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INVESTIGATION OF THE EFFECT OF SIMULATOR USAGE ON ADVANCED LIFE SUPPORT AND LABOR HELP QUALIFICATIONS, AND SELF-EFFICACY OF PARAMEDIC STUDENTS

Simülatör Kullanımının Paramedik Öğrencilerinin İleri Yaşam Desteği ve Doğum Yardımı Yeterlikleri ile Özgüven Durumları Üzerine Etkisinin İncelenmesi

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ABSTRACT

Professional self-competence and self-efficacy of paramedics who first interfere to emergency events are important. An important ratio of deaths in emergency intervention are due to emergencies that require cardiopulmonary resuscitation (CPR), and also emergency labor is frequently seen in rural areas. In this research, CPR and labor simulation training's effect on professional self-competence and relevance of self-efficacy in paramedic students has been investigated. The pre-test and post-test experimental research was carried out with 68 pregraduate paramedic students. Following the pre-questionnaire, all students were given simulation training about CPR and labor, and students were evaluated two times with a weak interval by making one-to-one simulation applications. Afterwards a post-questionnaire was applied, Sherer's General Self-Efficacy Scale (SGSES) was used to determine self-efficacy levels. Professional self-competence perception level and evaluation scores of the students increased significantly in pre and post-questionnaire comparison. The statistically significant difference between professional self-competence perception and graduated high-school in pre-questionnaire was not obtained in post-questionnaire. While SGSES scores were higher in the students who felt more professional self-competence, SGSES scores and professional self-competence scores did not statistically differ among pre and post-questionnaires. Simulation trainings in the education process of paramedic students has significant impact on professional self-competence.

Keywords: General self-efficacy scale, Simulation, Paramedic students, Professional self-competence.

ÖZ

Acil durumlara ilk müdahale eden sağlık görevlilerinin mesleki öz-yeterlikleri ve öz-etkililikleri önemlidir. Acil müdahaledeki ölümlerin önemli bir oranı, kardiyopulmoner resüsitasyon (KPR) gerektiren acil durumlardan kaynaklanmaktadır ve ayrıca kırsal alanlarda acil doğum sıklıkla görülmektedir. Bu araştırmada, KPR ve doğum simülasyonu eğitiminin paramedik öğrencilerinde profesyonel öz-yeterlik üzerine etkisi ve öz-etkililik ile ilişkisi araştırıldı. Ön-test ve son-test yarı-deneysel araştırma, 68 paramedik ön lisans öğrencisi ile gerçekleştirildi. Ön-anket sonrasında tüm öğrencilere KPR ve doğum ile ilgili simülasyon eğitimi verildi ve öğrenciler birebir simülasyon uygulamaları yapılarak bir haftalık aralıkla iki kere değerlendirildi. Ardından son-anket uygulandı, öz-etkililik düzeylerini belirlemek için Sherer'in Genel Öz-Yeterlik-Etkililik Ölçeği (SGÖEÖ) kullanıldı. Öğrencilerin mesleki öz-yeterlik algı düzeyleri ve değerlendirme puanları anket öncesi ve sonrası karşılaştırmada anlamlı olarak arttı. Ön anketteki mesleki öz-yeterlik algısı ile mezun olunan lise arasında istatistiksel olarak anlamlı fark, son ankette elde edilmedi. Daha yüksek mesleki öz-yeterlik hisseden öğrencilerin SGÖEÖ puanları daha yüksek iken, SGÖEÖ puanları ve mesleki öz-yeterlik puanları anket öncesi ve sonrası arasında istatistiksel olarak farklılık oluşturmamıştır. Paramedik öğrencilerin eğitim süreçlerindeki simülasyon eğitimlerinin mesleki öz-yeterlik üzerinde önemli etkisi vardır.

Anahtar kelimeler: Genel öz-etkililik-yeterlik ölçeği, Mesleki öz-yeterlik, Paramedik öğrencileri, Simülasyon.

