Original Article

The Standardized Patients Application Effectiveness Scale (SAES): A New Scale-Based Measure of Simulated Patient Application Effectiveness

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Abstract

Although there are various measurement tools in the literature about simulation, there is no tool that assess the efficacy of standardized patients (SP) training in communication education. This methodological study aimed to develop a scale for assessing the effectiveness of standardized patients (SP Application Effectiveness Scale (SAES)). Construction of the SAES was done over three key stages, including measure development, pilot testing and assessment of psychometrics and methodological quality. The resulting measure is a 27 item, univariate scale that is easily administered and scored. Evaluation of the methodological quality of the SEAS indicated that it has reliable and valid. The SAES can be used in assessing the effect of simulation teaching on students' learning outcomes and perception of learning effectiveness.

Key Words Standardized Patients, Communication Education, Methodological Study

Introduction and Background

One of the main goals of nursing and medical education is to provide students with the skills necessary for professional communication with patients (Turan et al., 2011). Students are expected to obtain theoretical knowledge about communication with patients, then combine that knowledge with critical thinking and psychomotor skills, develop self-confidence regarding their skills and eventually use these skills in the clinical practice as well as for patient treatment and care (Goris et al.,2014).

Communication skills education aims to develop competency and confidence for studentsin their professional interactions with patients. Methods to achieve this goal include role-playing, didactic teaching and similar methods (Bagnasc et al., 2014; Lane and Rollnick, 2007; Koponenet al., 2014). In simulation, a professional actor is trained to accurately and consistently to play the role of a patient developed in scenarios based on real life examples. This actor is referred to as a simulated patient (SP) (Robinson-Smith et al., 2009; Yardley et al., 2013; Ryan et al., 2010).

Use of simulation is a recognized method for providing learning opportunities in a safe environment where students can critique themselves (Kim et al., 2012). Before encountering actual patients, simulations enable students to actively participate in learning. The safety of the simulation environment encourage students to practice more confident therefore students can make an effective self-evaluation; discover their strengths and limitations, and can

reflect on and receive feedback about their emotional state. (Jackson and Back, 2011).

Although there are various measurement tools in the literature about simulation, there is no tool that assess the efficacy of SP training in communication education. The purpose of the study was to develop a scale for assessing the effectiveness of Standardized Patients as a method to improve the communication skills of nursing and medical students. The question expected to be answered in this research is as follows; Is SP Application Effectiveness Scale (SAES) valid and reliable?

Methods

Design: This is a methodological study. The study was divided into four separate but integrated sections. The first section included the construction of SP Application Effectiveness Scale. The second section the development of a script, and the third the process for training actors to be simulated patients. In the fourth section nursing and medical students were recruited to participate in the scenario and to respond to SP Application Effectiveness Scale at the completion of that experience.

Section one: Construction of the SP Application Effectiveness Scale.

Section two: For implementation of the developed scale, a scenario titled "Interview with a patient diagnosed with depression and suicidal ideation" was created based on the opinions of three experts.

Section three: After script writing, actors were recruited and trained as SPs. Training consisted of three different stages. First, the SPs were informed about depression during a 3-hour training course in the first stage. In the second stage, the overall appearance of a patient suffering from depression, their psychomotor behaviors, etc. were addressed via a training video, then a discussion about the video and the training was conducted. Finally, role-playing was performed until the SPs understood and could realistically perform their parts for 4 hours. In this study, five actors/actresses played SPs for a fee and none had a history of mental disorders or theatre training.

Section four

Ethical Considerations; Prior to recruitment of students, written permission and research approval

where necessary were obtained from the GATA Ethics Committee and Research-Based Survey Evaluation Board.

Participants: Fifty eightfifth-year medical students from Gulhane Military Medical Academy (GATA) in Turkey and 77 third-year nursing students from GATA School of Nursing in Turkey participated in the study. Criteria for participation in the study included, for third-year nursing students from GATA, to have completed the Mental Development and Behavior Committee program. For fifth-year medical students, the criteria to participate in the study was completion of theoretical training. Prior to the interview with the SPs, the students participated in a 2-hour course entitled "Guide to interview with patients with suicidal thoughts", which was prepared based on the opinions of 16 experts.

