Submitted: 16 July, 2024 Accepted: 09 October, 2024 Published: 08 May, 2025 DOI:10.22514/sv.2025.067

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Signa Vitae

ORIGINAL RESEARCH

The effect of simulation practice with a live subject on the anxiety level and perceived competence level of paramedic candidates in approaching a trauma patient

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Abstract

Backround: This study was carried out to examine the effect of training on the self-efficacy and anxiety levels of Paramedic students in a realistic, simulated environment of the pre-hospital scene. **Method**: A total of 72 second-year students in the Paramedic program participated in this study with an interventional approach. The data collection form used in the study consisted of sociodemographic characteristics, a self-efficacy form for approaching trauma patients, and the worry and anxiety scale. Within the framework of the research, a competition named "trauma rally" was organized for university Paramedic students, which consisted of the pre-hospital approach of injured live subjects. Through face-to-face interviews, the data collection form was filled out with the participants before, immediately after and one month after the competition. **Results**: A percentage of 71.4% of the participants was 20 years and younger, and 85.7% was female. The average self-efficacy pretest score of the participants was 52.54 ± 8.39, and the average Worry and Anxiety Scale pretest score was 48.28 ± 16.39. There was no significant difference between the Worry and Anxiety Scale pre-test, post-test and retention test averages. There was a significant difference between the average pre-test, post-test and retention self-efficacy test scores of the participants. According to the correlation result, it is observed that there is a negative, moderate and statistically significant relationship between the self-efficacy average and the Worry and Anxiety score average. **Conclusions**: As a result, simulation training with a live subject did not change the anxiety level of paramedic candidates but increased their self-efficacy against trauma cases; It was determined that there was a negative relationship between anxiety and self-efficacy scores. **Clinical Trial Registration**: Registered at ClinicalTrials.gov (Identification No NCT06556524).

Keywords

Simulation; Paramedic; Anxiety; Competence

1. Introduction

Teaching-learning strategies are methods to make it easier for the student to achieve professional goals in personal development. In the context of the academic education of healthcare professionals, ethical issues, patient safety, technological developments, health science, complexity of care measurements and current business world necessities should be taken into account by considering teaching-learning strategies [1]. In this context, simulation-based learning is one of the most effective and interesting teaching strategies and has been shown to reduce gaps between education and practice and adapt nursing students to clinical environments [2, 3]. Simulation is a set of structured activities that represent actual or potential situations in training and practice. These activities allow participants to develop or increase their knowledge, skills and attitudes, or to analyze and respond to realistic situations in a simulated environment [4]. Simulations are especially important in clinical environments because they imitate various aspects of the real world and provide safe learning environments where students can practice until they reach skill competence through self-correction [5]. As a matter of fact, the European heart association (ERC) points out that simulation programs increase the quality of trauma and advanced life support training and increase resuscitation rates after cardiac arrest [6]. High fidelity simulation-based training can be an important component in preparing students for a successful transition into clinical practice. Additionally, it contributes to student satisfaction, confidence, competence and reduced anxiety levels [7]. For these reasons, simulated experiences may be an option to complement traditional healthcare professional education methods [1].

In the literature review on the effect of simulation training on anxiety and competence, it is observed that research generally focuses on nursing and medical faculty students, and there are a limited number of studies on Paramedics, who have an important role in the pre-hospital scene [3, 5, 8, 9]. For this reason, we believe that this study will fill an important gap in literature.

This study was carried out to examine the effect of training in a realistic simulated environment of the pre-hospital scene on the self-efficacy and anxiety levels of Paramedic students.

2. Materials and methods

2.1 Research type and study group

A total of 72 second-year Paramedic students of the Gazi University, Vocational School of Healthcare Services participated in this study, which was designed as an intervention study. A criterion for participating in the study was to have taken Trauma and Advanced Life Support courses. An exclusion criterion in the study was to have been diagnosed with anxiety and depression in the last year. A total of 24 teams (3 people in each team) were formed for the competition. Two persons whose information was missing in the data set were excluded from the study and data analysis was carried out with 70 people.

2.2 Data collection form

The data collection form used in the study consisted of three parts. The first section included six questions regarding the socio-demographic characteristics of the participants.

In the second part, a self-efficacy form was used in approaching trauma patients. To measure the perception of self-efficacy, statements regarding diagnosis and treatment that could occur in 20 different trauma patients were stated and the participants were asked how competent they were for these statements. For situations where self-efficacy was questioned, a three-point Likert scale with answers such as "agree", "partially agree" and "disagree" was used. To measure the self-efficacy of the participants, 20 situations were created by the researchers and expert opinions were obtained from five academicians who are experts in their field.

