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Students' satisfaction with simulated skills in simulation labs unit

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ABSTRACT

Examining students' contentment with simulation is crucial for giving local and foreign academic teaching personnel feedback. The purpose of this study was to compare students studying emergency medical services' simulation satisfaction. There were 193 students involved in a comparison cross-sectional design during the second semester of the academic year 2018 utilizing a paper-based English version of the satisfaction with simulation experience scale. The findings revealed a slight to moderate positive correlation for factor two (clinical reasoning), 0.510 (P<0.001); and factor three (clinical learning), 0.628 (P<0.001) for students. A slight negative correlation was also found in factor one (debrief and feedback) 0.092 (P<0.001). The study showed that the reliability was 0.906 for factor one, 0.860 for factor two and 0.872 for factor three. Cronbach's Alpha for all factors: 0.937. ANOVA showed that factor three is significant with students' level (df 3, f, 4.186, sig. 0.007). Compared to other factors, students were less satisfied with clinical learning simulation, due to unfamiliarity of students with the simulation mannequin and environment. The frequent implementation of simulation practice in emergency medical services field is highly recommended to enhance mainly clinical learning, master new skills and satisfaction with the learning experience.

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1. INTRODUCTION

Emergency Medical Services (EMS) knowledge and methods for teaching it to students have improved over time, enabling the advancement of the development of a scientific body that upholds EMS as a science. The role of a prehospital EMS has improved significantly in the last decade, changing from a "load & go" into advanced professional role of patient care in the prehospital setting [1]. Due to current developments of prehospital proficiencies and expectations, it is so hard to expose and teach students to master skills through limited clinical settings presented to support theory part. Thus, simulation learning environments have become more common adjuncts for prehospital learning and training [2].

Moreover, to implement competency-based medical education methodologies, simulation is a powerful educational tool, and concentrated research in this area may help in assuring safety and effectiveness in prehospital emergency healthcare [3]. The outcomes of simulation in medical teaching are

highly valuable once it accompanied with the latest up-to-date pictures and sound technologies, realistic atmospheres, high-fidelity simulators and organized reflection around learning and decisions taken (debriefing) next each training case scenarios [4], [5]. However, if simulation implemented effectively, it represents best practice and could have a big impact on how realistic the simulation is [6].

According to Williams *et al*. [7] stated that: according to the literature, academic performance is more affected by satisfaction than by performance. As a result, a learner's capacity to advance their knowledge and abilities could be linked to their satisfaction with simulation. Additionally, it is crucial to have instruments like the Satisfaction with Simulation Experience Scale (SSES) and strong measurement qualities to use in learning studies [7]. Once the student has mastered the skill, he can modify his method to produce the desired outcome. A student can achieve such a high degree of mastery and performance in a very short amount of time that it can direct him toward making the right decisions for positive management [8].

The influence of satisfaction in simulation as a model of practice on student performance in clinical education can be a variable to consider. Simulation can help students experience clinical learning and enhance clinical reasoning, confidence, and perceived preparation for actual clinical education through debriefing and reflection [9]. The higher the satisfaction of the student with the simulation can increase its influence on their performance in the clinical settings [10]. While the lower the satisfaction and without exposing the students to simulation scenarios as it occurred in clinical settings will definitely reduce performance and affect patient safety [11].

In Saudi Arabia, there have been tremendous advancements in the EMS industry. However, there are still important problems that affect service providers, like the paucity of published studies, up-to-date statistics, and the necessity to improve the prehospital providers' level. Therefore, it is advised that empirical research be developed to examine and propose fixes for challenges facing the development of the EMS profession [12]. The University level of EMS education offers students with wide range recognizing of advanced concepts through simulation and clinical practice [13]. Simulation labs unit for Prince Sultan College for EMS (PSCEMS), King Saud University (KSU) offers multiple opportunities for the students to master their EMS skills. PSCEMS simulation unit offers a safe, learner-centered, and realistic atmosphere for emergency case scenarios and critical thinking [14].

