ORIGINAL RESEARCH



Student satisfaction and self confidence in learning scale (SSCL)—reliability and validity test of the Polish version

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Abstract

Determination of psychometric indices of the Polish language version of the Student Satisfaction and Self Confidence in Learning Scale (SSCL). The validity of the research conducted is significant, the scale of the SSCL will be the first tool in Poland, thanks to which the possibility will be created to monitor the didactic process in which the high-fidelity simulation method is used. Construct validity was tested using the following Confirmatory Factor Analysis (CFA fit index is 0.52) and Exploratory Factor Analysis (EFA explains 48.3% of the variance). Cronbach's alpha-coefficient was used to assess the internal consistency of the scale. The Cronbach's Alpha coefficient for the scale as a whole was 0.90, for the subscale "Satisfaction with current learning" was 0.87; for the subscale "Self-confidence in learning" was 0.84. As the study showed, the simulation of high-fidelity positively affects students' satisfaction and increases their confidence levels.

Keywords

Simulation; Nursing education; Self-confidence; Validation; Adaptation; Student satisfaction and self confidence in learning scale (SSCL)

1. Background

Studies show that simulation activities increase students' selfconfidence, reducing their levels of fear and anxiety during activities [1-5]. The simulation allows the class participants to feel as many stimuli as possible so that they understand that their work matters, that the profession they have chosen is an independent one, and that the nurse is part of the therapeutic team.

Training using simulation allows students to use the knowledge they have acquired and combine it with practical work in safe conditions for both the learner and the patient. The student participating in simulation activities has the opportunity to experience both positive and negative aspects of caring for patients in various states of health and illness [6]. In addition, he or she has the opportunity to discuss his or her work after working through the scenario. It is important to derive satisfaction from the learning process, as well as satisfaction from the work done during the scenario [7, 8].

The theory of simulation based on the assumptions of the National League of Nursing (NLN) Jeffries Theory model includes elements that allow the design and implementation of the best practices of simulation-based education. These are related to educational practices (feedback, collaboration, high expectations, active learning); simulation design (fidelity, problem-solving, student support/debriefing and objectives of the simulation) and learner outcomes (learning, skill performance, critical thinking, learner satisfaction and self-confidence), among others [9].

According to Jeffries & Rizzolo (2006) satisfaction and confidence are important elements that affect the learning process [1]. In order for nurses to be able to deal with complex clinical problems in their future careers, it is important that they are able to skillfully address the challenges of critical thinking or problem solving from the educational stage. During the implementation of the simulation scenario, students receive support and guidance from the instructor, which already creates the conditions for increased confidence and satisfaction in the learning process. Even if students fail to fully achieve their goals—which may initially lower their motivation—they are likely to repeat the activity many times until they achieve satisfaction.

The Student Satisfaction and Self Confidence in Learning Scale (SSCL) is used to assess students' contentment/satisfaction with various items related to the simulation activity and their confidence in the context of knowledge and practiced skills during the simulation scenario [1].

So far, the SSCL scale presented has been successfully adapted and validated in countries such as the United States, Hong Kong, Norway, Turkey, Portugal and Spain. According to the literature review of the presented studies, this instrument achieved very high reliability coefficients presented by means of Cronbach's alpha coefficient. In addition, these studies also described the accuracy of the presented scale by means of CFA and EFA [10–14]. The use of standardized tools provides an opportunity to assess the simulation in many aspects, including that of technical skills, team communication, or, as in the case of the tool presented here, self-confidence and satisfaction with the learning process. In addition, it is worth noting that in the literature review by Adamson *et al.* [15] (2013) it was confirmed that the use of already existing research tools increases the motivation to draw on existing knowledge, and thus increases the chances of using and further developing these instruments.

As already mentioned, the SSCL scale is used to assess student satisfaction and confidence in the learning process. It can be used to assess the aforementioned aspects in both medical students, including Nursing, and graduate nurses.