In the ultimate part, the Worry and Anxiety Scale (WAS) was used. This self-assessment scale was developed by Dugas *et al.* [10] (2001) and adapted into Turkish. The WAS measures the diagnostic criteria of Generalized Anxiety Disorder (GAD) as defined in DSM-IV (Diagnostic and Statistical Manual of Mental Disorders-IV) according to American Psychiatric Association The scale, consisting of a total of 11 items, is a nine-point Likert scale (0–8). The score that can be obtained from the scale is between 0 and 80. The WAS measures anxiety issues, the excessive and uncontrollable aspect of concern, duration and frequency of the disorder, somatic symptoms, worry and helplessness due to anxiety and its interference in one's life. The scale score is calculated by adding the scores from all items except the first item. The scale has good test-retest reliability (r = 0.75; for a 9-week test-retest). The scale has a good sensitivity (89.5%) in distinguishing between people who meet and do not meet GAD diagnostic criteria. The Cronbach's Alpha value for the Turkish adaptation of the scale is 0.891 [11].

2.3 Procedure

For the study, a competition named "trauma rally" was organized for Paramedic students of the Gazi University, Vocational School of Healthcare Services, consisting of pre-hospital approaches to injured live subjects. In this competition, participants were asked to intervene in a traffic accident with a person in a vehicle, a fall from a height, an injured person under rubble, and a patient whose heart has stopped, according to the scenario. The competition was held on 30 December 2022 at the Gazi University, Vocational School of Healthcare Services. The trauma and advanced life support issues included in the checklists to be used in the competition have been prepared in line with the ERC 2021 guide and preliminary preparations have been completed. The surveys were administered by the research conductor through face-to-face interviews. The checklists were used during the competition by researchers who are experts in their field and who received the necessary training on how to apply the checklists. The checklists included the patient/injured person's history, vital signs, patient's medical history, the physical injury findings of the patient, preliminary diagnosis of the patient, interventions to be performed on the patient, and instructions for use of the stretchers. The survey form was filled out just before the competition, after the competition and 30 days after the competition.

Scenario 1: Adult advanced life support; According to the scenario, a British tourist at the scene, calls in ambulance services for his father, whose heart stopped due to an electric shock in a hotel room.

Scenario 2: Traffic accident with a person in a vehicle; An accident took place with a vehicle carrying a married couple and a baby. The responding team is expected to, based on clues, find a baby who went through an open window due to the accident and to treat all three injured persons.

Scenario 3: Falling from a height; An ambulance is called in when a person climbing a tree to pick apples falls. Competitors arriving at the scene are asked to approach the injured person with multiple trauma.

Scenario 4: Intervention in narrow areas; Intervention is requested for an injured pregnant woman who has gone into labor and who is trapped under the rubble after an earthquake hit.

2.4 Statistical analysis

In the study, the data were evaluated with the SPPS 20.0 statistical program (IBM, Westchester, NY, USA). The socio-demographic variables of the participants are expressed in numbers and percentages. Before proceeding with the pre-test, post-test and retention test analysis, it was examined whether the WAS and self-efficacy score averages were normally distributed. Kurtosis and skewness values were checked for normality tests. The results showed that the data were normally distributed (+1.5 to −1.5) [12]. The Cronbach's Alpha value calculated for this study was found 0.941.

A correlation analysis was performed to determine the re-

lationship between age, GPA (Grade Point Average), self-efficacy score and WAS score. The one-way ANOVA (Analyze of Variance) test was used to compare WAS and self-efficacy score averages according to the pre-test, post-test and retention tests. Least Significant Difference (LCD) was used as a *post-hoc* test. The results were evaluated at a 95% confidence level, and $p < 0.05$ was considered to be statistically significant.

3. Results

A percentage of 71.4% of the participants was 20 years old and younger, 85.7% was female, 64.3% were graduates of the vocational high school for healthcare (SML), 21.4% had previously received trauma training and 31.4% of them had previously received advanced life support training (Table 1).

TABLE 1. Some characteristics of the participants.

	Number	%
Age		
20 and younger	50	71.4
21 and older	20	28.6
Sex		
Male	10	14.3
Female	60	85.7
High school graduation		
Vocational high school for healthcare	45	64.3
Anatolian high school	18	25.7
Other	7	10.0
Received Trauma Training		
Yes	15	21.4
No	55	78.6
Received Advanced Life Support Training		
Yes	22	31.4
No	48	68.6

Descriptive statistics regarding the Age, Grade Point Average, Self-Efficacy Score and WAS Score of the participants in the study are given in Table 2.