In previous studies, The SSES was initially developed to evaluate the differences in satisfaction between nursing students using medium and high-fidelity manikins during simulated-based learning [15]. In 2013, another research utilizes the instrument to assess satisfaction among paramedic students at an Australian University and showed similar results [7]. Pawłowicz [11] in his research also mentioned that simulation is interesting, but the students not fully benefit from simulation, because of the slight emphasis placed on practical parts in the current curriculum. In addition, most studies assess satisfaction in simulation among students who will work inside hospital settings (more staffs and resources) [4], [10], [11], [15]. While limited studies assess the satisfaction in simulation as a model of practice among students who will work outside hospital settings (few staffs, limited resources, and serious emergencies) [7]. Students' satisfaction is a crucial outcome because it is correlated by better engagement in the practice and better motivation for education. In connection with the description, the problem affecting student performance in the EMS field is the implementation of simulation as a model of practice is reflected by satisfaction in simulation. Moreover, students are not frequently exposed to a standard simulation practice model as it occurred in clinical settings.

Based on the previous study, no research has been found that discusses the influence of satisfaction in simulation as a model of practice on student performance in the EMS field. Researchers also have not found research comparing simulation satisfaction among EMS students in Saudi Arabia. It is hoped that the results of this study can be used by educational institutions, especially in Saudi Arabia to improve The EMS teachers performed education and training activities based on simulations as the main resource in educational institutions. Hence, there is no available data for EMS instructors engaged in simulation-based training and education in Saudi Arabia. Thus, comparing simulation satisfaction among EMS students at PSCEMS, KSU was the goal of this study.

2. RESEARCH METHOD

2.1. Study design, sample, and setting

During the second semester of the 2018–19 academic year, second, third, and fourth-year students in an undergraduate paramedic program at PSCEMS, KSU were subjected to a cross-sectional study employing a paper-based version of the SSES. A convenient sample of 193 (84 participants in the second year, 55 in the third year, and 35 in the fourth year) students from the teaching a bachelor's degree of EMS enrolled the study. The inclusion criteria were set as the students participating in the EMS practical lessons and agreeing to participate in the study. Participants were all PSCEMS, KSU undergraduate paramedic students enrolled on one campus.

2.2. Instruments

The 18-item SSES, which was recently designed that measures students' satisfaction with simulation. On a 5-point Likert scale, participants indicate how much they agree or disagree with each statement (1=strongly disagree–5=strongly agree). The SSES was created by nursing researchers initially, but because it is generic in design, replication studies and additional validity hypotheses can be explored using data from other health-related disciplines. The authors found that the SSES was valid and reliable (alpha 0.77), and each subscale (Debriefing and reflection, clinical reasoning, and clinical learning) revealed a high level of internal consistency (0.94, 0.86, 0.85) respectively. No items are reversed scored [15].

2.3. Ethical considerations

A standard code of ethics for subjects were followed. The study follows the "Guidelines for Ethical Research Practice". Due to low-risk nature of this research it was exempt of Institutional Review Board (IRB) approval from KSU Board of Medical Research Ethics. The study received authorization and approval from Tracy Levett-Jones to use SSES instrument. The explanatory statement and the fact that participation was optional and anonymous were both given to participants. In the office of the lead investigator, a safe cabinet was used to store all questionnaires and study materials.

2.4. Data collection and procedures

Data was collected during the second semester of school year 2018 at PSCEMS, KSU. Prior to filling out the questionnaire, participants received an explanation letter regarding the study. Participants were informed that the study was confidential and anonymous and that they could opt out before turning in the questionnaire. Since the student participants were not required to disclose any identifying information on the questionnaire and the data was analyzed on a group basis, anonymity was offered to them. There were neither rewards nor follow-ups implemented. Participants completed a questionnaire that included the SSES and a few demographic questions under the guidance of a non-teaching staff member. The questionnaire took about 10 minutes to complete.