In a study conducted by Guerrero *et al.* [16] (2022), it was found that after a simulation class on Managing Patient with Pneumothorax and Chest Tube, both students and graduate nurses have opportunities to improve their skills, which translates into job satisfaction and thus the quality of care provided and patients. It is important for both future nursing and professional staff to improve their practical skills, especially in the field of intensive care, where equipment and apparatus are very advanced and require staff, not only specialized knowledge but also technical skills and competence. Simulation creates safe conditions for practice related to, for example, operating a ventilator, caring for a tracheotomy tube or a patient in immediate life or health danger [17, 18]. Perfecting these skills will create an opportunity for high quality care, which will directly increase patient safety.

Currently, there is no tool available for students taking part in simulation classes to assess their level of confidence in the simulation learning process. Accordingly, cultural adaptation and psychometric validation of the SSCL scale were attempted. This scale, in the context of the competencies being assessed, will provide a reliable source of information about the teaching methods used in simulation, the way of learning, or the instructor/teacher's use of simulation capabilities for the student's needs.

In conclusion, the validity of the conducted research is significant because the SSCL scale will be the first tool in Poland through which the possibility of monitoring the didactic process will be created, which will allow to adapt it to the needs of both the learner and the teacher. At the same time, most of the schools training future nurses in Poland (*e.g.*, Opole, Krakow, Lublin, Poznań, Krosno) have innovative high-fidelity simulation centers, which will create an opportunity to eliminate the gap between the use of high-fidelity simulation in education and the monitoring of this education.

2. Research question(s)

For the purposes of this study, the following research questions were posed:

What indicators of psychometric properties will the SSCL Polish version achieve?

3. Methods & design

The study was conducted in accordance with the Declaration of Helsinki, considering point no. 7 relating to the conduct of medical research, which is subject to strict ethical standards; after the simulation activity, students were given the SSCL scale questionnaire and answered according to their feelings. Completion of the questionnaire was without the presence of the teacher in charge of the teaching activity being evaluated.

3.1 Instrument

The instrument used is the Student Satisfaction and Self Confidence in Learning (SSCL), consisting of 13 questions rated on a scale of 1 to 5. It is used to assess satisfaction with the learning process (items from 1 to 5) and to assess student confidence in the learning process (items from 6 to 13). The Cronbach's alpha coefficient for satisfaction is 0.94, and confidence is 0.87. The subscale assessing students' satisfaction with the learning process is related to the educational methods used during the simulation classes or the way the content was delivered. In this part of the subscale assessing satisfaction with the learning process, the respondent could obtain 25 points. On the other hand, the second subscale, assessing the student's confidence in the learning proces, relates to, among other things, the required knowledge during the simulation classes and the effectiveness in the student's mastery of the content, getting help in solving a given clinical situation or developing skills. In this part of the subscale, 40 points could be obtained [1]. Consent to use the tool was received on 19 November 2019.

3.2 Procedure

Validation and adaptation of Student Satisfaction and Self Confidence in Learning (SSCL) took place in accordance with World Health Organization (WHO) principles (Fig. 1) [19]. A "forward translation" was made to develop a Polish version of the surveyed tool. This was followed by a "backward translation", where the final version of the SSCL scale was discussed with the translators and agreed upon. The final step was to test the tool for its psychometric properties.

4. Data analysis

Various methods of data analysis were used, including descriptive analysis (mean and standard deviation) and bivariate statistics (correlation). The standard deviation (SD) represents how the values of a variable are scattered around its mean. Correlation, on the other hand, measures the strength of the presumed linear relationship between two variables and takes a value from -1 to +1. If the correlation value is 0, it is concluded that there is no linear relationship between the variables under study [20].

Cronbach's alpha coefficient was used to assess the internal consistency of the scale. A score higher than 0.7 was considered acceptable [21]. In addition, the construct's relevance was tested using Confirmatory Factor Analysis (CFA), for which the following parameters were determined Root Mean Standard Error of Approximation (RMSEA), Comparative Fit Stage I: obtaining written permission from the authors of the scale: National League of Nursing, for use of the scale in Poland

Stage II: the translation of the scale, the so-called 'Forward translation', was undertaken by two independent translators whose mother tongue was Polish.