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INTRODUCTION

Paramedics, so called "Ambulance and Emergency Care Technisions" in Turkey, are professional health personnel who provide health service in life-threatening conditions and paramedics are generally expected to intervene the patients by themselves in pre-hospital services (Pfütsch, 2018; Yıldırım, 2017). The necessity of fast and accurate intervention reveals the importance of professional competencies of paramedics (Furseth, Taylor & Kim, 2016; D. Yıldırım, Sarı, Gündüz & Yolcu, 2014). Hence, the development and standardization of paramedic education and qualifications have become a priority in Turkey as well as the world (Leggio, Miller & Panchal, 2020; Mercan, 2017).

Cardiopulmonary emergencies and arrest are frequent life-threatening emergencies, and emergency interventions performed in the first minutes are very important for the patient in terms of life and death (Long, Koyfman & Gottlieb, 2019; Skoczyński, Wizowska, Pochciał, Leśkiewicz & Zyśko, 2020). Also, though the frequency has decreased with developments in the health care system, paramedics often encounter with emergency labor especially in rural areas (Vilalta & Troeger, 2020). While performing cardiopulmonary resuscitation (CPR) with adequate airway management and defibrillation, and assistance in emergency labor are medical responsibilities of paramedics (Çelikli, 2016), these topics have been reported to be among the least frequently performed interventions in education (Freitas, Quirino, Giesta & Pinheiro, 2020; Gürbüz, Yetiş & Çırak, 2019; Yıldırım, 2017). By this point, usage of vocational skill laboratories and simulation of pre-hospital emergency events are suggested to increase the professional self-competence of the students (Mercan, 2017; Olvera, Smith, Prater & Hastings-Tolsma, 2020; D. Yıldırım et al., 2014). Hence, simulation training comes to the fore as an important method in developing adequate training programs on CPR and emergency labor (Freitas et al., 2020; McLelland et al., 2017; Olvera et al., 2020; Yağcan & Sezer, 2019).

Health workers' psychological state, self-efficacy and professional self-competence are also important factors in the implementation of professional applications (Anderson, Slark, Faasse & Gott, 2019; Tramèr et al., 2020; Yaşar Can & Dilmen Bayar, 2020). The effect of self-competence and self-efficacy on professional development of paramedic students are in search (Kinney, Hunt & McKenna, 2018; Moghadari-Koosha et al., 2020; Williams, Fielder, Strong, Acker & Thompson, 2015). Although studies have been done about paramedic students' professional self-competence perceptions and entrepreneurial skills, and the effect of simulation application on these subjects in Turkey, we have not reached a study on the effect

of self-efficacy on entrepreneurial competence (Akbaba, Tercan, Tarsuslu & Yurt, 2020; Yağcan & Sezer, 2019; Yaşar Can & Dilmen Bayar, 2020).

The aim of this research is to determine the paramedic students' perceptions of professional self-competence and their state of being able to do the expected interventions before and after the simulation applications, and to determine the relationship of these situations with their self-efficacy.

MATERIAL AND METHOD

This research was carried out in pre-test and post-test quasi-trial model with Inonu University Health Sciences Non-Interventional Clinical Research Ethics Committee permission 2018/7-4. The universe of the research was all pregraduate students of First and Emergency Aid Program in 2020-2021 school year. Participation of all the pregraduate students was aimed (n=75), however the study was completed with 68 (90.6%) students who accepted and attended. Data was evaluated with SPSS 24 program and, descriptive statistics, frequency, One-way ANOVA, paired sample T, independent samples T, Kruskal Wallis and Mann Whitney U tests were used.

Before the simulation training, the students were applied a questionnaire prepared by the researchers including questions about; demographic information, training status, proficiency professional self-competence perception, professional practise frequency and Sherer's General Self-Efficacy Scale (SGSES) pre-test (Gürbüz et al., 2019; Williams et al., 2015; Yıldırım & İlhan, 2010; Yıldırım, 2017).

