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Original research

Examining the effect of simulation based learning on self-efficacy and performance of first-year nursing students

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ABSTRACT

Background: Self-efficacy is an individual's belief in oneself and in one's own judgment and ability to be successful in a task. Strong self-efficacy allows for the achievement of success, well-being, personal development and the diversification of skills. An individual's perception of his/her self-efficacy plays a key role in adopting behaviors and initiating and sustaining change.

Aims: The first aim of this study is to evaluate the effects of simulation-based learning on the self-efficacy and performance of first-year nursing students. The second aim is to examine students' pre- and post-scenario proficiency in their self-assessment of competence in regard to scenario objectives to compare the students' self-assessment and their instructor's assessment in terms of performance evaluations.

Methods: This semi-experimental study was conducted with sixty-five first-year nursing students. A standardized patient method was used as a simulation technique. Students' self-efficacy and their perceptions of their own competence in completing skills were measured using the General Self-Efficacy Scale and the Proficiency Assessment Form, respectively. Students' actual performance was evaluated via an Objective Structured Clinical Assessment and performance evaluation checklists.

Results: The mean self-efficacy score of students was 52.68 (± 10.19) before the scenario and 49.59 (± 12.90) post-scenario ($p = .001$). With regard to their scenario objectives, a decrease was observed in students' proficiency in their post-scenario self-assessment of competence. This decrease was only statistically significant in the "Establishing a safe patient unit" objective ($t = 2.27$; $p = .03$).

Conclusions: We observed that self-efficacy scores declined in the post-simulation scenario. Using standardized patients in simulation training allows novice nursing students to meet a real patient and to recognize their own true self-efficacy.

1. Background

Psychomotor skill competence is an integral part of professional nursing practices. Approximately 90% of nurse academicians report that newly graduated nurses are able to provide safe care; however, only 10% of nursing managers indicate that new graduates are competent enough to provide safe care (Berkow et al., 2009).

In 1977, Bandura stated that self-efficacy is an individual's belief that he/she can achieve something. Self-efficacy is defined as "organizing the activities necessary for the individual to fulfill a particular performance and perception of their ability to successfully carry out the performance" (Bandura, 1995; Bandura, 1982 page number: 122). Self-efficacy influences how individuals feel, think, motivate themselves and act (Multon et al., 1991; Bandura, 1982). An individual must believe in his/her own sufficiency to successfully perform a task. It has been suggested that those who do not believe in their own sufficiency have forgotten the skills they have learned over time, abstain in difficult situations and demonstrate reluctance (Bandura, 1989). Self-efficacy can increase a person's success and confidence by influencing his/her ability to take on new tasks, which is an important step in ensuring high-quality patient care and preventing false beliefs (Morfoot and Stanley, 2018; Kim, 2018). Self-efficacy is also an important factor in determining clinical competence, nursing education and nursing knowledge. Self-efficacy, or a person's belief in his/her ability to succeed, is

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frequently associated with simulation training, and it can affect confidence, success and performance (Morfoot and Stanley, 2018). Systematized, simulation-based learning techniques are required for the development and utilization of self-efficacy (Jeffries, 2005). A learning strategy that incorporates education combined with simulation is important to develop clinical nursing skills and eliminate students' negative experiences (Cannon-Diebl MR, 2009).

The development of self-efficacy is an important outcome of simulation-based learning (Arslan et al., 2018; Foronda et al., 2013; Lubbers and Rossman, 2017; Bartimote-Aufflick et al., 2016). However, contradictory results exist as a result of heterogeneity in the design and systematics of simulations (Yuan et al., 2012; Adib-Hajbaghery and Sharifi, 2017). Nursing education requires theoretical knowledge, behavioral skills and critical thinking (Tomietto et al., 2012). Since skills and practice are inseparable in nursing education, it has been suggested that studies that aim to determine the effect of simulation-based learning on skills and self-efficacy should be conducted (Fadale et al., 2014; Roh, 2014).

Determining the effects of simulation-based learning on students' self-efficacy will provide important information on how to increase success in teaching by leading to the development of strategies to facilitate learning. Because students are the care professionals of the future, it is necessary to train them as individuals who can cope with problems, who do not abstain from difficult situations and who are aware of their own abilities. These goals can only be achieved by training individuals with high self-efficacy and skill competence. Based on these observations, we aimed to evaluate the effects of simulation-based learning on the self-efficacy and performance of first-year nursing students.