When Table 3 is examined, no significant difference can be observed between the participants' WAS score averages, pre-test, post-test and retention test averages. A statistically significant difference was observed between the participants' self-efficacy pre-test, post-test and retention test score averages. As a result of the *post hoc* test, it was determined that the significant difference was due to the pre-test, and the pre-test mean score was significantly lower than the post-test and retention test averages.

When Table 4 is examined, it is observed that there is a low positive relationship between the self-efficacy score and GPA and that this relationship is statistically significant. According to the correlation result, it is observed that there is a negative, moderate and statistically significant relationship between the self-efficacy average and the WAS score average.

4. Discussion

For nearly 20 years, simulation-based training has been shown to be an integral part of health education. Simulation training has made an invaluable contribution to traditional education and training methods due to the importance it attaches to patient and staff safety [13, 14]. Wrong clinical decisions of paramedics, who are important members of pre-hospital emergency healthcare services, reduce the safety of patients and injured persons. To prevent this, simulation-based education needs to be increased [15]. In fact, according to a study conducted by Alshehri and his colleagues on this subject, participants mentioned that simulation-based training was safer, less risky, and the most suitable environment for seeing and correcting incorrect practices performed on patients [16]. Paramedic students who receive simulation training on subjects such as intubation, ventilation, trauma care, cardiopulmonary resuscitation and trauma resuscitation, will understand their wrong decisions, increase their self-confidence, and make the right decisions in the fast decision-making process [17]. As far as the literature was examined, this study is the first simulation research conducted for Paramedic candidates in Türkiye.

4.1 Simulation and anxiety level

Experiencing a decreased level of anxiety with increasing simulation experience may be associated with how well participants prepared. With increased preparation for the simulation, participants' anxiety may decrease even before the simulation [18]. However, there are studies showing that well-prepared participants still experience high anxiety [19]. This may be because participants were expecting something extraordinary to happen during the simulation. In our study, there was a decrease of approximately four points in the average WAS score of the participants between the pre-test, post-test and retention test averages, but this decrease was not significant. Being peer reviewed during emergency care caused anxiety. This has also been described in previous studies [20]. Fear of criticism, both positive and negative, is associated with increased anxiety levels of participants [18]. Participants become anxious when a caregiving action is performed incorrectly or when they do not know what to do while being observed by their peers [21]. It is thought that being observed by peers was effective in finding high pre-test scores. The competitive nature of the simulation studies may have increased students' anxiety, which may then decrease. In addition, the high anxiety of the participants in the pre-test may be due to reasons such as not having had any previous simulation experience or fear of making the wrong intervention.

When the literature was examined, similar results were encountered. In the study conducted by Torné-Ruiz and colleagues, who planned to reduce anxiety levels in nursing students with simulation training, it was observed that the anxiety levels of nursing students were high before the simulation application and that there was a significant decrease in anxiety levels after the training [22]. In a study by Couarraze and colleagues examining how simulation-based training given to critical care healthcare workers would affect their anxiety

TABLE 2. Values concerning age, GPA, self-efficacy score and WAS Score of the participants.

	Min	Max	Mean	SD	Mode	Median
Age	19.00	26.00	20.31	1.17	20.00	20.00
GPA	1.70	3.88	2.78	0.48	2.50	2.82
Self-efficacy score-pre-test	22.00	60.00	52.54	8.39	60.00	58.00
Self-efficacy score-post-test	20.00	60.00	55.41	9.59	60.00	59.00
Self-efficacy score-retention	20.00	60.00	57.22	5.43	60.00	59.00
Worry and anxiety scale-pre-test	12.00	78.00	48.28	16.39	33.00	48.00
Worry and anxiety scale-post-test	10.00	79.00	45.18	20.30	10.00	49.50
Worry and anxiety scale-retention	10.00	80.00	44.45	20.64	10.00	45.00

GPA: Grade point average; SD: standard deviation; Min: Minimum; Max: Maximum.

TABLE 3. Comparison of participants' WAS and efficacy perception score averages with pre-test, post-test and retention test averages.

	Mean	SD	*F*	*p*	Significant difference
WAS					
1. Pre-test	48.28	16.39			
2. Post-test	45.18	20.30	0.784	0.458	
3. Retention test	44.45	20.64			
Self-efficacy					
1. Pre-test	52.54	8.39			
2. Post-test	55.41	9.59	6.100	0.003	1 < 2, 3
3. Retention test	57.22	5.43			

WAS: Worry and Anxiety Scale; SD: standard deviation.

TABLE 4. Relationship between age, GPA, WAS score and self-efficacy score of the participants.