Data Collection: Prior to beginning the study each participant's written consent was obtained for participation in the study. Prior to data collection, the students (participants) were informed where necessary and approval forms were signed by each participant. Data were collected by the researcher during a 30-minute interview with each student following participation in SP training. The Student Information Form, the SP Application Effectiveness Scale developed in this study, to test the validity of the developed scale, the Simulation Design Scale, Perceived Learning Scale, Motivation and Learning Strategies Scale and the Spielberger State-Trait Anxiety Scale were completed by all participants. To address the test-retest reliability of the developed scale, 74 students were re-tested with the SP Application Effectiveness Scale within 2-4 weeks.

Instruments

Student Information Form: In this form, there are questions about the level of anxiety that students have previously interviewed and participated in a simulated patient practice, feeling confident in interviewing a patient in the future, and anticipating an interview with a patient in the future.

SP Application Effectiveness Scale (SAES): This scale was developed within the scope of this study with the aim of determining the effectiveness of simulated patient education in communication

skills. The scale consists of 27 items. There are four factorson this scale; "Learning, Inner Motivation, Anxiety and coping and Self-efficacy". The learning factor is 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 18; Inner motivation factor 1, 5, 16 and 17; Anxiety and coping factors 19, 21 and 23, and Self-Efficacy Factor 25, 26, 27, 28, 29 and 30 items. The scale is arranged as "five-point Likert". Items 9, 12 and 15 of the scalewere inversely rated and the scores should be summed by inversely while coding those items. In this study, the Cronbach alpha coefficient of the scale is 0.952. The higher the total scale score, the higher the effectiveness of the application's communication skills**.**

Motivation and Learning Strategy Scale: This scale was developed by Pintrich et al. in 1991 (Pintrich et al., 1991) and adapted to Turkish by Buyukozturk et al. in 2004. This scale consists of two parts; the Motivation Scale and the Learning Strategies Scale.The Motivation Scale was used in this study. There are 3 factors on Motivation Scale "Internal target arrangement, External target arrangement and Self-efficacy in learning and performance" (Buyukozturk et al., 2004).

Perceived Learning Scale: The scale was developed by Rovai et al. in 2009(Rovai et al., 2009)and adapted to Turkish language by Albayrak et al. (2014).Turkish form scale 3 factors (Cognitive factor, Affective factor and Psychomotor factor) (Albayrak et al., 2014).

Spielberger State and Trait Anxiety Scale: The scale was developed by Spielberger et al. and adapted to Turkish language by Öner and Le Comt. This scale consists of two parts as state anxiety and trait anxiety. The state anxiety section was used in this study (Yıldırım and İlhan 2010).

Intervention: Participation in training comprised of three major stages: preliminary information, application and resolution. In the preliminary information stage, students were informed about the SP method, expected aims and goals and the scenario. During the application stage, the students interviewed the SPs one on one for 15 minutes. In the final stage, which was the resolution session, students shared their learning and skills experiences in a non-judgmental atmosphere and expressed their thoughts and feelings during the application stage. Students also indicated whether

they aimed to use the skills they had gained in future interviews with real patients.

Data Analysis: The scale in this study was subjected to item analysis, validation and reliability test. For item analysis, Upper-lower Group Averages and Correlation-Based İtem Analysis were used. For the reliability assessment, Internal Consistency and Test-Retest Reliability Analyses were used. The validity of the scale was tested Concept, Face And Concurrent Criterion Validity, Construct validity (Exploratory Factor Analysis and Confirmative Factor Analysis).