Following the questionnaire and scale application, all students were given theoretical and practical training by simulation about effective CPR and emergency labor. After both trainings, one-to-one simulation applications were done at least two times with each student. For objective evaluation of each student, an application chart (a 100 points evaluation of each parameter) was filled by the trainer during the first and last simulation applications. Between the first and last simulation applications, one-week interval was given. After completion of applications, a second questionnaire to determine the proficiency professional self-competence perception about effective CPR and labor, and self-efficacy (SGSES) post-test were applied.

In the professional self-competence pre-test and post-tests, the students were asked whether they felt competent about the relevant topics and answers were scored as; strongly disagree-1 to strongly agree-5. The professional self-competence perception scores were

calculated as 5 (minimum)-25 (maximum) points when the five parameters (basic life support, airway management and endotracheal intubation technique, life-threatening cardiac rhythms and defibrillator use, cardiopulmonary resuscitation and assisting labor) in the research were calculated.

SGSES has been developed by Sherer et al. and has been adapted to Turkish by Yıldırım and İlhan (Sherer et al., 1982; F. Yıldırım & İlhan, 2010). The reliability of the scale has been determined as 0.86 and 0.80 respectively. In this research, Crombach Alpha value was found as 0.70. The Turkish form of the scale consists of 17 items in a 5-point Likert style, 6 questions (1, 3, 8, 9, 13 and 15) are plain and 11 questions are reverse questions. The range of score is between 17-85, an increase in total score is interpreted as increase in self-efficacy belief.

FINDINGS

The mean age of the students was 21.16±1.75. When the participants' mother occupation and education level were evaluated, 95.5% were determined to be housewives and 62.7% were primary school graduates. Of the participants' father's; 36.5% were self-employed and 40.3% were primary school graduates. 90.9% of the students lived with their families and 73.8% had moderate economic situation. While 62.7% of the participants were 'health vocational high-school' graduates, (6% First and Emergency Aid Program, 56.7% other health programs), 37.3% had not taken vocational education before university (Table 1).

Table 1. Sociodemographic Characteristics of the Students Participating in the Research

Descriptive features	**N**	**(%)**
Gender		
Female	38	55.9
Male	30	44.1
Place of residence		
Family home	60	90.9
Not family home	6	9.1
Economical status		
Good	16	24.6
Moderate	48	73.8
Bad	1	1.5
Graduated high school		
First and Emergency Aid Program	4	6
Vocational High School	38	56.7
Not Vocational High School	25	37.3

When the students' number of professional practical applications before simulation training was evaluated, the rate of not making any application in related subjects was found to

be; 66.2% for cardiopulmonary resuscitation, 80.6% for endotracheal intubation, 82.1% for defibrillator use, and 88.2% for emergency delivery (Table 2).

Table 2. The Number of Professional Practical Applications About Paramedic Responsibilities Before Simulation Training

Number of applications of the specified practises by students	**NONE**		**ONE TIME**		**2-5 TIMES**		**≥ 6 TIMES**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
1. Cardiopulmonary resuscitation	45	66.2	11	16.2	11	16.2	1	1.5
2. Endotracheal intubation	54	80.6	6	9.0	7	10.4	0	0
3. Defibrillator usage	55	82.1	9	13.4	2	3	1	1.5
4. Assisting in emergency labor	60	88.2	3	4.4	3	4.4	2	2.9

When the pre-test and post-test mean scores of the students' perception of professional self-competence were compared, the total score of the professional self-competence perceptions in the post-test was statistically significantly higher than the total score of the pre-test in all parameters ($p<0.05$) (Table 3).