In this study, we sought answers to the following questions:

1. What is the effect of simulation-based learning on the self-efficacy of first-year nursing students?
2. For students who have completed the theoretical education and laboratory application, what is their pre- and post-scenario proficiency in their self-assessment of competence with regard to the scenario objectives?
3. Is there any difference between the instructor's assessment and students' self-assessment when evaluating student performance?

2. Materials and methods

2.1. Aim

We aimed to evaluate the effects of simulation-based training on the self-efficacy and performance of first-year nursing students and to compare the students' self-assessment and their instructor's assessment in terms of performance evaluations.

(P) – Population: First-year university nursing students, 18–22 years of age, taking the course Fundamentals of Nursing.
(I) – Intervention: Simulation-based training
(C) – Comparison: Comparison of the students' self-efficacy scores for target skills pre- and post-simulation; the relationship between the instructor's and students' performance evaluations.
(O) – Outcome: Changes in the students' self-efficacy, proficiency and performance related to their skills in various scenarios.
(T) – Time: The outcome was measured before, during and after the simulation.

2.2. Study design

This semi-experimental study was conducted between March 2017 and April 2017.

2.3. Sample and setting

This study was conducted with first-year nursing students (n = 70) at a nursing college in Turkey. We did not implement the use of sampling methods to select students for this study. All students were informed about the aims and methods of this study during a 30-min session. All students volunteered to participate in the study (n = 70; 100%). Initially, all volunteers were included in this study; however, five students (7.1%) did not evaluate their post-scenario performance via video. Therefore, five students were excluded from the study. As a result, the study was completed with 65 (92.9%) volunteer students. This study was planned and performed independently from the course. Simulation was not concluded with a performance grade that would affect the students' decision to succeed in any course. The students were informed by the responsible researcher, who was not responsible for any of the courses of 1st-level students. All students were invited to the simulation. Only the data of students who were willing to participate in the research and who completed the related forms were evaluated within the scope of the research.

2.4. Instruments

General Self-Efficacy Scale (GSE): The 23-item original form of the scale was developed by Sherer et al. A Turkish validity and reliability study of the scale was performed by Yıldırım and Ilhan (2010). The scale's internal consistency demonstrated by Cronbach's alpha coefficient was 0.80. The original scale consists of two factors: general self-efficacy and social self-efficacy. The social and general self-efficacy dimensions can be used separately. Participants score the scale items on a five-point scale ranging from "none" to "very good". The score for each question ranges from 1 to 5. Items 2, 4, 5, 6, 7, 10, 11, 12, 14, 16 and 17 are reverse-scored. The total score of the scale can vary from 17 to 85, and higher scores indicate increased belief in self-efficacy.

Proficiency Assessment Form (PAF): This is a visual analog scale that was prepared by the researchers. The students were asked to rate their skills on a scale from inadequate to very adequate. The PAF has four items that are in line with the simulation scenario objectives to determine the students' perceptions of the adequacy of their skills: 1) properly communicating with the patient, 2) establishing a safe patient unit, 3) transferring the patient safely and 4) acting on body mechanics. This form was used after the students completed theoretical courses and laboratory studies to determine how they perceived their own competencies in regard to these skills.

Performance evaluation checklist: This is a 28-item checklist established by the researchers to evaluate student performance using an objective structured clinical assessment (OSCA). For each item, a low of 0 and a high of 56 points can be obtained from the checklist, where 0 = insufficient, 1 = needs improvement and 2 = sufficient according to the evaluator. In this study, the internal consistency Cronbach's alpha coefficient of the checklist was 0.711. This checklist was used to evaluate the performance of the students in providing patient transfers and safe patient units in line with the objectives of the scenario.

2.5. Procedures

All students who participated in this study received 12 h of theoretical courses, including proper communication with the patient (4 h), safe patient transfer (2 h) and acting on body mechanics (2 h). After the completion of these theoretical courses, students were given 20 h of skills training. Prior to the OSCA, students who completed the skills training filled out the Proficiency Assessment Form that identified their ability to assess their own skills. It took the students approximately 10 min to complete this form (See Fig. 1 Study Design-flowchart).

