Spanish validation of the national league for nursing questionnaires for clinical simulation

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ABSTRACT

Introduction: Learning by clinical simulation enables students to experience the nuances often encountered in clinical settings before experiencing actual real-world patient scenarios. Valid and reliable assessment tools are required to measure clinical competence. The aim of this study was to validate the National League for Nursing satisfaction instruments for its use in the Spanish context.
Methods: Psychometric and cultural adaptation study. Student Satisfaction and Self-Confidence in Learning Scale, the Simulation Design Scale and the Educational Practices Questionnaire were adapted culturally, and their psychometric properties were tested empirically.
Results: Fourth-year undergraduate nursing students participated in the study (n = 173). The Cronbach's alpha scores obtained ranged from 0.90 to 0.95. Confirmatory factor analysis revealed adequate goodness of fit values (RMSEA: 0.04 to 0.08).
Conclusions: The Spanish-language version of the National League of Nursing instruments obtains satisfactory results. Further study is needed to determine the factorial invariance and whether any modifications in the instruments are needed.

Introduction

In university teaching, simulation is a powerful tool for developing transversal competences. Nursing students greatly benefit from simulation and patient scenarios before interacting in actual clinical settings.

In Spain, simulation has been used in various nursing contexts, including the clinical safety of patients and professionals with respect to diseases such as the Ebola virus (Vizcaya-Moreno et al., 2015) and concerning issues such as pain management (Roscales et al., 2014). The intervention of nursing students in these scenarios involves multiple factors, including technical skills, theoretical knowledge, confidence, self-efficacy, satisfaction, critical thinking and other competences that must be gleaned when interacting with patients in clinical settings (Seagull & Rooney, 2014; Vasconcelos et al., 2011). These interventions need to be properly evaluated. The complexity of the scenario means that a problem may arise when it is necessary to evaluate not only the student's performance in the simulation, but also the adequacy of the scenario that has been constructed (Lubbers & Rossman, 2017; Zapko et al., 2018). Furthermore, research into the learning process in nursing training has shown that repeated studies are necessary to determine the impact of preferences on learning styles in areas such as technical skills, clinical judgment and patient safety (Adamson, 2015; Adamson et al., 2013).

However, previous studies of the use of simulation in nursing studies at Spanish universities have mainly focused on determining the level of students' satisfaction with this practice (Alconero-Camarero et al., 2016; Juguera et al., 2014). The evaluation process itself has not been systematized and therefore analysis of this aspect is necessary to determine which learning assessment tools are most suitable for use in the simulation environment (Samawi et al., 2017; Uys et al., 2004). On that note, a study has recently been published that highlights the importance of systematizing and researching the evaluation and teaching-learning processes in nursing training, as well as the importance of disseminating the results of such research. This means that not only healthcare practice must be evidence-based but also education in order to promote continuous improvement (Thrower et al., 2020).

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A recent review (Lavoie et al., 2018) sought to identify the theories that underlie simulation learning in undergraduate nursing education, and reported that 56.6% of the studies considered explicitly identified the conceptual framework employed. The one most commonly used was the National League for Nursing (NLN) framework, followed by Kolb's Learning Styles and Experiential Learning theory (Kolb, 1999) and Bandura's social-cognitive theory (1977) In 2006, the NLN developed three instruments to evaluate clinical simulation in nursing (Franklin et al., 2014), but to date, no validated version of these instruments has been made available in Spain.

The theoretical framework of the NLN describes guidelines for the design, implementation, and evaluation of simulation activities in nursing training. It consists of five components: (1) facilitator; (2) participant; (3) educational practice (active learning, feedback, student-teacher interaction, collaboration, expectations, diverse learning, and task-centered time); (4) simulation design features (aims, fidelity, authenticity, problem solving, support, reports); (5) expected student outcomes (knowledge, performance of skills, satisfaction, critical thinking, self-confidence) (Seagull & Rooney, 2014; Vasconcelos et al., 2011). According to the authors, the instrument is based on a set of eclectic principles and techniques in application of various theoretical perspectives, including student-centered learning, constructivist, and socio-cultural approaches. A possible limitation of the NLN framework is that it might be said to place more emphasis on teaching than on the learning paradigm (Lavoie et al., 2018).

Adamson et al. (2013) reviewed the evaluation instruments used in such a simulation, and concluded that the use of existing tools instead of developing purpose-built ones consolidates previous knowledge, and underscored the importance of further using and developing these instruments, and of validating them for use in contexts other than those for which they were originally designed (Cappelletti et al., 2014). For this reason, the main goal of the present study was to adapt and validate the NLN questionnaires in university nursing education for implementation in the Spanish context.

Methods

Psychometric validation and cultural adaptation of the NLN assessment instruments: The Simulation Design Scale, the Educational Practices Questionnaire, and the Student Satisfaction and Self-Confidence in Learning Scale.