Results and Discussion: This study, we developed a scale to assess the effectiveness of Standardized Patients as a method to improve the communication skills of nursing and medical students and to test the validity and reliability of the scale. The item analysis is performed to evaluate the functioning of the items (Bagcivan 2012). For item analysis, which is necessary to understand how a particular item works, upper-lower group averages and item analysis methods based on correlation values were used. Changes in the Cronbach's alpha factor were analyzed to decide whether to include an item in the scale. When the item average scores of the lower-upper groups are determined, the items are ranked in an ascending order from the lowest to the highest, then the ones scoring in the bottom and top 27% are assigned to the lower and upper groups respectively. The difference between the average of these two independent groups is compared and thus the item discrimination is determined (Alpar R. 2010).The upper (upper 27%, 37 people) and lower groups (lower 27%, 43 people) of students were determined. Based on the answers obtained from students in each group, item discrimination indexes for each item were calculated. The scores for item 20 (t=-1.36, p=0.17) and item 22 (t=-0.13, p=0.894) were not significantly different from each other in the upper and lower groups. The Cronbach's alpha for the developed scale increased when items 20 and 22 were excluded (Cronbach's alpha before items 20 and 22 were removed: 0.932; after removal: 0.947). Thus, we decided to remove these two items from the scale (Table 1). In correlation-based item analysis, the "item-total correlation coefficient" was used (Yurdugul 2005; Bagcivan 2012). The item-total correlation coefficient for item 24 was lower than 0.20.

Cronbach's alpha factor of the scale after removing item 24 (total items: 27) was 0.952. As a result, we decided to remove item 24 as well given that it lowered the Cronbach's alpha of the scale when included **(Table 2)**.

Table 1 Item analysis results based on Lower-Upper Group averages

Items	Groups	N	Ave±SD	T	P
Item 1	Lower group (LG)	37	3.56±1.01	8.50	0.001
	upper group (UP)	43	4.93±0.25		
Item 2	(LG)	37	3.75±0.79	7.94	0.001
	(UP)	43	4.93±0.25		
Item 3	(LG)	37	3.86±0.85	7.77	0.001
	(UP)	43	4.93±0.25		
Item 4	(LG)	37	3.78±0.82	8.37	0.001
	(UP)	43	4.90±0.29		
Item 5	(LG)	37	3.83±0.83	7.86	0.001
	(UP)	43	4.90±0.29		
Item 6	(LG)	37	3.75±0.79	9.13	0.001
	(UP)	43	4.93±0.25		
Item 7	(LG)	37	3.91±0.79	7.58	0.001
	(UP)	43	4.93±0.33		
Item 8	(LG)	37	3.70±0.90	8.75	0.001
	(UP)	43	4.95±0.21		
Item 9	(LG)	37	2.91±1.11	6.07	0.001
	(UP)	43	4.44±1.19		
Item 10	(LG)	37	3.78±0.85	7.62	0.001
	(UP)	43	4.93±0.45		
Item 11	(LG)	37	3.70±0.81	10.48	0.001
	(UP)	43	5.00±0.01		
Item 12	(LG)	37	3.13±1.20	6.02	0.001
	(UP)	43	4.65±1.04		
Item 13	(LG)	37	3.48±0.83	9.50	0.001
	(UP)	43	4.86±0.41		
Item 14	(LG)	37	3.72±0.76	10.40	0.001

	(UP)	43	4.97±0.15	
Item 15	(LG)	37	3.29±1.17	6.66	0.001
	(UP)	43	4.76±0.78	
Item 16	(LG)	37	3.81±0.81	9.24	0.001
	(UP)	43	4.97±0.15	
Item 17	(LG)	37	3.78±0.85	9.34	0.001
	(UP)	43	5.00±0.00	
Item 18	(LG)	37	3.56±0.89	10.12	0.001
	(UP)	43	4.97±0.15	
Item 19	(LG)	37	3.56±0.89	8.70	0.001
	(UP)	43	4.88±0.39	
Item 20*	(LG)	37	2.64±1.27	-1.36	**0.177**
	(UP)	43	3.02±1.18	
Item 21	(LG)	37	3.35±1.00	3.05	0.003
	(UP)	43	4.04±1.02	
Item 22*	(LG)	37	2.59±1.14	-0.13	**0.894**
	(UP)	43	2.55±1.27	
Item 23	(LG)	37	3.89±0.77	4.59	0.001
	(UP)	43	4.67±0.74	
Item 24	(LG)	37	3.16±1.30	2.74	0.008
	(UP)	43	3.95±1.27	
Item 25	(LG)	37	3.83±0.64	11.21	0.001
	(UP)	43	4.97±0.15	
Item 26	(LG)	37	3.51±0.83	8.35	0.001
	(UP)	43	4.76±0.47	
Item 27	(LG)	37	3.89±0.61	8.81	0.001
	(UP)	43	4.86±0.35	
Item 28	(LG)	37	3.89±0.56	8.10	0.001
	(UP)	43	4.81±0.45	
Item 29	(LG)	37	3.81±0.65	8.08	0.001
	(UP)	43	4.79±0.41	
Item 30	(LG)	37	3.78±0.71	6.85	0.001
	(UP)	43	4.74±0.53	