After completing the theoretical and laboratory courses, students participated in the implementation of four scenarios. Due to the high number of students, the OSCA was carried out at 2 different stations

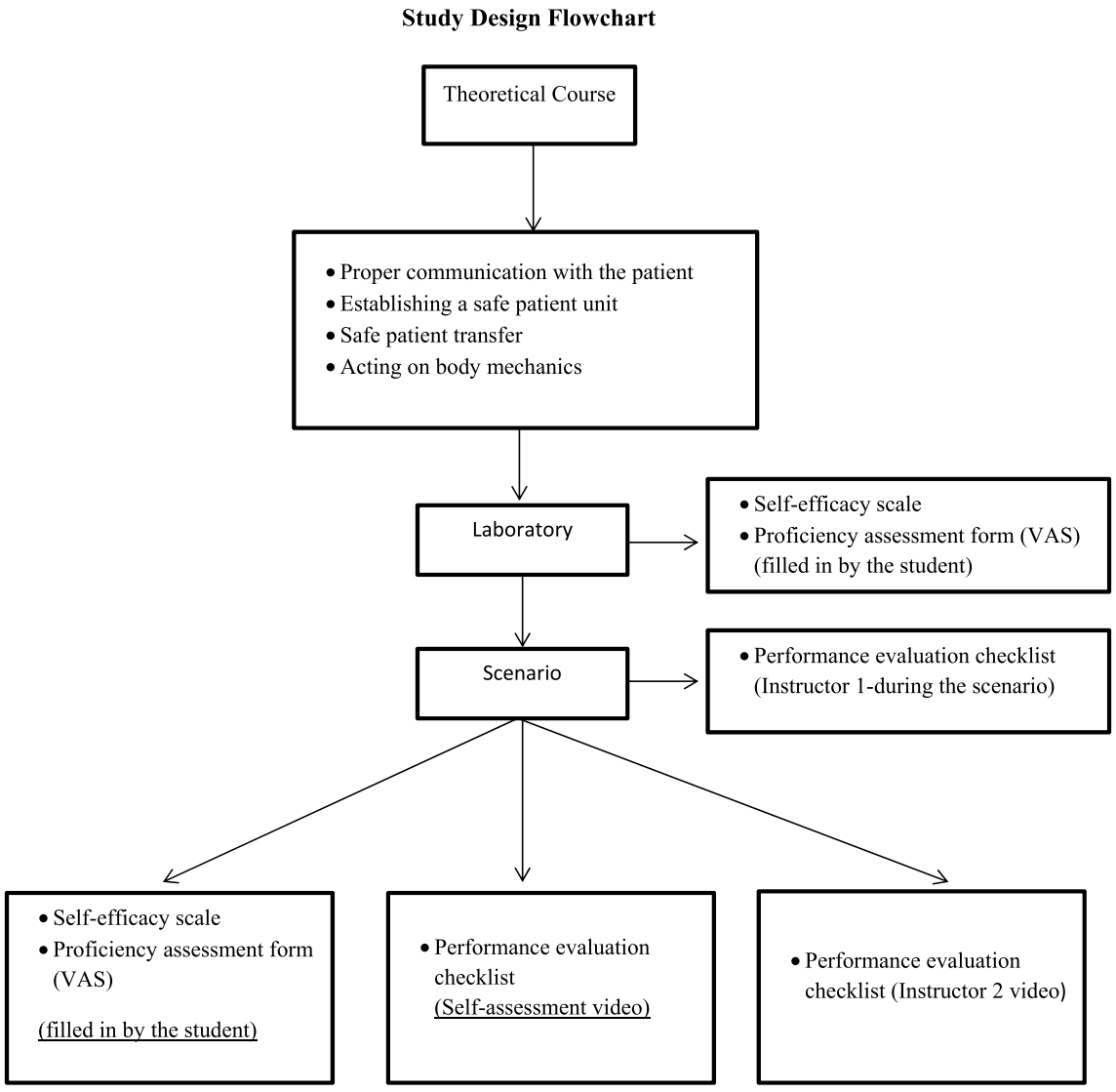

Fig. 1. Study design flowchart.

that the students were taken to individually. Each student was given 7 min for the OSCA. Students participated in a debriefing session and completed the General Self-Efficacy Scale and Proficiency Assessment Form again after the OSCA. It took approximately 10 min for the students to complete the forms (See Fig. 1 Study Design-flowchart).

Student performance was evaluated by faculty staff during each scenario. Students completed their own self-assessment through the performance evaluation checklist by watching videos on which their performances were recorded independently from each other (through the performance evaluation checklist). In addition, two faculty members reevaluated each student's performance independently from the OSCA through video recordings (see Fig. 1 Study Design-flowchart).

