


RESEARCH ARTICLE

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Turkish Validity and Reliability of the Satisfaction with Simulation Experience Scale

ABSTRACT

Objective: Research on simulation-based experience focuses primarily on the student's level of knowledge, skills, self-confidence, and satisfaction. There is only one scale in Turkish that can be used to measure satisfaction with the simulation experience. The aim of this study was to establish the validity and reliability of the Turkish version of the Satisfaction with Simulation Experience Scale (SSES).

Methods: The study sample consisted of 130 nursing students from two universities. Data were collected using a student information form, the Turkish version of the Satisfaction with Simulation Experience Scale (SSES-TR) and the Scale of Student Satisfaction and Confidence in Learning (SSSCL). The original SSES was translated into Turkish. Thirteen academics, who were experts in nursing and simulation, were consulted for content validity. Expert feedback was collected in a form to determine the content validity ratio using Lawshe's technique. The Turkish adaptation of the SSES was performed by four linguists to ensure linguistic validity. The correlation between the SSES-TR and SSSCL was determined using concurrent validity and Pearson's Correlation. Internal consistency tests were used to test reliability. The SSES-TR was administered to 35 students as a test-retest with an interval of two weeks to determine its consistency across time. Construct validity was evaluated by confirmatory factor analysis (CFA).

Results: The scale had a content validity index (CVI) of 0.86. The SSES-TR had a Cronbach's alpha (α) of 0.928. The correlation between SSES-TR items and total and subscale scores ranged from 0.492 to 0.749. Test-retest reliability coefficients showed that the SSES-TR total score and subscale scores were compatible. The fit statistics of the 3-factor scale structure according to CFA are at the level of "acceptable fit" according to RMSEA (0.095) and SRMR (0.090).

Conclusions: The SSES-TR is a reliable and valid measure that can be used to assess nursing students' satisfaction with simulation-based experience.

Keywords: Simulation, Experience, Satisfaction, Nursing Students, Validity And Reliability.

Simülasyon Deneyimi Memnuniyet Ölçeğinin Türkçe Geçerlik Güvenirliği

ÖZET

Amaç: Simülasyona dayalı eğitime ilgili çalışmaların çoğu öğrencilerin bilgi ve beceri edinme, özgüven ve memnuniyet ölçüm sonuçlarına odaklanmaktadır. Simülasyon deneyiminde memnuniyeti ölçen sadece bir Türkçe ölçek vardır. Bu çalışmanın amacı "Simülasyon Deneyimi Memnuniyet Ölçeği'nin" Türkçe geçerlik güvenirliliğini yapmaktır.

Gereç ve Yöntem: Çalışmanın örneklemini iki farklı üniversitenin Hemşirelik bölümünde öğrenim gören 130 öğrenci oluşturmaktadır. Veriler Öğrenci Tanıtım Formu, Simülasyon Deneyimi Memnuniyet Ölçeği (SDMÖ), Öğrenmede Öğrenci Memnuniyeti ve Özgüven Ölçeği (ÖÖMÖÖ) kullanılarak toplanmıştır. Türkçe çevirisi yapılan ölçek kapsam geçerliği için hemşirelik alanında uzman, simülasyon uygulamaları yapan 13 akademisyenin görüşüne sunuldu. Uzmanların görüşleri Lawshe Tekniği kullanılarak tek bir formda birleştirilerek kapsam geçerlilik oranı belirlendi. SDMÖ'nin dil geçerliğini sağlamak amacıyla Türkçe'ye uyarlama çalışmaları dört dil uzmanı tarafından gerçekleştirildi. ÖÖMÖÖ ile SDMÖ arasındaki ilişki eş zaman geçerliliği yöntemi uygulanarak Pearson Korelasyonu ile değerlendirildi. Ölçeğin güvenirliliği iç tutarlılık testleri ile değerlendirildi. Ölçeğin zaman göre değişmezliğini incelemek için 35 öğrenciye 2 hafta ara ile SDMÖ ölçeği tekrar uygulandı. Yapı geçerliliği, doğrulayıcı faktör analizi (DFA) ile değerlendirildi.