Stage III: comparison of the resulting draft Polish versions of the tool by an appointed team of experts, resulting in an agreed single language version.

Stage IV: the resulting Polish version of the scale was subjected to a process of 'back translation', into English, and a comparison with the original.

Stage V: once the final version of the scale was constituted, its correctness was confirmed, the method of application was established, and the final version of the instructions for those completing the survey was formulated.

Stage VI: assessment of the psychomotor properties of the final version of the SSCL scale.

FIGURE 1. Model of adaptation and validation of the SSCL scale according to WHO. SSCL: Student Satisfaction and Self Confidence in Learning.

Index (CFI), NFI (Normed Fit Index), TLI (Tucker-Lewis Index). The authors of the study interpret the preferred values for these parameters as follows: An RMSEA of less than 0.05 indicates excellent model fit, and a score of less than 0.10 indicates good model fit; CFI, NFI, and TLI ranging from 0 to 1, where 1 denotes a perfectly matched model [22]. Exploratory Factor Analysis (EFA) was also conducted, which is a tool for examining the relationship between variables and the number of underlying factors [23]. Based on EFA, two factors were selected, matching individual Items with a load above 0.30 for each to the corresponding factor.

All calculations were performed using R software (version 3.5.0, R Foundation for Statistical Computing, Vienna, Austria).

5. Results

The study was conducted on a group of 361 second- and thirdyear nursing students at two academic centers in Poland (a university, higher vocational school). 96.4% of the respondents were women, while men accounted for 3.6%. The average age of the subjects was 21.78 (SD \pm 3.19). Nonprobability sampling was used with the following inclusion criteria: written consent to participate in the study, major in Nursing, participation in high-fidelity simulation classes, firstdegree studies, complete and correct completion of the set of research questionnaires. Exclusion criteria are a field of study other than nursing, second-degree studies, incomplete and incorrect completion of research questionnaires, lack of consent to participate in the study. Demographic data are shown in Table 1.

5.1 Reliability

The Cronbach's alpha reliability coefficient for the surveyed tool is as follows: for the total scale, it is 0.90; for the subscale "Satisfaction with current learning" it is 0.87; for the subscale "Self-confidence in learning" it is 0.84. Most Items (1-5) of the "Satisfaction with current learning" subscale correlates strongly with the overall scale score and range from 0.67 to 0.72, their removal would lower the reliability of the measure 0.84. Only the removal of Item 5 would slightly improve the reliability of the survey tool (0.95). On the "Self-confidence in learning" subscale, Items 6-12 show a strong correlation with the overall score, falling between 0.53 and 0.62, and removing them would slightly reduce the reliability of the measurement (0.81-0.82). Item 13 has a weak correlation with the overall scale score (r = 0.28), and its removal would improve the reliability coefficient to 0.85. Detailed data are shown in Table 2.

In conclusion, the reliability of the surveyed tool as measured by the Cronbach's alpha coefficient took a very high value, which proves the correctness of the Polish version of the instrument.

5.2 Validity

The indicators for CFA achieved satisfactory results (RMSEA, WRMR); moreover, CFI, TLI, NFI reached fully acceptable values for the presented model (Table 3). The resulting loads for the overall EFA model are fully satisfactory (for Items 1–12) with the exception of Item 13, which was not included in any of the factors obtained (Table 4). The model presented explains 48.3% of the variance, while the index of CAF fit is 0.52 (CAF index).