As part of the bachelor's degree program in emergency medical services, which consists of 33 hours of practicum credits, students at all levels apply the specialized competencies they've acquired over the years to create a set of simulated EMS experiences that are based on the resolution of comprehensive and challenging scenarios. After graduation, EMS students are frequently assigned to remote rural locations where they are immediately in charge of a large number of patients who require sophisticated emergency care. The intervention's goal was to provide students with a safe setting in which to enhance their clinical assessment, interprofessional communication, decision-making, time-management, patient safety, and prescribing competence. Moreover, teamwork, leadership, problem-solving in complicated circumstances, decision-making, and assertive communication are among the objectives, in addition to the development of competencies to act in emergency situations. The facilitators have been EMS instructors who were educated in the way to train using simulation-based mastering.

The simulation labs unit where the scenarios are played out uses medium fidelity (Advanced Life Support Mannequins Megacod, adult and Junior, with VitalSim), high-fidelity (SimMan, SimMom, SimBaby by Laerdal), and adult patient simulators (iStan and Meti). The students were invited to participate in the study at the conclusion of this curricular simulation lab unit and were given information about its goals and the anonymous and voluntary nature of their involvement.

2.5. Data analysis

The management and production of statistics were done using the Statistical Package for Social Sciences. The demographic and SSES data were summarized using descriptive statistics, which included mean and standard deviations. To compare the variations in year levels and age, inferential statistics including independent t-tests and one-way analysis of variance were performed.

3. RESULTS AND DISCUSSION

3.1. Demographic data

A total of 193 students participated in this study; total number of student's level one was 84, level two 55, level three 35, and level four 19. The participants' backgrounds are discussed in relation to their age and academic year. Of the 193 participants engaged in the study, the greater part of students 191 (98%) were <25 years of age, and 193 (100%) were male. The mainstream did not have a previous healthcare-related qualification n=193 (100%). The full distribution of demographic information is shown in Tables 1 and 2.

Table 1. The distribution of the participants' age

		Frequency	%	Valid (%)	Cumulative (%)
Valid	19.00	16	8.3	8.3	8.3
	20.00	57	29.5	29.5	37.8
	21.00	52	26.9	26.9	64.8
	22.00	40	20.7	20.7	85.5
	23.00	12	6.2	6.2	91.7
	24.00	14	7.3	7.3	99.0
	25.00	2	1.0	1.0	100.0
	Total	193	100.0	100.0	

Table 2. The distribution of the participants' levels

		Frequency	%	Valid (%)	Cumulative (%)
Valid	84	43.5	43.5	1.00	43.5
	55	28.5	28.5	2.00	72.0
	35	18.1	18.1	3.00	90.2
	19	9.8	9.8	4.00	100.0
	193	100.0	100.0	Total	

3.2. Participant's answers on the SSES

Several items generated high mean scores, as displayed in Tables 3 to Table 5. For example, factor 3 with student age df=6, F=2.703 sig. 015 p<001. It includes clinical learning (the simulation caused me to reflect on my clinical ability, the simulation tested my clinical ability, the simulation helped me to apply what I learned from the case study, and the simulation helped me to recognize my clinical strengths and weaknesses).

Also, the same item produced high mean scores factor three with student level df=3, f=4.186 sig. 0.007 p<001. It includes clinical learning (the simulation caused me to reflect on my clinical ability, the simulation tested my clinical ability, the simulation helped me to apply what I learned from the case study and the simulation helped me to recognize my clinical strengths and weaknesses). The detail is shown in Table 6.