Bulgular: SDMÖ kapsam geçerlilik indeksi (CVI) 0.86'dır. Ölçeğin Cronbach Alfa katsayısı 0.928 olarak elde edildi. SDMÖ maddeleri ile ölçek toplam puan ve ilgili alt boyut puanı arasındaki korelasyon katsayıları 0.492 ile 0.749 arasında değişmektedir. Ölçeğin test-tekrar test güvenirliliği incelendiğinde, ÖÖMÖÖ toplam puanı ve alt boyutları için puanların uyumlu olduğu görülmüştür. DFA'ya göre 3 faktörlü ölçek yapısının uyum istatistikleri, RMSEA (0,095) ve SRMR'ye (0.090) göre "kabul edilebilir uyum" düzeyindedir.

Sonuç: SDMÖ hemşirelik öğrencilerinin simülasyon temelli deneyimden memnuniyetlerini değerlendirmek için kullanılabilir güvenilir ve geçerli bir ölçüm aracıdır.

Anahtar Kelimeler: Simülasyon, Deneyim, Memnuniyet, Hemşirelik Öğrencileri, Geçerlik ve Güvenirlik.

INTRODUCTION

Simulation is an active learning method widely used in nursing education (1). Simulation-based experience (SBE) has recently become popular among nursing educators due to the low number of academics, increasing number of students, patient safety, and malpractice cases (2,3). SBE is conducted in risk-free learning environments where students are allowed to make mistakes and learn from them (4). The debriefing session is a critical stage of SBE (5,6) because it facilitates learning by helping students understand the simulation experience (7).

Simulation-based experience increases nursing students' knowledge, self-confidence, and satisfaction. Inadequate preclinical readiness and low self-confidence in clinical settings cause stress among nursing students and negatively affect their self-confidence and satisfaction. Research, however, shows that simulation-based experience in nursing education improves student confidence and satisfaction (1,8).

Studies on simulation-based experience focus primarily on the student's level of knowledge, skills, self-confidence, and satisfaction (8, 9, 10), but there are only a handful of scales that measure these characteristics. Only one Turkish scale is available for measuring self-confidence and satisfaction (11). The Satisfaction with Simulation Experience Scale (SSES) focuses mostly on debriefing sessions and clinical reasoning and learning. It differs from other scales, because it has items on the debriefing session. Scale diversity allows us to see how useful simulation experiences are for students, which can be used as a guide for both students and educators. The aim of this methodological study was, therefore, to establish a Turkish version of the Satisfaction with Simulation Experience Scale (SSES-TR).

MATERIAL AND METHODS

Population and Sample: The study population consisted of all nursing students (n = 208) from the faculties of health sciences at two different universities in Ankara and Istanbul. A total of 133 students agreed to participate in the study. Three students were excluded because they were unable to complete the research process. Therefore, the final study sample consisted of 130 students.

Data Collection Tools: The student information consisted of items on gender, age, grade level, etc.

The Satisfaction with Simulation Experience Scale (SSES) was developed by Levett-Jones et al. (12). It consists of 18 items scored on a 5-point Likert-type scale (1= Strongly Disagree; 5= Strongly Agree), and three subscales: (1) debrief and reflection (nine items; $\alpha = 0.94$), clinical reasoning (five items; $\alpha = 0.86$), and clinical learning (four items; $\alpha = 0.85$) (12). Higher scores

indicate higher satisfaction with simulation experience.

The Scale of Student Satisfaction and Confidence in Learning (SSSCL) was used to determine internal consistency. The Turkish validity and reliability of the scale were established by Unver et al. (2017) (11). The scale consists of 12 items scored on a 5-point Likert-type scale (1= Strongly Disagree; 5= Strongly Agree) and two subscales; satisfaction with learning (five items) and self confidence in learning (seven items). There are no reverse-scored items. The scale total score is the sum of the total subscale scores divided by the number of items. Higher scores indicate higher satisfaction and self-confidence. The SSSCL has a Cronbach's alpha of 0.95 while the subscales have a Cronbach's alpha of 0.91.