Table 3. Comparison of the Pre-Test and Post-Test Mean Scores of Perception of Professional Self-Competence in Simulation Training Topics

	Pre-test mean score	**Post-test mean score**	**Meaningfulness**
	X ± SS	**X ± SS**	
Do you feel competent about basic life support?	3.63 ± 0.91	4.25 ± 0.74	t=4.659 **p=0.00**
Do you feel competent about cardiopulmonary resuscitation?	3.47 ± 0.95	4.03 ± 0.86	t=4.197 **p=0.00**
Do you feel competent about endotracheal intubation?	3.25 ± 0.87	4.40 ± 0.76	t=9.091 **p=0.00**
Do you feel competent about defibrillator usage?	3.27 ± 1.01	4.12 ± 0.86	t=5.624 **p=0.00**
Do you feel competent about assisting in emergency labor?	3.16 ± 1.10	3.87 ± 1.10	t=4.669 **p=0.00**

When the pre-test and post-test scores of professional self-competence perception were evaluated according to the graduated high schools, post-test scores were determined to be higher than pre-test scores ($p<0.05$), there was no significance in post-test scores.

When the pre-tests of the state of practice (never, once, 2-5 times, 6 and more) and perceptions of feeling competent in practice were evaluated, while there was statistically significant difference in cardiopulmonary resuscitation ($p=0.017$), statistical significance was not found in endotracheal intubation, defibrillator use and emergency labor ($p>0.05$). In the evaluation of the post-tests with practice status and professional self-competence perception, there was not statistically significant difference in none of the mentioned topics ($p>0.05$).

After the findings about the effect of the practise number on perceptions of feeling competence in practise, we decided to compare the effect of making practise and not making

the practise. The participants' practice status was classified as none and at least once, and was statistically evaluated with the simulation training given parameters and, cardiopulmonary resuscitation (p=0.002), endotracheal intubation (p=0.017) and emergency labor (p=0.016) scores were found to be statistically significantly lower in the pre-test scores of those who had not practiced before. No statistically significant difference was found in the post-test scores of the applications (p>0.05) (Table 4). In comparison of the pre and post-tests of the groups, the students' post-test professional self-competence scores of the group that had not done the application before were determined to be statistically significantly higher (p≤0.05) (Table 4).

Table 4. Comparison of the State of Having Done the Applications Before or Not and the Students' Professional Self-Competence Pre-Test and Post-Test Scores

Medical Application of the Subject		**Never done***		**At least once**		**Meaningfulness**
		N	**X ± SS**	**N**	**X ± SS**	
Do you feel competent about cardiopulmonary resuscitation?	Pre-test Post-test	45	3.22 ± 0.90^{x} 3.98 ± 0.91^{y}	23	3.95 ± 0.88 4.13 ± 0.75	**p=0.002** p=0.494
Do you feel competent about defibrillator usage?	Pre-test Post-test	55	3.20 ± 1.01 ^{x} 4.20 ± 0.80 ^{y}	12	3.58 ± 0.99 3.83 ± 1.03	p=0.236 p=0.178
Do you feel competent about endotracheal intubation?	Pre-test Post-test	54	3.12 ± 0.80 ^{x} 4.35 ± 0.78 ^{y}	13	3.76 ± 1.01 4.53 ± 0.66	**p=0.017** p=0.430
Do you feel competent in assisting emergency labor?	Pre-test Post-test	60	3.05 ± 1.08 ^{x} 4.00 ± 0.93 ^{y}	8	3.83 ± 1.11 4.13 ± 1.13	**p=0.016** p=0.487

*p≤0.05, among x and y in each group

In comparison of first and second evaluation scores given by the trainer, there was a statistically significant increase for each parameter (p<0.05) (Table 5).

Table 5. Comparison of the First and Second Evaluations of the Trainer

	First evaluation	**Second evaluation**	**Meaningfulness**
	X ± SS	**X ± SS**	
Basic life support	66.62 ±6.93	89.79 ± 4.39	**p=0.00**
Cardiopulmonary resuscitation	64.48 ± 6.05	89.55 ± 3.93	**p=0.00**
Defibrillator usage	62.72 ± 5.49	90.51 ± 4.15	**p=0.00**
Endotracheal intubation	65.73 ± 6.30	90.58 ± 4.19	**p=0.00**
Birth assistance in case of emergency	63.38 ±5.56	90.44 ± 3.53	**p=0.00**

When the mean scores of the SGSES of the participants were evaluated before (68.83±10.85) and after (65.96±11.30) training and application, no difference was found (p>0.05). In comparison of SGSES mean scores and gender, 68.57±10.76 (female) and 68.94±11.07 (male), no statistically significant difference was determined (p>0.05). Hence, statistically significant difference was not found (p>0.05) when the participants'; graduated high school, mother and father's education and occupation, place of residence and economic status, and the scores of the SGSES were evaluated.