	Age	GPA	WAS
Age			
r	1.000		
p			
GPA			
r	−0.227	1.000	
p	0.059		
WAS			
r	0.031	−0.109	1.000
p	0.796	0.368	
Self-efficacy			
r	0.028	0.267	−0.413
p	0.818	0.026	0.002

GPA: Grade point average; WAS: Worry and Anxiety Scale.

levels in the short term, it was observed that simulation-based training reduced the anxiety levels of the participants. They explained that the most important reason for the decrease in the participants' anxiety was that they understood the clinical situations better and the treatment was organized correctly [23]. In a study conducted by Roseland *et al.* [24] with nurses, nurses were given simulation-based training for pediatric patients requiring critical care. After the training, an approximately 24% decrease in the anxiety levels of the nurses was found [24].

4.2 Simulation and self-efficacy level

The best learning in adult education is achieved through active participation in the education process and taking part in the education process. Through this way of learning, the student gains experience by including his existing knowledge and experiences. Simulation, which is among the active participation methods, is effective in developing both the cognitive, psychomotor and attitudinal knowledge and skills of students by providing them with a realistic learning environment in which they experience real life situations [25]. In our study, there was a significant increase of approximately five points between the average self-efficacy score of the participants in the pretest and the average self-efficacy score in the retention test. In the training conducted by Attoe and colleagues to reduce newborn deaths, a 40% decrease in neonatal mortality was detected in a one-year study period following the implementation of simulation training [25]. According to the results of the study planned by Guerrero *et al.* [26] to examine the improvements in knowledge, skills, self-efficacy, confidence and satisfaction of nurses after simulated clinical experience in providing care to a patient undergoing chemotherapy; a significant increase in

self-efficacy was found in nurses after the simulation. When Tucker and colleagues examined the effects of simulation-based resuscitation training given to nursing students on their self-efficacy levels, an increase in students' self-efficacy levels was found after the simulation training, but this increase was not statistically significant [27]. According to the research conducted by Kassabry on Palestinian nursing students, which examined the effect of simulation-based advanced life support training on the students' self-efficacy, it was concluded that the participants felt statistically significantly more competent after the simulation training [28]. In a study conducted by Afni and his colleagues in Indonesia, participants were trained with a traffic accident simulation. Participants were subjected to a traffic accident simulation and then asked to provide first aid. At the end of the training, there was a statistical increase in the participants' self-efficacy [29].

4.3 Anxiety and self-efficacy level

According to the correlation result, it is observed that there is a negative, moderate and statistically significant relationship between the self-efficacy average and the WAS score average. In the study by Al-Ghareeb *et al.* [30], which examined the effect of simulation on the anxiety levels of nursing students, it was observed that students with low levels of anxiety performed best and that performance decreased with medium to high anxiety levels. The participants' belief that they had low self-efficacy may have increased their anxiety levels. Participants with low self-efficacy may have become anxious because they thought they could make more mistakes.

4.4 Limitations of the study

The study was conducted at Gazi University School of Health Services. A budget request was requested from the unit that was the funding source for the study to be conducted here. This study may form the basis for future studies.

5. Conclusions

As a result, it was determined that simulation training with a live subject did not change the anxiety level of paramedic candidates, but increased their self-efficacy against trauma cases, and that there was a negative relationship between anxiety scores and self-efficacy scores. According to our research, students' self-efficacy has been significantly increased after simulation training. Considering that interventions on patients and injured people in the pre-hospital scene are critical, it is recommended that simulation methods be combined with traditional methods in paramedic training. In paramedic education, the inclusion of simulation techniques in addition to traditional training methods will increase students' competence and reduce their anxiety.

AVAILABILITY OF DATA AND MATERIALS

The data presented in this study are available on reasonable request from the corresponding author.

AUTHOR CONTRIBUTIONS

AAE—designed and wrote it. SBD—made the application. İÇ—designed and wrote it. HT—made and wrote the statistical analysis.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Permission to conduct this study was granted by the Non-Clinical Studies Ethics Commission of the Gazi University dated 22 February 2022 and numbered 4 and was registered at ClinicalTrials.gov (Identification No NCT06556524). During the study, the study and its content were explained to the participants, and voluntary participants were included in the study.

ACKNOWLEDGMENT

Not applicable.

FUNDING

This study was supported by Gazi University Scientific Research Projects Coordinator with project number TGA-2022-7734.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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How to cite this article: Abdullah Alper Ertem, İsmet Çelebi, Sariye Bilge Doğan, Hakan Tekedere. The effect of simulation practice with a live subject on the anxiety level and perceived competence level of paramedic candidates in approaching a trauma patient. Signa Vitae. 2025; 21(5): 62-67. doi: 10.22514/sv.2025.067.