Participants

The study population was composed of fourth-year nursing students at the University of XXX (Spain). The students of this course were selected to ensure that they possessed sufficient clinical theoretical competencies to undertake the simulation scenarios designed. The evaluation was performed during the scheduled objective structured clinical examinations (OSCEs) and courses on Critical Care Nursing, where simulation was carried out by means of previously-designed clinical scenarios for the assessment of students' skills and theoretical knowledge. There was no randomization. All students enrolled in the fourth year of the Nursing program were informed of the nature and objectives of the study, and those who gave written consent to participate, did so, although students on international mobility programs were excluded, in order to avoid possible bias due to differences in academic programs. The study's data were compiled in June 2016.

Instruments

The instruments considered in this study were the three NLN questionnaires on educational practices, in the version translated and piloted in Spanish (NLN-e).

The first one, Student Satisfaction and Self-Confidence in Learning Scale (SCLS; Jeffries & Rizzolo, 2007), measures students' satisfaction with instructional methods, learning materials and instructors (five items), and their self-confidence in learning (eight items). It is based on a five-point scale, from totally disagree to totally agree. The scores that can be obtained range from 13 to 65 points and, were validated with a Cronbach's alpha of 0.90. The second questionnaire, the Simulation Design Scale (SDS; Jeffries & Rizzolo, 2007), measures students' perceptions of five characteristics of the simulation design: objectives/information, support, problem solving, guided feedback/reflection and fidelity. It consists of 20 items, using a 5-point scale, on which each item is evaluated for presence or absence (totally disagree to totally agree) and for importance (not important to very important). The results obtained can range from 20-100 points, each, for presence and importance. The content validity of the SDS was established by the Cronbach's alpha score of 0.92 obtained for the presence of the elements, and of 0.96 for their importance. Finally, the Educational Practices Questionnaire (EPQ; Jeffries & Rizzolo, 2007) measures students' perceptions regarding active learning, collaboration, expectations and learning diversity. It consists of 16 items, evaluated on two 5-point scales, with each item assessed for presence and importance. The scores obtained can range from 16 to 80 points for each scale, and the Cronbach's alpha scores for the original version of these scales were 0.86 and 0.91, respectively.

Cultural Adaptation

The following steps were taken in adapting the questionnaire:

1. First, the scales were translated and backtranslated (from English to Spanish and vice versa) by two independent evaluators (each qualified at level C of the Common European Framework of Reference for Languages).
2. The two versions were then compared and, any discrepancies resolved by consensus between the two evaluators.
3. A native professional translator compared the translated versions with the originals.
4. A committee of experts, composed of eight lecturers from the University Nursing Department, met to resolve any semantic discrepancies in the final translated versions (Fig. 1).
5. Finally, the definitive versions in Spanish were empirically evaluated in a sample of 173 fourth-year Nursing undergraduate students.

Procedure

The participants were required to address, individually, two simulation scenarios as part of the evaluation of their training. The following clinical cases were presented: a woman with urinary retention after abdominal surgery and a man with urinary tract infection and obstruction of peripheral venous access. In both scenarios, the students had to assess the situation, diagnose the problem, and perform, respectively, the techniques appropriate to bladder and venous catheterization. Subsequently, they were asked to complete the questionnaires online, using the LimeSurvey platform. The simulations were conducted by two teachers/evaluators who contextualized the case and interacted with the students during the simulation. Each case had to be resolved in a maximum of ten minutes, followed by a debriefing of the same duration, among groups of four students.

Ethical Questions

This study was accepted and approved by the University Office of the Vice Chancellor for Academic Organisation and Teaching Staff (PIE 144_15). Authorizations from the National League of