*Items excluded from the scale.

Table 2 Item analysis results for SP Application Effectiveness Scale based on Item-Total Correlation Coefficient

	Scale items	Item-total correlation coefficient	Scale Cronbach's Alpha when item is removed
	1	0.811	0.943
	2	0.767	0.944
	3	0.762	0.944
	4	0.791	0.944
	5	0.756	0.944
	6	0.748	0.944
	7	0.715	0.945
	8	0.688	0.945
	9*	0.376	0.950
n=135	10	0.759	0.944
Total item	11	0.790	0.944
number:28	12*	0.465	0.948
Cronbach's	13	0.689	0.945
alpha =	14	0.832	0.943
0.947	15*	0.449	0.948
Avg±SD	16	0.821	0.944
=118.2±14.5	17	0.747	0.944
	18	0.727	0.944
	19	0.737	0.944
	21	0.237	0.950
	23	0.488	0.947
	24**	**0.184**	0.952
	25	0.773	0.944
	26	0.538	0.946
	27	0.708	0.945
	28	0.647	0.945
	29	0.708	0.945
	30	0.578	0.946

*Reverse items **Item excluded from the scale.

Table 3 Factor Analysis

Factors	Items	Factor Loading			
Factor 1	2	0.802			
	3	0.584			
	4	0.828			
	6	0.810			
	7	0.823			
	8	0.563			
	9	0.772			
	10	0.696			
	11	0.707			
	12	0.743			
	13	0.541			
	14	0.777			
	15	0.826			
	18	0.639			
Factor 2	25		0.679		
	26		0.782		
	27		0.848		
	28		0.826		
	29		0.847		
	30		0.796		
Factor 3	1			0.788	
	5			0.833	
	16			0.791	
	17				0.683
Factor 4	19				0.681
	21				0.860
	I23				0.629
Cronbach's alpha		**0.916**	**0.928**	**0.899**	**0.519**
Total Cronbach's alpha coefficient of SP Application Effectiveness Scale					**0.952**

Internal Consistency and Test-Retest Reliability: To study the reliability of the scale, the Cronbach's alpha value for internal consistency reliability analysis was calculated. In this study, the calculated Cronbach's alpha for the developed scale with 27 items subsequent to its application was 0.952. Based on these results, the scale appeared to have high reliability and the items in the scale were consistent with each other and also evaluated the same qualities. For the test-retest reliability assessment, 74 students retook the test after two-four weeks. The average total scale score in the first test was 124.8±14.9 and the average test-retest scale score was 128.01±10.9. The difference between the two values was statistically insignificant (t=0.669, p=0.506). In the correlation analysis for the test-retest reliability, a significant and positive correlation was found between the scale scores of the participants in the first and second tests (r=1, p=0.001). These results confirmed that the scale gives consistent results over time and has test-retest reliability.