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Sex	%	Number			
Female	96.4%	348			
Male	3.6%	13			
Year of study					
II	51%	184			
III	49%	177			
University	%	Number			
University	35.18%	127			
Higher Vocational University	64.82%	234			
Subject of the classes					
Internal diseases and internal medicine nursing	16.34%	59			
Surgery and surgical nursing	14.68%	53			
Pediatrics and pediatric nursing	20.22%	73			
Primary health care	8.31%	30			
Psychiatry and psychiatric nursing	9.41%	34			
Geriatrics and geriatric nursing	5.81%	21			
Neurology and neurological nursing	10.80 %	39			
Palliative care	5.51%	20			
Anesthesiology and nursing in life-threatening cases	8.86%	32			

TABLE 1. Participants' demographic profile (N = 361).

TABLE 2. Value of Cronbach's alpha coefficient and correlation coefficient.

Item	Item-total correlation	Cronbach's alpha
Satisfaction with current learning		
1. The methods used in this simulation were supportive and effective.	0.67	
2. The simulation provided me with a variety of educational materials	0.70	
and activities to promote my learning.		0.87
3. I liked the way my instructor taught me the simulation.	0.72	
4. The teaching materials used in this simulation were motivating and	0.71	
helped me learn.		
5. The way my instructor taught the simulation was appropriate to my	0.70	
way of learning.		
Self-confidence in learning		
6. I am confident that I am mastering the simulation activity presented	0.62	
to me by my instructors.		
7. I am confident that this simulation covered the essential content	0.61	
necessary to master the material covered in the curriculum.		0.84
8. I am confident that I am developing the skills and gaining the required	0.55	0.04
knowledge from this simulation to perform the necessary tasks in a		
clinical setting.		
9. My instructors used a variety of helpful resources to teach simulation.	0.53	
10. It is my responsibility as a student to learn what I need during	0.57	
simulation classes.		
11. I know how to get help when I do not understand the concepts in the	0.59	
simulation.		
12. I know how to use simulation exercises to learn the critical/key	0.60	
aspects of these skills.		
13. It is the instructor's responsibility to show me what I need to learn	0.28	
during the simulation class.		
Total Cronbach's alpha		0.90

Student Satisfaction and Self-Confidence Scale			
	CFA	EFA	
RMSEA	0.09	0.09	
90% CI	0.07; 0.10	0.08; 0.01	
CFI	0.90	0.90	
TLI	0.88	0.88	
NFI	0.87	0.88	
WRMR	0.04	0.09	
SRMR	0.05	0.05	
Chi-square	256.10	256.10	
<i>v</i> -Value	< 0.001	< 0.001	

TABLE 3. CFA and EFA statistics for SSCL.

RMSEA, Root Mean Standard Error of Approximation; 90% CI, Confidence interval; CFI, Comparative Fit Index; TLI, Tucker-Lewis Index; NFI, Normed Fit Index; WRMR, Weighted Root Mean Square Residual; SRMR, Standardized Root Mean Square Residual; p-Value, p value; CFA, Confirmatory Factor Analysis; EFA, Exploratory Factor Analysis.

TABLE 4. Factor loading for SSCL.

	F1	F2
P1		0.674
P2		0.712
P3		0.815
P4		0.733
P5		0.798
P6	0.738	
P7	0.704	
P8	0.628	
Р9	0.498	
P10	0.593	
P11	0.661	
P12	0.752	
P13	0.291	

F1, Factor 1; F2, Factor 2.

Table 5 shows the preliminary results on the level of satisfaction and confidence of the student in the learning process. As it can be seen from the data obtained, the highest rated question in the section assessing satisfaction with learning was question 4 on the teacher's method of teaching using the simulation method (4.4 ± 0.9). Similar results can be seen in the study conducted by Franklin *et al.* [11] (2014), where respondents rated this question at 4.43 ± 0.68 ; or in the study by Reierson *et al.* [13] (2020), where the question received a rating of 4.43 ± 0.635 . By interpreting the above results, it can be concluded that students felt satisfaction and contentment with the simulation-based teaching methods undertaken by the teacher. This may testify to the teacher's professional preparation for classes and the high quality of education. On the other hand, in the section on assessing confidence in the learning process, question 13 was rated the highest in the opinion of the respondents (4.4 ± 1.8) . It relates to the teacher's responsibility to present what the student should learn during simulation classes. In contrast, in the previously cited study conducted by Franklin *et. al.* [11] (2014), this question was rated the lowest. This may be due to cultural differences or a better understanding of the assumptions of simulation methodology which puts the learner/student at the center of the learning process. In Poland, simulation has been used for only a few years. The mean response value was 4.2 ± 0.7 , for both the "Satisfaction with current learning"and "Self-confidence in learning" subscales (Table 5).