Procedure: Written permission was obtained from Tracy Levett-Jones to establish the Turkish validity and reliability of the SSES.

Translation of SSES Items into Turkish/Linguistic Validity: The Turkish adaptation of the SSES was performed by four linguists to ensure linguistic validity. Two independent translators translated the original SSES into Turkish. The Turkish version was back translated into English by two independent translators and compared to the original scale. The SSES-TR was finalized based on the feedback of a Turkish linguist who reviewed the English and Turkish meanings of the scale items.

Content Validity: Content validity refers to the extent to which a measure is representative of all components of the construct it is designed to assess (13). The content validity ratio (CVR) was first developed by Lawshe (1975), whose technique suggests that a panel from 3 to 20 experts be consulted to establish content validity (14,15). In this study, 13 academics, who were experts in nursing and simulation applications, were consulted to establish the content validity of the SSES-TR. They used Lawshe's CVR to assess the items for relevancy and clarity on a scale of 1 to 3 (1 = Appropriate, 2 = Revise, 3 = Remove) and provided feedback. The content validity ratio was calculated, and the SSES-TR was finalized based on experts' assessments (13, 16).

Pilot Test: A pilot test was conducted with 20 students to evaluate the intelligibility of the SSES-TR, which was then finalized based on their feedback.

Criterion Validity: Criterion validity, also known as predictive validity, refers to the extent to which a measure agrees with a firmly established and widely accepted external criterion of the phenomenon being measured. The correlation between the SSES-TR and SSSCL was determined using concurrent validity and the Spearman correlation (13,16). Thirty-five students were

recruited to establish the predictive validity of the SSES-TR.

Reliability: Internal consistency tests were used for scale reliability. Internal consistency is a method of reliability used to determine how correlated items proposed to measure a certain construct are with each other (17). The Cronbach's alpha reliability item total score correlation was evaluated (19).

Test-Retest Reliability: A measure is expected to yield consistent results over time. Test-retest reliability is commonly used to assess the consistency of a measure from one time to another. In this study, thirty-five students were administered the SSES-TR as test-retest with an interval of two weeks to determine its consistency across time.

Ethical Considerations: The study was approved by the Ethical Council for Clinical Research of Ankara Yıldırım Beyazıt University (Protocol No: 2018-61). Written informed consent was obtained from participants prior to participation.

Statistical Analysis: Data were analyzed using the Statistical Package for the Social Sciences (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.) at a significance level of 0.05. Age data were tested for normality using the Shapiro-Wilk test and normality plots. Median (min-max) scores were presented for age. Mean \pm standard deviation (Mean \pm SD) were calculated for the items, and for the total and subscale scores. Categorical variables were presented as n (%). A confirmatory factor analysis (CFA) and bootstrapping were performed using R language (v.3.5.1) and the "lavaan" package on RStudio Software (v.1.2.1335). A path diagram was drawn using the "semPlot" package.

Construct Validity: A confirmatory factor analysis (CFA) with a diagonally weighted least square (DWLS) estimator was performed to determine the construct validity of the SSES-TR. Standardized factor loadings (SFL) greater than 0.30 were presented. The Root Mean Square Error of Approximation (RMSEA), Normed Fit Index (NFI) Comparative Fit Index (CFI), Incremental Fit Index (IFI), Tucker-Lewis Index (TFI), ratio of χ^2 to degree of freedom (df), and Standardized Root Mean Square Residual (SRMR) were used to assess model fit (18). χ^2 was taken into consideration together with other fit indices because it is sensitive to large sample sizes and strong intra-item correlations. The criteria for good (or acceptable, at least) fit were as follows: CFI \geq 0.95, TLI \geq 0.95, RMSEA $<$ 0.06 or $<$ 0.08 at most, SRMR $<$ 0.08, and $\chi^2/df < 3$ (20,21,22). The consistency of the fit indices was estimated using nonparametric bootstrapping with 1000 iterations. The bootstrap results with 95% confidence interval (CI) were presented.