2.6. Data analyses

Data were analyzed using the Statistical Package for the Social Sciences (SPSS, Inc., Chicago, IL, USA) for Windows version 18.0. The normality of the data was tested using the Kolmogorov–Smirnov test. Descriptive statistics were presented using the arithmetic mean and standard deviation, minimum–maximum, frequency, and percentage. The results obtained were compared using Student's t-test, the Pearson correlation and the Bonferroni correction. A p value of $< .001$ was considered statistically significant.

2.7. Ethical considerations

This study was approved by the ethical review boards at the authors' institution (Number: 2017–4/22). In accordance with the ethical standards of the simulation center, written consent was obtained from all students for the video recordings taken during laboratory practices and for the use of these records for education and scientific research. In addition, all students participating in the scenario applications were informed of the purpose and the procedures of this study. The data of 65 students who gave written consent and completed the study are included here.

3. Results

Of the participating students, 91.4% were female and 8.6% were male. The age of the students ranged from 18 to 22 years, and the mean age was 18.97 (± 1.27). The students' mean self-efficacy scores were 52.68 (± 10.19) before the scenarios and 49.59 (± 12.90) post-scenario. There was a statistically significant decline in mean scores after the intervention ($t = 2.04$; $p = .001$) (Table 1).

In line with the scenario objectives, the pre- and post-scenario proficiency in the self-assessment of competence of students who participated in theoretical education and laboratory application were

Table 1
Comparisons of students' general self-efficacy and proficiency based on students' self-assessment of competence scores post-theoretical/laboratory and post-OSCA (n = 65).

	After theoretical and laboratory practice	Post scenarios	Statistical tests
	M ± SD	M ± SD	
Self-efficacy scale	52.68 ± 10.19	49.59 ± 12.90	t = 2.04; p = .001
Proficiency based on students' self-assessment of competence (according to learning objectives)			
Suitable communication with the patient	6.19 ± 1.53	6.15 ± 2.22	t = .13; p = .90
Establishing a safe patient unit	6.51 ± 1.44	5.98 ± 2.08	t = 2.27; p = .03
Safe patient transfer	7.05 ± 9.17	5.89 ± 2.02	t = 1.01; p = .32
Acting on body mechanics	7.00 ± 6.46	5.80 ± 2.25	t = 1.44; p = .16

compared. The results of the t-tests showed no statistically significant differences between the pre-scenario mean score (6.19 ± 1.53) and the post-scenario mean score (6.15 ± 2.22) for the objective of proper communication with the patient (t = 0.13; p = .90). Students' pre-scenario scores (6.51 ± 1.44) and post-scenario scores (5.98 ± 2.08) with regard to establishing a safe patient unit objective were statistically significant (t = 2.27; p = .03). No significant differences existed between the pre-scenario (7.05 ± 9.17) and post-scenario (5.89 ± 2.02) scores of the safe patient transfer objective (t = 1.01; p = .32). Additionally, no statistically significant differences existed between the pre-scenario self-assessment score (7 ± 6.46) and post-scenario score (5.80 ± 2.25) of the acting on body mechanics objective (t = 1.44; p = .16) (Table 1).

Using the performance evaluation checklist, the mean scores obtained during the scenario from the assessment of instructor 1 were 28.23 ± 7.26, and the mean assessment scores from the post-scenario video recordings by instructor 2 were 29.75 ± 6.01. The students' self-assessment mean scores from the post-scenario video recordings were 35.38 ± 7.26. A positive, significant relationship was found between the student performance evaluations of instructor 1 and instructor 2 (r = 0.573; p = .001), between the evaluation of instructor 1 and the students' self-assessment scores (r = 0.658; p = .001) and between the evaluation of instructor 2 and the students' self-assessment scores (r = 0.563; p = .001) (Table 2).

Additionally, a strong positive relationship between the students' mean self-efficacy scale and the performance evaluation checklist scores was observed (r = .927; p = .011).

4. Discussion

During the first year of nursing programs, it is necessary to enrich the theoretical education with clinical experience starting with the course "Basic Principles and Practices in Nursing". Simulation-based training has recently come to the forefront of nursing education as more patient safety issues arise and the increased number of university students makes clinical applications challenging. Another issue that has emerged in nursing education is the transformation to a structure in which individuals learn to learn and become responsible for their own learning. This transformation process should be enriched with teaching techniques that allow students to accurately evaluate their self-efficacy.