Table 3. Descriptive results of participant's answers on the SSES according to student age

Student age		Factor 1	Factor 2	Factor 3
19.00	Mean	3.6667	3.5250	3.6250
	N	16	16	16
	Std. Deviation	.84911	.66883	.68920
20.00	Mean	3.7115	3.4947	3.5307
	N	57	57	57
	Std. Deviation	.93219	.92898	1.02977
21.00	Mean	3.6368	3.6577	3.9231
	N	52	52	52
	Std. Deviation	.78200	.75805	.85109
22.00	Mean	3.7083	3.6500	3.6250
	N	40	40	40
	Std. Deviation	.71686	.71862	.86046
23.00	Mean	3.3519	3.0000	2.8333
	N	12	12	12
	Std. Deviation	.80659	1.00544	.96727
24.00	Mean	3.4921	3.7286	3.3214
	N	14	14	14
	Std. Deviation	1.00683	.98170	1.17845
25.00	Mean	3.6667	3.6000	3.8750
	N	2	2	2
	Std. Deviation	.31427	.56569	.17678
Total	Mean	3.6482	3.5606	3.6088
	N	193	193	193
	Std. Deviation	.83205	.83448	.95393

N=Number of participants; Std. Deviation=Standard deviation

Table 4. Descriptive results of participant's answers on the SSES according to student levels

Student level		Factor 1	Factor 2	Factor 3
1.00	Mean	3.6839	3.5190	3.6280
	N	84	84	84
	Std. Deviation	.81202	.81322	.91794
2.00	Mean	3.7091	3.6109	3.8091
	N	55	55	55
	Std. Deviation	.88308	.83747	.87792
3.00	Mean	3.6317	3.6171	3.6143
	N	35	35	35
	Std. Deviation	.78279	.85319	.88356
4.00	Mean	3.3450	3.4947	2.9342
	N	19	19	19
	Std. Deviation	.85578	.93421	1.19560
Total	Mean	3.6482	3.5606	3.6088
	N	193	193	193
	Std. Deviation	.83205	.83448	.95393

N=Number of participants; Std. Deviation=Standard deviation

Table 5. Analysis of variance comparing the differences between age groups

			Sum of squares	df	Mean square	F	Sig.
Factor1 * Student age	Between groups	(Combined)	1.781	6	.297	.421	.864
	Within groups		131.141	186	.705		
	Total		132.922	192			
Factor2 * Student age	Between groups	(Combined)	5.247	6	.874	1.266	.275
	Within groups		128.454	186	.691		
	Total		133.701	192			
Factor3 * Student age	Between groups	(Combined)	14.012	6	2.335	2.703	.015
	Within groups		160.703	186	.864		
	Total		174.715	192			

df=Degree of freedom; F=Variance of group means; Sig.=Significance

Table 6. Analysis of variance comparing the differences between student level groups

			Sum of squares	df	Mean square	F	Sig.
Factor1 * Student age	Between groups	(Combined)	2.067	3	.689	.995	.396
	Within groups		130.856	189	.692		
	Total		132.922	192			
Factor2 * Student age	Between groups	(Combined)	.479	3	.160	.226	.878
	Within groups		133.222	189	.705		
	Total		133.701	192			
Factor3 * Student age	Between groups	(Combined)	10.885	3	3.628	4.186	.007
	Within groups		163.830	189	.867		
	Total		174.715	192			

df=Degree of freedom; F=Variance of group means; Sig.=Significance

These findings imply that, as compared to other factors, factor three simulation satisfaction among PSCEMS students was lower. The number three SSES factors for first through fourth years showed statistical significance (P<0.001) across groups according to the analysis of variance. With factor 3, statistical differences were discovered (clinical learning).

For PSCEMS students, there was a little to moderate positive association for each factor: clinical reasoning, 0.510 (P<0.001); and clinical learning, 0.628 (P<0.001). Debrief and the feedback factor also showed a little negative association 0.092 (P<0.001). These findings imply that there are relationships between the students, the number of simulations performed, and simulation enjoyment.

This study aimed to examine and compare simulation satisfaction among all EMS student levels at PSCEMS, KSU. The findings of the study showed that all of the (100%) participants were male; socially, gender equality of entree to those job opportunities still limited in Saudi Arabia, which explain absent of female participants in the study [12], [16]. While, other studies conducted in Australia and Jordan showed that of the 511 participants were female (61.3%) n=313 enrolled the study [7]. Also, the findings of the study showed that all participants did not have a previous health care-related qualification (100%) n=193. As well as most participants ages were fall between 20 to 22 years old (77.1%) n=149 as shown in Table 1; generally, the paramedic students in our country have first year preparation and internship phase outside our college, which explain a small percentage of other ages of the participants in the study.