Content and Face Validity: Three methods were used for content validation of the scale. In the first method, i.e. quality stage, data obtained from people who had participated in SP training were compared with data obtained through focus group interviews with people who did not participate but had a chance to observe the changes in the participants. The second method consisted of a literature review. The third method involved determining specific dimensions of a variable based on the opinions of 34 experts. During this process, a draft version that included 96 items was first prepared, then reduced to 32 items. The draft version of the developed scale with 32 items was sent to 15 experts to determine the concept validity. The experts evaluated all items in three different classes: "item is necessary and should stay in the item pool", "item is useful but inadequate" and "item is not necessary." The concept validity was calculated from their responses. From the draft including 32 items, only two items with a concept validity value below 0.49 were removed. The scale was finalized with 30 items for preliminary application. After the literature review, expert opinions, qualitative data and concept validity analysis, dimension validation of the 30-item scale was performed. To this end, preliminary application with 10 second-year students from the

School of Nursing was performed to evaluate the comprehensibility and practicality of the scale. As a result, we concluded that dimension validity had been achieved in the developed scale and it had both comprehensibility and practicality.

Concurrent Criterion Validity: It was found that there is no equivalent scale to assess the effectiveness of SP application on communication skills worldwide. Thus, to determine the validity of the developed scale, other alternative scales such as the Simulation Design Scale, Perceived Learning Scale, Motivation and Learning Strategies Scale and the Spielberger State-Trait Anxiety Scale *(STAI Form TX)* were used. Considering the correlation values between the total and sub dimension scores for the developed scale and the other scales, the developed scale has scale validity and appears to be acceptable.

Construct Validity: Exploratory Factor Analysis

Self-worth, factor loading and cumulative explained variations were evaluated with exploratory factor analysis (Hazneci, 2012; Büyüköztürk, 2002). The exploratory factor analysis showed that the four factor. When the factor loading for each item was analyzed, the 14 items in the first factor ranged from 0.541-0.828, the six items in the second factor ranged from 0.679-0.848, the four items in the third factor ranged from 0.683-0.833 and the three items in the fourth factor ranged from 0.629-0.860. The Cronbach's alpha coefficients for the first, second, third and fourth factors were 0.916, 0.928, 0.899 and 0.519, respectively. The fourth factor, which had a Cronbach's alpha value lower than 0.7 indicating lower reliability, was considered acceptable given that the scale is still in the initial stages and it would be useful to study the same aspect with different samples. Based on these results, it is clear that the scale has structural validity (Table 3).

Construct Validity: Confirmative Factor Analysis: Confirmatory factor analysis was performed on the assessment model of the research using the AMOS program. The χ2/df of the model was 2.261 (χ2=709.842, df=314, p=0.001). It is acceptable to have a χ2/df ratio between 0.1 and 3 (Ustasuleyman and Eyuboglu, 2010). The fitness of the model was as follows: 0.731 for the Goodness of Fit Index (GFI), 0.873 for the Comparative Fit

Index (CFI), 0.874 for the Incremental Fit Index (IFI) and 0.858 for the Tucker-Lewis Index (TLI). The SP Application Effectiveness Scale therefore has an acceptable goodness of fit indices. Parameter estimates were considered significant since the indexes were all above 0.70 (Topçu et al., 2010). Though values ranging from 0.8-0.9 are considered acceptable, values above 0.9 indicate a good fit (Ustasuleyman and Eyuboglu, 2010). Additionally, the GFI, CFI, IFI and TLI indexes have frequently been used in previous studies (Ozturk, 2011; Orucu et al., 2015; Satici, 2014). However, it is not clear which of the individual indexes should be considered to determine the goodness of the fit (Tanhan and Senturk 2011).

Conclusions and Suggestions: The aim of this study was to use a comprehensive methodological process to develop a scale-based measure of the SP Application Effectiveness. This process resulted in a 27 item questionnaire that can be used to assess "effectiveness in communication skills training" of simulated patient usage. The study provides evidence that the The SP Application Effectiveness Scale is reliable and valid for measuring student perception of learning effectiveness. The scale is helpful in building the evidence-based knowledge of the effect of simulation teaching on students' learning outcomes**.** The study is limited to data collected from participants in the study group. Development of a scale takes a long time. We plan to continue the development process (applying the scale to different samples and repeating the confirmatory/validation analysis).

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