In this study, after students completed theoretical and skills training on "suitable communication with the patient", "establishing a safe patient unit, "safe patient transfer" and "acting on body mechanics", their efficacy levels were evaluated with the "General Self Efficacy Scale" and the "Proficiency Assessment Form". Students also participated in a simulation application before their self-efficacy levels were measured again. Interestingly, it was observed that the students' perception of their efficacy level decreased after completing a simulation (see Table 1). It may be expected that students' level of proficiency will increase after simulation training. Many studies have shown that simulation-based training positively affects student performance and leads to the development of critical thinking and decision-making skills (Alinier et al., 2006; Cant and Cooper, 2017; Kunst et al., 2017; Park et al., 2017). Nursing students may have a high perception of self-efficacy after theoretical and skill training because they do not encounter a real clinical environment in the first year. In agreement with our study, Karabacak et al. (2013) showed that nurses' self-efficacy was high in the first application but decreased after the second (Karabacak et al., 2013). Self-efficacy is the belief that one can take the necessary steps to achieve a goal. Students may not be able to achieve psychomotor and high-level cognitive skills despite being confident in their performance (Kardong-Edgren, 2013). Our data emphasize the need to address the question "Does the feeling of self-efficacy lead to competence?" in the nursing literature. In light of these results, we suggest that training in various simulation scenarios enables novice nursing students who lack previous clinical practice to experience meeting a real patient and ultimately to realize their own true self-efficacy.

In this study, students conducted a self-evaluation by watching video recordings of their post-scenario performance (the performance evaluation checklist score was 35.38 ± 7.26). Evaluations performed by different instructors using the performance evaluation checklist pre- and post-scenario were found to be similar to one another (28.23 ± 7.26 vs 29.75 ± 6.01). Differences between the students' self-evaluation scores regarding their performance and the instructors' scores on students' performance lead to the question, "Are students unaware that they are performing poorly?" Simulation-based training is important to increase the perception of reality. Students learn by making mistakes; however, they do not want to compare their mistakes with others (Blazeck and Zewe, 2013). In addition, fear of making mistakes in real practice areas can put students into a passive position. Simulation-based training provides students the opportunity to practice in a safe learning environment (Garrett et al., 2011), and discussing their performance on video during the debriefing process allows them to learn from their mistakes. In Weaver's study (2015), it was

Table 2
The relationship between the performance evaluator's assessment of student competence during and post-scenario **(n = 65)**.

Performance evaluator	During the scenario (Instructor 1)	Post-scenario (Self-assessment video)	Post-scenario (Instructor 2 video)
During the scenario (Instructor 1)	1		
Post-scenario (self-assessment video)	r = .573 p = .001	1	
Post-scenario (Instructor 2 video)	r = .658 p = .001	r = .563 p = .001	1

determined that the use of videotapes in the debriefing process had an effect on the development of the students' clinical judgments and their confidence, albeit at a lower level (Weaver, 2015). Abelsson and Bisholt (2017) found that students are aware of their existing knowledge and identify what they need to know through observation and discussion (Abelson and Bisholt, 2017). Post-simulation reflections indicate whether they are ready for clinical practice. Mariani et al. (2013) determined that a structured debriefing session focused on learning ensures an integrated approach that includes a review of information, technical skills, and emotions and reactions during the learning experience (Mariani et al., 2013).

5. Conclusions

It is important for first-year nursing students to develop the appropriate behaviors and clinical skills required in practice. Nurses who are critically minded, have developed patient and team communication skills, and are confident in their competence have high self-efficacy. This study shows that the self-efficacy of students is negatively affected during their first meeting with individuals/patients in nursing care practice. This result suggests that similar situations may occur while providing care to patients in a clinical setting. Preparing first-year nursing students for real clinical situations with simulation-based scenarios and examining their clinical competencies and self-efficacy perceptions at each stage will enhance their ability to identify accurate care and determine effective approaches. Additionally, the use of checklists during skill training and scenario activities is recommended because responses to the performance evaluation checklists during the OSCA show consistency between the students and the evaluators. This approach is effective in ensuring the development of common goals and approaches between the students and teaching staff.

Author's contribution to the paper

All of the authors have contributed to the study on conception and design, drafting the article, revising it critically for important intellectual content, and final approval of the version to be published. All authors are in agreement with the content of the manuscript.

Conflicts of interest

No conflict of interest has been declared by the authors.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.nepr.2019.03.012.

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