Stress Questionnaire	Negative rank	17	25.03	425.50	-0.325	0.745
	Positive rank	25	19.10	477.50		
	Equal	2				
Sub-dimensions of the Coping with Stress Scale for nursing students						
Optimistic Attitude	Negative rank	19	16.74	318.00	-0.509	0.611
	Positive rank	18	21.39	385.00		
	Equal	7				
Transfer	Negative rank	7	17.36	121.50	-3.342	**0.001***
	Positive rank	29	18.78	544.50		
	Equal	8				
Problem-Solving	Negative rank	19	15.95	303.00	-0.734	463

	Positive rank	18	22.22	400.00		
	Equal	7				
Avoidance	Negative rank	12	17.83	214.00	-2.976	**0.003***
	Positive rank	30	22.97	689.00		
	Equal	2				

*Abbreviation: n= number, * Wilcoxon Signed-Rank Test, p < 0.05*

For the control group, no statistically significant differences were noted between the pre-test and post-test scores for either the clinical stress scale or the subdimensions of the Coping Behaviors Scale for Nursing Students (p>0.05) (Table 5).

Table 5. Within-group comparison of the clinical stress questionnaire and the coping behaviors of stress scale for nursing students in the control group

Grops	**Pretest-posttest**	**n**	**Mean rank**	**Sum of ranks**	**z**	**p**
Clinical Stress Questionnaire	Negative rank	24	22.98	551.50	-0.384	0.701
	Positive rank	21	23.02	483.50		
	Equal	1				
Sub-dimensions of the Coping with Stress Scale for nursing students						
Optimistic Attitude	Negative rank	26	19.19	499.00	-1.205	0.228
	Positive rank	14	22.93	321.00		
	Equal	5				
Transfer	Negative rank	22	21.07	463.50	-1.033	0.302
	Positive rank	17	18.62	316.50		
	Equal	6				
Problem-Solving	Negative rank	18	18.72	337.00	-0.743	0.458
	Positive rank	21	21.10	443.00		
	Equal	6				
Avoidance	Negative rank	18	22.25	400.50	-0.128	0.898
	Positive rank	22	19.07	419.50		
	Equal	5				

*Abbreviation: n=number, *Wilcoxon Signed-Rank Test, p < 0.05*

DISCUSSION

This study was conducted to evaluate the effect of simulation-based NRP training on clinical stress and coping behaviors among nursing students. Furthermore, there were no statistically significant differences in the pre-test mean scores of the clinical stress scale and the subdimensions of the Coping Behaviors Scale for Nursing Students in either the simulation or the control groups.

When examining the stress coping behavior scale of nursing students in the simulation and control groups, a statistically significant difference was found in the posttest mean scores of the optimism subscale. In a study by Durmuş and Gerçek (2017), self-perception as a problem solver also showed a statistically significant relationship with the optimism subscale. The results of the simulation group in the present study are consistent with the literature. This finding is attributed to the simulation environment providing opportunities to develop new problem-solving strategies without risking patient safety. The results of this subscale, which indicate decreased feelings of helplessness and avoidance of difficult situations, suggest that the simulation experience helped students maintain optimism by realizing that they were not helpless even when they repeatedly failed to solve a problem.

The simulation group's higher mean scores on the optimism subscale compared to the control group were not consistent with the finding of a weak correlation between the optimism subscale and clinical practice self-efficacy in a study by Altıntaş et al. (2024). This inconsistency may be attributed to the fact that the sample in Altıntaş et al.'s study consisted of international nursing students who were studying in a country where their native language was not spoken and therefore experienced learning difficulties.

When the stress coping behavior scale for nursing students was examined across groups, the mean posttest scores in the problem-solving subscale showed a statistically significant difference. A study evaluating the impact of Simulation-Based Education on Clinical Competencies for Nursing Practice reported increased problem-solving and solution-generating skills in the simulation-trained group (Mohamed & Fashafsheh, 2019). A study by Ergini et al. (2018) indicated that problem-solving behavior was the most frequently used behavior in response to stress experienced by nursing students. A study by Koukourikos et al. (2021) reported that simulation was effective in improving clinical decision-making skills in addressing problems. This finding is consistent with the literature. The

higher mean problem-solving scores in the simulation group were attributed to the simulation providing a safe learning environment, allowing students to confidently develop problem-solving skills without waiting for someone else to solve them.

In our study, the optimistic subscale and problem-solving subscale of the stress coping behavior scale were found to be significant, but this result is not consistent with a study conducted in Taiwan in 2020. This is thought to be due to the use of role-playing techniques and situational simulation techniques based on specific scenarios in the study, while our study used a high-fidelity simulation technique.

When the pretest-posttest mean ranks of the simulation group were examined, the transfer subscale of the stress coping behavior scale showed a significant difference for nursing students. A study by Bozyılan and Güngörmüş (2021) indicated that nursing students used transfer as a coping behavior when faced with stress stemming from faculty, nurses, and the hospital environment. Another study observed a significant correlation between the willingness to learn and openness to development subscale and the transfer subscale. In the items of the transfer subscale, students expressed confidence in overcoming challenges and did not avoid faculty during the learning process (Eray & Çevik Kaya, 2023). The results obtained in this regard are parallel to the literature. The higher posttest transfer subscale score compared to the pretest may be due to factors such as the simulation group's increased desire to learn, stronger relationships with faculty, and the simulation environment's resemblance to a hospital environment. It is thought that the transfer sub-dimension, which includes taking a shower and doing physical activities to rest and relax, may be due to the need to frequently experience stress and relax during simulation training, and that stress levels decrease when more physical movement is done during simulation training.

In conclusion, the reproducibility of simulation training and the ability to confidently perform procedure steps without harming the patient are believed to contribute to nursing students' optimism and problem-solving skills. coping with stress. Their ability to cope with stress, and consequently, their lower stress levels, will positively impact the quality of nursing care they provide (Kahraman and Akgün, 2022). It is anticipated that students' active and active behavior during simulation training may inspire the transfer method for coping with stress. It is estimated that students who understand the importance of time management during the simulated NRP application, but who experience success when the necessary priority rankings are implemented, laid the foundation for avoidance behavior in coping with stress.

The results of this study are limited to nursing students at the school where the study was conducted. Generalizations to the entire population are not possible. Because the researchers participated in the intervention and analysis phases of the study, blinding was not possible. This constitutes another limitation of our study.

CONCLUCION

In this study, simulation-based NRP training was found to have a positive effect on nursing students' stress-coping behaviors, particularly in the dimensions of problem-solving and optimistic attitudes. The findings suggest that the structural features of simulation may contribute to enhancing students' stress-coping skills, facilitating their practice of the required steps in NRP training, and supporting their achievement. Therefore, it is recommended that simulation be utilized in stressful clinical practices such as NRP, to foster improved coping behaviors in nursing students.It is suggested that educators implement similar interventions aimed at improving stress-coping behaviors through the recognition of clinical stress levels and the creation of more supportive learning environments. More studies can be conducted to investigate the long-term effects of such practices on professional development.

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