6. Discussion of findings

As mentioned earlier, the study conducted in Turkey, similar to the Polish study, achieved satisfactory results of Cronbach's alpha scale coefficient. It was 0.89 for the whole scale, 0.85 for the subscale "Satisfaction with current learning" and 0.77 for the subscale "Self-confidence in learning". When item 13 was removed from the scale, Cronbach's alpha coefficient rose to 0.79. Also in this study, the correlation value was over 0.30, except for the aforementioned finding 13 (r = 0.18) [14].

In the southern United States, in a study group of 2200 novice nurses, the presented tool also obtained results indicating high reliability of the tool. Cronbach's alpha for the overall scale was 0.92 and for "Satisfaction with current learning" and "Self-confidence in learning" 0.92 and 0.83, respectively [11]. However, after removing item 13, the reliability coefficient increased to 0.94. A significant difference in the present study from those presented is the size of the study group, with more than 2000 respondents.

Another country where this tool was adapted was Spain. Among the 489 nursing students who participated in the study, the SSCL scale achieved very good psychometric values. The coefficient of Cronbach's alpha was 0.88 for the overall scale, with the subscale "Satisfaction with current learning" at 0.84 and the subscale "Self-confidence in learning" at 0.81. The mean response value was $M \pm 4.2$ for the "Satisfaction with current learning" subscale, and $M \pm 4.2$ for the "Self-confidence in learning" subscale [10]. Juxtaposing the results of Spanish students with those of Polish students, they can be considered very close to each other.

Also, in Hong Kong, the SSCL scale was successfully validated and adapted for a group of 300 nursing students. The Cronbach's alpha for the overall scale was 0.87 and 0.85 and 0.78 for the satisfaction and confidence in learning subscales, respectively. The present study did not find that removing item 13 from the scale would result in an increase in Cronbach's alpha reliability coefficient [12].

In Norway, on the other hand, in a study group of 105 nursing students, the tested tool achieved the following values of Cronbach's alpha coefficient: for the total scale 0.88; for the subscale Satisfaction with current learning 0.81; for Self-Confidence in Learning 0.82. When item 13 was removed, as in the Polish or Turkish study, Cronbach's alpha coefficient increased to 0.89. As in the Polish and Turkish surveys, item 13 had a low correlation score (r = 0.13), while the remaining

TABLE 5. Preliminary result for SSCL scale.							
	х	SD	min	max	c25	c50	c75
Satisfaction with current learning							
1. The methods used in this simulation were supportive and effective.	4.2	0.9	1.0	5.0	4.0	4.0	5.0
2. The simulation provided me with a variety of educational materials and activities to promote my learning.	4.1	0.9	1.0	5.0	4.0	4.0	5.0
3. I liked the way my instructor taught me the simulation.	4.4	0.9	1.0	5.0	4.0	5.0	5.0
4. The teaching materials used in this simulation were motivating and helped me learn.	4.2	0.9	1.0	5.0	4.0	4.0	5.0
5. The way my instructor taught the simulation was appropriate to my way of learning.	4.2	0.9	1.0	5.0	4.0	4.0	5.0
Self-confidence in learning							
6. I am confident that I am mastering the simula- tion activity presented to me by my instructors.	4.1	0.8	1.0	5.0	4.0	4.0	5.0
7. I am confident that this simulation covered the essential content necessary to master the material covered in the curriculum.	4.2	0.8	1.0	5.0	4.0	4.0	5.0
8. I am confident that I am developing the skills and gaining the required knowledge from this simulation to perform the necessary tasks in a clinical setting.	4.2	0.9	1.0	5.0	4.0	4.0	5.0
9. My instructors used a variety of helpful resources to teach simulation.	4.1	0.9	2.0	5.0	4.0	4.0	5.0
10. It is my responsibility as a student to learn what I need during simulation classes.	4.2	0.8	1.0	5.0	4.0	4.0	5.0
11. I know how to get help when I do not understand the concepts in the simulation.	4.1	0.8	2.0	5.0	4.0	4.0	5.0
12. I know how to use simulation exercises to learn the critical/key aspects of these skills.	4.1	0.9	1.0	5.0	4.0	4.0	5.0
13. It is the instructor's responsibility to show me what I need to learn during the simulation class.	4.4	1.8	2.0	35.0	4.0	4.0	5.0
Satisfaction with current learning	4.2	0.7	1.0	5.0	4.0	4.0	5.0
Self-confidence in learning	4.2	0.7	1.0	35.0	4.0	4.0	5.0