Criterion Validity: Criterion validity was determined using Spearman's rank correlation coefficient for the SSES-TR and SCLS scores.

Reliability: Internal consistency was assessed using Cronbach's alpha coefficient for both the total scale and subscales. Test-retest reliability was investigated using intraclass correlation coefficient (ICC) of a two-way mixed ANOVA design for absolute agreement and single measure.

RESULTS

The majority of participants (84.6%) were women. The median age of participants was 20 years (min-max:18-22). The SSES-TR had high item, subscale and total scores (Table 1).

Table 1. Descriptive Statistics of SSES-TR Items, and Total and Subscale Scores

Items	Mean \pm SD	Min-Max
Item 1	4.431 \pm 0.715	1-5
Item 2	4.485 \pm 0.707	1-5
Item 3	4.308 \pm 0.955	1-5
Item 4	4.423 \pm 0.815	1-5
Item 5	4.415 \pm 0.765	1-5
Item 6	4.469 \pm 0.728	2-5
Item 7	4.469 \pm 0.637	2-5
Item 8	4.500 \pm 0.718	1-5
Item 9	4.292 \pm 0.849	1-5
Item 10	4.446 \pm 0.648	2-5
Item 11	4.377 \pm 0.662	2-5
Item 12	4.223 \pm 0.760	2-5
Item 13	4.038 \pm 0.875	2-5
Item 14	4.500 \pm 0.685	2-5
Item 15	4.292 \pm 0.772	2-5
Item 16	4.454 \pm 0.648	2-5
Item 17	4.446 \pm 0.683	1-5
Item 18	4.638 \pm 0.543	2-5
SSES-TR total score	4.400 \pm 0.494	1.83-5
Debrief and reflection	4.421 \pm 0.574	1.33-5
Clinical reasoning	4.317 \pm 0.530	2-5
Clinical learning	4.458 \pm 0.531	2-5

Content Validity: The SSES-TR items had a CVR of 0.69 to 1.00 while the scale had a content validity index (CVI) of 0.86.

Construct Validity: Table 2 shows the fit statistics of the CFA 3-factor structure and their 95% bootstrap confidence interval, suggesting an "acceptable fit" according to the RMSEA, SRMR and χ^2 / df criteria, and a "good fit" according to the other criteria.

The estimates for covariance parameters between item factor loadings and factors showed that the standard factor loadings ranged from 0.629 to 0.897 while the correlations between the subscales ranged from 0.743 to 0.915 (Figure 1). ($p < 0.001$)

The chi-square statistics and p-value for three-factor CFA model were 285,7852 and $p < 0.001$ respectively ($\chi^2 = 285,7852$, $p < 0.001$, Table 3). All coefficients were significant (Figure 1) ($p < 0.001$, Table 3).

Table 2. CFA Construct Validity Results for SSES-TR

Fit Measures	Good Fit	Acceptable Fit	Model Results (95% CI of Bootstrap)	Fit Status
RMSEA	$0 < RMSEA < 0.05$	$0.05 \leq RMSEA \leq 0.10$	0,095 (0.076-0.123)	Acceptable
NFI	$0.95 \leq NFI \leq 1$	$0.90 \leq NFI < 0.95$	0.973 (0.954-0.988)	Good fit
CFI	$0.97 \leq CFI \leq 1$	$0.95 \leq CFI < 0.97$	0.985 (0.965-0.994)	Good fit
IFI	$0.97 \leq IFI \leq 1$	$0.95 \leq IFI < 0.97$	0.986 (0.965-0.994)	Good fit
TLI	$0.96 \leq TLI \leq 1$	$0.85 \leq TLI < 0.96$	0.983 (0.960-0.993)	Good fit
SRMR	$0 \leq SRMR \leq 0.06$	$0.06 < SRMR \leq 0.10$	0.090 (0.088-0.161)	Acceptable
χ^2/df	$0 \leq \chi^2/df \leq 2$	$2 < \chi^2/df \leq 3$	2.165 (1.992-4.342)	Acceptable