In comparison of the pre-test (16.79±3.64) and post-test (20.68±3.53) total scores of the perception of feeling self-sufficient with the SGSES scores, a statistically significant difference was found in the pre-test scores ($p<0.05$).

The group with higher pre-test efficacy perception scores had a higher SGSES score than the groups who felt less competent. However, there was no statistically significant difference between them ($p>0.05$) (Table 6). When the post-test scores were evaluated, there was a double increase in the number of students who felt more competent, and there was no student in the group who felt less competent. No significant difference was found in the comparison of group values with Sherer's General Self-Efficacy Scale scores ($p>0.05$) (Table 6).

Table 6. Comparison of the Students' Total Vocational Proficiency Scores in the Subjects on Which Simulation Training was Given and the SGSES Score Averages.

	N	**SGSES score averages**	
Pre-Practice Professional Self-Competence Perception Scores			
5-11	5	62.40±19.26	KW=4.687
12-18	36	67.66±9,55	**p=0.09**
19-25	23	71.86±10.16	
Post-Practice Professional Self-Competence Perception Scores			
5-11	-	-	KW=1.076
12-18	19	66.63±11,28	p=0.30
19-25	45	69.66±10,66	

DISCUSSION AND CONCLUSION

Development and standardization of paramedic education and increasing paramedic qualifications have become a priority in Turkey as well as the world (Leggio et al., 2020; Mercan, 2017). It has been shown that the health workers' psychological state, sense of self-confidence and self-efficacy are also important factors in professional practise (Kunzler et al., 2020; Tramèr et al., 2020; Yaşar Can & Dilmen Bayar, 2020). The aim of this study is to evaluate the effect of simulation training on paramedic students' feelings of professional self-competence regarding the professional applications, and also to investigate the effect of their self-efficacy and professional self-competence on this subject. The fact that the research was conducted at a time when face-to-face education and practice opportunities were very limited due to the Covid-19 pandemic, also enabled the evaluation of the effects of the pandemic on health education.

In the evaluation of the number of applied vocational practices, besides the rate of "none" was higher, also application numbers were lower when compared to previous studies (Table 2) (Gürbüz et al., 2019; Tosun, 2009; Yaşar Can & Dilmen Bayar, 2020; Yıldırım,

2017). The two main reasons for this situation may be the application inadequacies brought by the pandemic process and the lower number of vocational high school graduates in the relevant field compared to previous studies.

When the individual professional self-competence perceptions were evaluated before and after the simulation training, statistically significant increase was found in all parameters after the training (Table 3). In this research, the increase in students' perceptions of proficiency after training is an important finding that shows the positive effect of simulation training. Similar to this research, Sandy et al. in their study in South Africa and Negri et al. in their study evaluating 53 separate articles found that simulation training had a positive effect on the perception of students' professional self-efficacy (Negri et al., 2017; Sandy, Meyer, Oduniyi & Mavhandu-Mudzusi, 2021; Tosun, 2009; Yaşar Can & Dilmen Bayar, 2020).

Similar to the former studies, when 'having done the applications before situation' was evaluated, those who had never done the applications before felt more inadequate in general in the pre-tests of professional self-competence perception (Table 4) (Gürbüz et al., 2019; Yaşar Can & Dilmen Bayar, 2020). After training, the situation of not having done practice before did not make statistical difference on professional self-competence perception (Table 4). This result is an important finding which shows the effect of simulation training in terms of not finding the application chance in clinical practise process.