x, Mean value; SD, Standard Deviation; c25,50,75, Percentiles; min, Minimum value; max, Maximum value.

statements (1-12) had correlations above r = 0.4. Item 1 was rated the highest among the respondents (M \pm SD: 4.76 \pm 0.450), it refers to the methods used during simulations and their effectiveness [13].

In addition, analyzing the results of the Polish study with the American study by Franklin [11], the Turkish study by Unver [14], and the Norwegian study by Reierson et al. [13] where an exploratory factor analysis (EFA) was conducted, a binary model was extracted in which Item 13 was not included ("It is the instructor's responsibility to tell me what I need to learn of the simulation activity content during class time"). As the authors [13, 24] suggest when analyzing this problem, it can be surmised that Item 13 does not fully address the student's level of satisfaction and confidence. Simulationbased learning (SBL) is designed to activate the student, so transferring responsibility from learner to instructor is not quite in line with the perception of students at SBL. According to other researchers, the use of a scale of 12 items should be considered. This is because the removal of item 13 increases the reliability of the measurement, resulting in an increase in the accuracy of the tool used [11, 14]. In addition, the Norwegian binary EFA model explained 56% of the variance, the Turkish 51.02%, and the Chinese 50.11% [12–14].

7. Implications

The value of this study is to provide empirical evidence of the feasibility of using the SSCL Polish version both in the

process of student learning during simulation activities and for scientific research. Moreover, the use of the SSCL scale in the Polish version will allow an international discussion related to education based on the medical simulation method. In addition, such an important issue as the student's satisfaction with the learning process and confidence during the implementation of simulation activities will create an opportunity to implement better and better educational practices.

8. Limitations

This study was conducted at two nursing student training centers in Poland using a high-fidelity simulation method, which may be a limitation of the study. In the future, it would be advisable to expand the study to other academic nursing training centers, using the high-fidelity simulation method. Future research using this scale will probably help solidify the psychometric values of the scale and increase its potential use.

9. Conclusions

The purpose of the study was to validate and culturally adapt the "Student satisfaction and self-confidence in learning" scale, in Polish conditions, and to analyze its reliability and accuracy. Its Polish version of the language reads: "Student Satisfaction and Confidence in Learning".

The statistical analysis used in this study achieved fully reliable results and confirms the validity of using the SSCL scale questionnaire in the Polish version both to assess the quality of education and to conduct scientific research. Moreover, that investigation confirmed that individual country scale adaptation is possible and can be performed as a universal approach.

AVAILABILITY OF DATA AND MATERIALS

Not applicable.

AUTHOR CONTRIBUTIONS

KS—designed the study, wrote original draft, reviewed and edited; DZ—wrote original draft, reviewed and edited; JZ—designed the study, reviewed and edited; KS, DZ, JZ—reviewed and edited.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by the Bioethics Committee of the Medical University of Lublin (KE-0254/348/2018) and was conducted in accordance with the Helsinki Declaration. Informed consent was obtained from all subjects involved in the study.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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