RMSEA: Root Mean Square Error of Approximation, NFI: Normed fit index , CFI: Comparative Fit Index, IFI: Incremental fit index , TLI: Tucker-Lewis Index, SRMR: Standardized Root Mean Square Residual, df: Degree of freedom

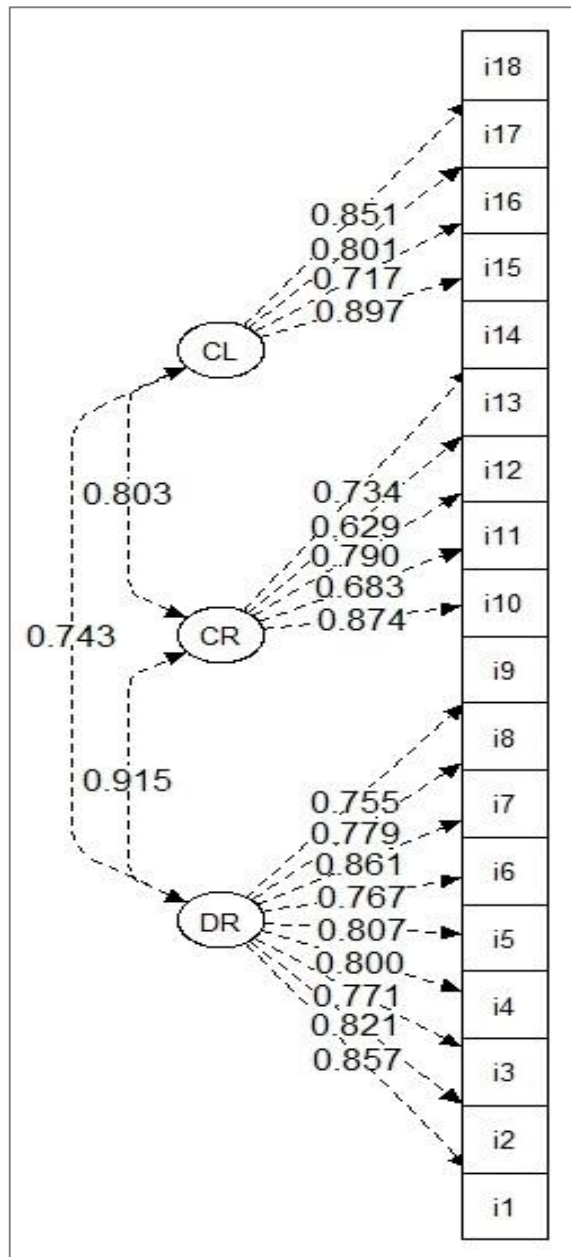


Figure 1. The path diagram of CFA

Table 3. Parameter estimates of CFA model

Path Coefficient of	Standardized Estimate	Standard Error	Z-statistics	p-value
Item 1	0.857	0.039	21.915	<0.001
Item 2	0.821	0.034	24.104	<0.001
Item 3	0.771	0.043	18.080	<0.001
Item 4	0.800	0.039	20.768	<0.001
Item 5	0.807	0.039	20.662	<0.001
Item 6	0.767	0.052	14.610	<0.001
Item 7	0.861	0.034	25.022	<0.001
Item 8	0.779	0.039	19.953	<0.001
Item 9	0.755	0.040	18.960	<0.001
Item 10	0.874	0.038	22.715	<0.001
Item 11	0.683	0.044	15.466	<0.001
Item 12	0.790	0.039	20.051	<0.001
Item 13	0.629	0.057	11.022	<0.001
Item 14	0.734	0.061	12.020	<0.001
Item 15	0.897	0.041	22.118	<0.001
Item 16	0.717	0.053	13.532	<0.001
Item 17	0.801	0.048	16.788	<0.001
Item 18	0.851	0.050	17.084	<0.001
Covariances between				
DR~~CR	0.915	0.023	38.978	<0.001
DR~~CL	0.743	0.042	17.608	<0.001
CR~~CL	0.803	0.056	14.460	<0.001