Similar to the studies evaluating the effectiveness of CPR and birth simulator use on student education in Turkey and the world, scores of the participants for each topic increased significantly after the last applications when the scorings made by the trainer were evaluated (Table 5). This finding is valuable in terms of objectively reflecting the positive effects of simulation education on student competencies (Akbaba et al., 2020; Gürol, Öztürk, Seval & Yücel, 2017; Harris & Kudenchuk, 2018; McLelland et al., 2017; Yağcan & Sezer, 2019).

Self-efficacy is related to the individual's trust to his own resources rather than being talented, and high self-efficacy can be associated with high professional self-competence (F. Yıldırım & İlhan, 2010). Self-efficacy status may develop over time and differentiate depending on experiences (Williams, Beovich, Ross, Wright & Ilic, 2017). In a meta-analysis evaluating 50 different factors effecting students' academic performance, self-efficacy and self-confidence were concluded as the strongest parameters (Richardson, Abraham & Bond, 2012). In this research, SGSES total scores are similar or higher than some conducted studies (Arslan, 2019; Arslan, Ilıman & Aslan, 2019; Gün, Aslantekin & Karadağ, 2021; Sarani et al., 2020). The SGSES was administered to the participants twice as; before and after the

simulation training, and no statistically significant difference was found between them (the first scale results have been used in evaluations of the research). This result can be expected as the scale is making a general measurement inspite of academical evaluation. Application of academic self-efficacy and professional self-competence scales to the participants in further studies will be valuable in terms of determining the effect of simulation training on academic professional self-competence.

A statistically significant increase in the perception of professional self-competence was determined between the pre-test and post-test total scores, this finding show similarity with Molu et al.'s study in which interactive education has been determined to have statistically positive difference in pre-evaluation and post-evaluation comparisons in terms of communication, empathy and self-efficacy (Molu, Ceylan & Özcan, 2019). In this study, while there was a statistically significant difference in the evaluation of participants' pre-test scores and SGSES scores, no statistical difference was found for the post-test. This finding shows that participants with high self-efficacy and professional self-competence feel more competent in professional initiatives. Similarly, Ahmadi et al. and Williams et al. have determined high self-efficacy perception in paramedic education to have positive effects on academic motivation, and emphasized the necessity of organizing trainings for personal development in paramedic students (Ahmadi, Ziapour, Lebni & Mehedi, 2021; Williams et al., 2017). At the same time, the fact that interactive education with simulation increases the perception of self-efficacy independent from the SGSES score shows the importance of education in vocational initiatives.

When the professional self-competence perceptions and self-efficacy scale scores were evaluated in the research, although the scale scores of the group who felt less competent in the pre-test were lower than the other groups, there was no statistically significant difference (Table 6). In the post-test evaluation, the facts that; there was no statistical difference in terms of SGSES scores, there were no students in the group that felt the least competent, the number of students in the group that felt more competent was doubled, and the scores of the SGSES were determined to be quite close to each other in terms of simulation education, shows the positive effect of simulation training on professional self-competence of the participants regardless of self-efficacy. This result is valuable in terms of showing the place of simulation training in the education of paramedic students.

As a result of this study, it has been determined that simulation training has significant positive effects on the perception of self-efficacy and professional skills in paramedic

students, and that self-efficacy may have an effect on the acquisition of professional skills. It can be recommended to increase and diversify simulation trainings in order to ensure the quality and standardization of training in paramedic education programs. Arrangements to increase students' self-efficacy in the education curriculum will make significant contributions for the development of their professional competencies.

The facts that; the research was conducted with only one program's students, the research could not be completed by all students during the Covid-19 process, the educator's evaluation was independent from the student surveys, can be considered as the limitations and inadequacies of the research. Conducting long-term, more sophisticated and multi-centered studies on the effect of simulation education on professional self-competence and role of self-efficacy will be valuable in terms of increasing and standardizing the paramedic program education quality.

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