The study's findings revealed that PSCEMS students had a high degree of satisfaction with simulation for each aspect in the SSES. For example, PSCEMS undergraduate programs utilize comparable educational approaches, utilize EMS instructors in simulations, spend comparable amounts of time in such settings, and provide comparable opportunities for clinical skill development. According to a study by Fogg *et al.* [17], a student's language, culture, and heritage influence their learning preferences, which could impact how satisfied they feel with simulated learning settings.

Numerous research of the societies of various nations have been done to assess the paramedic student's simulation satisfaction; generally, regardless the type of simulation, the paramedic students reported the highest satisfaction with simulation skills [7], [18]–[22]. All PSCEMS participants reported generally high levels of satisfaction with simulation. These aggregate self-reported data suggest that PSCEMS students strongly support simulation-based learning. Significantly, these findings should be appreciated since they supplement the fragmented research on simulation in EMS education.

Clinical learning is improved through engaging participants in realistic environments practice. In addition, activities in clinical learning encompass integration of knowledge, psychomotor and cognitive skills such as drug calculation and critical thinking to improve a clinical reasoning [23], [24]. In our study, differences were found among cohorts of students. Through examining the factor of "clinical learning", ANOVA showed that factor three is significant with students' level (df 3, f, 4.186, sig. 0.007). When comparing year levels, first- and second-year students were less satisfied than third- and fourth-year students. This might refer to that the higher-level students were more expose to clinical practice, more confidence and familiar with the complex scenarios and high-fidelity simulation mannequin and environment than the lower levels students [25], [26].

Another reason for the lower rating of satisfaction in clinical learning might be that the faculty were anxious and not completely familiar with high fidelity simulation. the role of faculty who facilitate simulation in student learning is very important [27], [28]. It is important to orient and offer sufficient training to faculty members to prepare them with skills needed to effectively perform high fidelity simulation and clinical learning' (Table 6). A study conducted by Williams *et al*. [7] revealed that differences were found among both cohorts of students regarding the factor of "debrief and reflection". While, in our study differences were not found among cohorts of students in the factor of "debrief and reflection". This might refer to that the PSCEMS have experiences and certified as American Heart Association (AHA) and National Association of Emergency Medical Technicians (MAEMT) instructors, and most of faculty members use simulation and debriefing regularly in the training of Advanced Life Support courses. Thus, the faculty member has no challenges with debrief and reflection factor.

There was a significant difference in students' satisfaction scores on the clinical learning. The students might be unfamiliar with the high-fidelity simulation mannequin and environment. The additional high-fidelity simulation practice sessions may give the students the chance to enhance clinical learning, master new skills and satisfaction with the learning experience [29], [30].

4. CONCLUSION

This study revealed that PSCEMS students reported low level of satisfaction with simulation across factor three (clinical learning) compared to other factors, due to unfamiliarity of students with the high-fidelity simulation mannequin and environment. Therefore, we believed that student performance in the EMS field is reflected by satisfaction in simulation. The frequent implementation of standard simulation practice model as it occurred in clinical setting is highly recommended to enhance clinical learning, master new skills and satisfaction with the learning experience.

Moreover, the results of this study suggest that there are relationships between the students, the number of simulations undertaken, and satisfaction of simulations. These results may provide important data for EMS faculty engaged in the cognitive and psychomotor training in Saudi Arabia, mainly in the area of clinical based simulation sittings. Results encourage use of cross-cultural in future studies.

However, this study has several limitations. Due to the geographic location, the cultural demographics, and absent of female paramedic students in our college, so, all the study participants were male students. In addition, the study may did not consider the student's differing amount of "actual" involvement with simulation; therefore, the results found may not be a true drawing of the sample as a whole.

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