There was a strong positive correlation between the SSES-TR “debrief and reflection” and “clinical reasoning” subscales ($r = 0.749$, $p < 0.001$, Table 4). There was a moderate positive correlation between the SSES-TR “clinical learning” and the other two subscales ($p < 0.001$). Participants responded very consistently to the SSSCL items. The SSSCL had a Cronbach's alpha of 0.920 while its subscales “satisfaction with learning” and “self-confidence in learning” had a Cronbach's alpha of

0.888 and 0.849, respectively. Participants had a median SSSCL “satisfaction” and “self-confidence” subscale score of 22 (min-max: 5-25) and 30 (min-max: 10-35), respectively. They had a median total SSSCL score of 4.33 (min-max: 1.25-5.00). Their SSSCL total and subscale scores were weakly and positively correlated with their SSES-TR total and “debrief and reflection” and “clinical reasoning” subscale scores ($p < 0.05$).

Table 4. Correlation between SSES-TR and SSSCL scores

	SSES-TR							
	Debrief and reflection		Clinical reasoning		Clinical learning		Total	
	r*	p-value	r	p-value	r	p-value	r	p-value
SSES-TR								
Clinical reasoning	0.749	<0.001						
Clinical learning	0.589	<0.001	0.573	<0.001				
SCLS								
Satisfaction	0.238	0.006	0.219	0.012	0.047	0.595	0.211	0.016
Self-confidence	0.260	0.003	0.141	0.111	0.153	0.082	0.207	0.018
Total	0.265	0.002	0.181	0.039	0.114	0.197	0.221	0.011

*Spearman correlation coefficient

Reliability: The SSES-TR had a Cronbach's alpha values 0.928, which dropped when the items were removed one by one (Table 5). This was also

true for the subscales. The correlation coefficients between the items and scale total and subscale scores ranged from 0.492 to 0.749.

Table 5. Internal consistency of SSES-TR items

Subscales/Items	Total Scale		Subscale	
	Cronbach Alpha Values*	CITC [§]	Cronbach Alpha Values**	CISC ^{§§}
Debrief and reflection				
Item 1	0.921	0.731	0.885	0.711
Item 2	0.922	0.704	0.887	0.692
Item 3	0.925	0.613	0.898	0.583
Item 4	0.923	0.665	0.889	0.656
Item 5	0.922	0.690	0.882	0.749
Item 6	0.923	0.647	0.888	0.667
Item 7	0.922	0.717	0.885	0.737
Item 8	0.923	0.653	0.886	0.701
Item 9	0.924	0.624	0.895	0.589
Clinical reasoning				
Item 10	0.922	0.708	0.712	0.620
Item 11	0.926	0.538	0.742	0.521
Item 12	0.924	0.637	0.715	0.598
Item 13	0.927	0.509	0.744	0.534
Item 14	0.924	0.599	0.751	0.492
Clinical learning				
Item 15	0.924	0.626	0.759	0.640
Item 16	0.926	0.536	0.738	0.671
Item 17	0.926	0.533	0.764	0.616
Item 18	0.926	0.552	0.776	0.603

Cronbach alpha values: 0.928 for SSES, 0.900 for DR, 0.774 for CR, 0.808 for CL

*Cronbach alpha values of SSES if item deleted **Cronbach alpha values of the corresponding subscale if item deleted

§ Corrected Item-Total Scale Correlation §§ Corrected Item-Subscale Correlation

According to the test-retest reliability results, the SSES-TR total and subscales scores were quite compatible (min ICC = 0.968, Table 5).

Table 6. Test-retest Reliability Results

n=35	ICC (95% CI)	p-value
SSES Total	0.990 (0.980-0.995)	<0.001
Debrief and reflection	0.984 (0.968-0.992)	<0.001
Clinical reasoning	0.968 (0.909-0.986)	<0.001
Clinical learning	0.981 (0.962-0.990)	<0.001

ICC: Intraclass Correlation Coefficient, CI: Confidence interval

DISCUSSION

Education experts argue that satisfaction has a significant effect on academic performance (23). Satisfaction also helps students to increase their knowledge, develop skills, and build self-confidence. It is, therefore, of paramount importance to determine student satisfaction with simulation-based experience. There is, however, only one valid and reliable Turkish scale that can be used to measure student satisfaction with simulation-based experience (11).

A rule of thumb for validity and reliability studies is to have a sample size 5 to 10 times the number of scale items (17). The study sample consisted of 130 participants, which was 7 times the

number of the SSES-TR items. Levett-Jones (2011) had recruited 286 students while Williams and Dousek (2011) recruited 167 students (12,24). One hundred and sixty-two paramedic students had been recruited to establish the validity and reliability of the Korean version of the Satisfaction with Simulation Experience Scale (SSES-KR) (25).

The SSES-TR had a CVI of 0.86 while its subscales had a CVI of 0.69 to 1.00. Therefore, no items were removed from the scale. These results show that the SSES-TR has appropriate content and is easy to understand. Confirmatory factor analysis was used for construct validity. Similar to the original scale, the SSES-TR items were loaded to three factors. No item had a factor loading below 0.30 (See Figure 1). Esin et al. recommend that each item have a factor loading of at least 0.30. Therefore, no items were removed. The correlation coefficients between the SSES-TR items and total and subscale scores ranged from 0.492 to 0.749. The SSES-KR was reported to have factor loadings ranging from 0.564 to 0.792 (25).

According to the CFA results, the SRMR and RMSEA were at acceptable levels. $RMSEA \leq 0.08$, and CFI, GFI, and NNFI ≥ 0.90 , AGFI ≥ 0.80 indicate good fit (26). The CFA results show that the SSES-TR is an appropriate measure that can be used to determine student satisfaction with

simulation-based experience. The SSES-TR also has three subscales, the names of which are the same as those of the original scale; “debrief and reflection,” “clinical reasoning,” and “clinical learning.” However, Williams and Dousek (2012) changed the names of the subscales to “clinical learning and reflection,” “debriefing teamwork and collaboration,” and “clinical reasoning” (24).

Internal consistency was determined using Cronbach's alpha reliability coefficient. Levett-Jones (2011) reported a Cronbach's alpha of 0.776 for the total scale and 0.850 to 0.935 for the subscales (12). The total SSES-KR was reported to have a Cronbach's alpha of 0.841 and its subscales were reported to have a Cronbach's alpha of 0.852 to 0.913 (25). In this study, the total SSES-TR has a Cronbach's alpha of 0.928 while its subscales have a Cronbach's alpha ranging from 0.774 to 0.900. A Cronbach's alpha score of 0.6 to 0.80 indicates “acceptable reliability” while a Cronbach's alpha score of 0.8 to 1.00 indicates “high reliability” (27). Test-retest was used to assess scale

consistency over time. The test-retest method is used to determine how responses to scale items change over time (28). An ICC analysis was used to analyze participants' responses to the scale items. The results showed that the ICC ranged from 0.968 to 0.990, indicating agreement between the two tests.

CONCLUSION

The SSES-TR is a valid and reliable measure that can be used to evaluate student satisfaction with simulation-based experience. The SSES-TR has subscales similar to those of the original scale. Our results show that the SSES-TR is a highly reliable measure that can be used for the Turkish population. The SSSCL is the scale that is commonly used in Turkey. We, however, believe that the SSES-TR is superior to it because its “debrief and reflection” subscale allows researchers to evaluate student feedback. The validity and reliability of the SSES-TR should be tested on different populations, and the scale should be used in different scenarios.

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