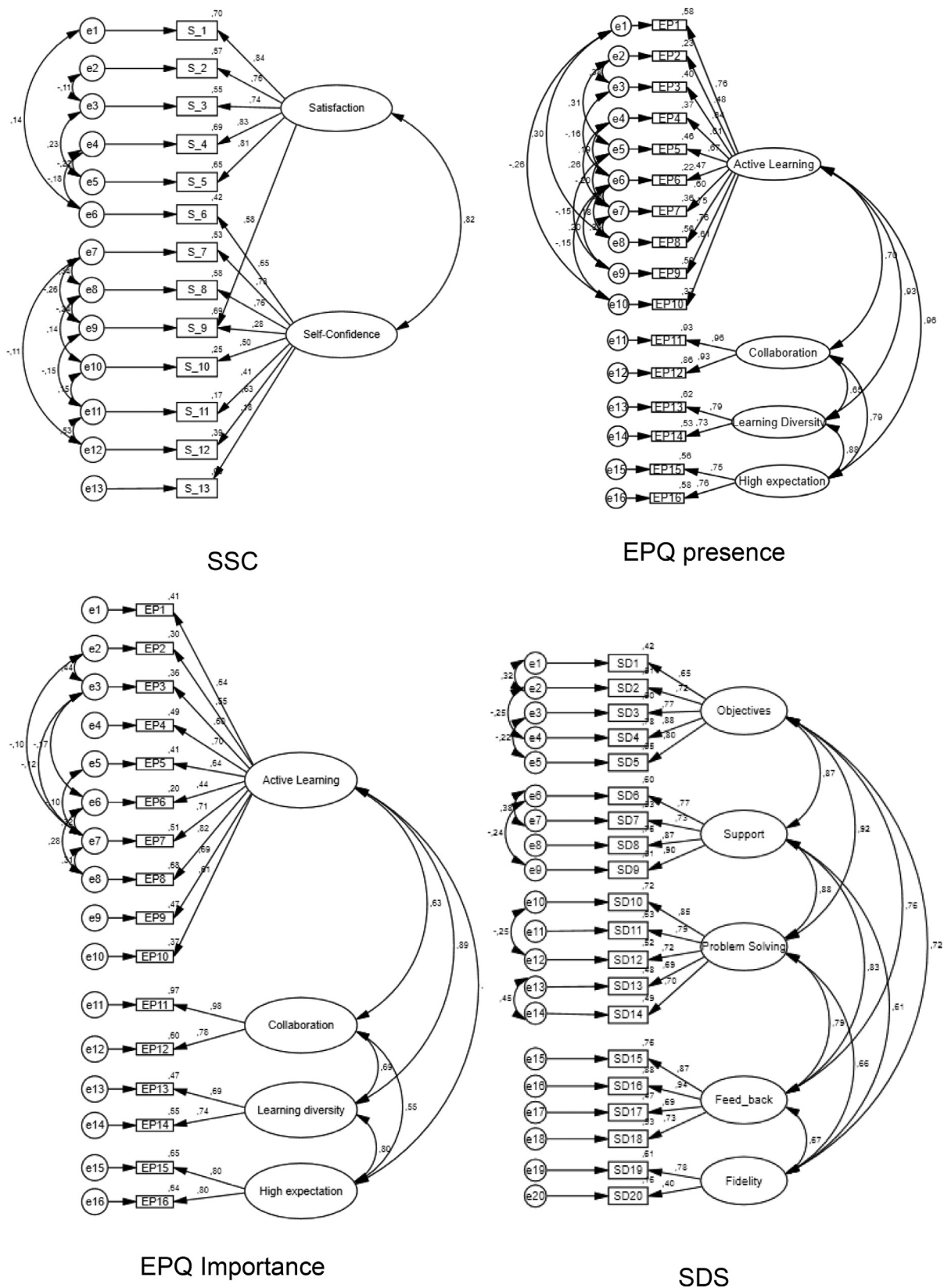**Fig. 1.** SSC, EPQ presence and importance, and SDS factor structure.

Nursing were requested and obtained for the use, translation, and validation of the NLN instruments. The students who participated did so voluntarily. All data were processed in aggregate form, anonymously.

Data Analysis

A descriptive analysis was made of all the questionnaire items. First, the ceiling-floor effect was evaluated according to the

frequency of endorsement of each item. The internal consistency of each instrument and its dimensions were then determined by Cronbach's alpha. The construct validity was evaluated by confirmatory factor analysis, considering the fit of the factorial models reported in the original validation study (Franklin et al., 2014) by means of the following indices: the penalizing function (CMIN/DF), which is indicative of good fit with values <3; the root mean square error of approximation (RMSEA) index and its confidence interval, taking 0.05 as a cut-off value of good fit; the Normed Fit Index (NFI), the Comparative Fit Index (CFI) and the Goodness of Fit Index (GFI), with a 0-1 range and a good fit value of $\geq$0.95. The homogeneity of the instruments was tested by analysis of inter-item and item-total correlations.

Results

The group of experts who carried out the review of the final version translated into Spanish was composed of eight teachers (six women and two men) from the Nursing Department of the University of XXX, with an average age of 37.1 years (range 28-57). Their clinical, teaching and research experience ranged from 10 to 27 years. The issues that generated disagreement were resolved by consensus in a discussion group. Only three semantic discrepancies were found, concerning items 3, 8 and 11 (Table 1).

Table 1
Item-total correlation and correlation among the three scales

	Corrected ítem-total correlation	Squared multiple correlation	Cronbach's Alpha if ítem deleted
EPQp1	.739	.666	.914
EPQp2	.501	.438	.920
EPQp3	.605	.534	.918
EPQp4	.571	.473	.919
EPQp5	.630	.528	.918
EPQp6	.494	.427	.921
EPQp7	.599	.564	.918
EPQp8	.761	.684	.914
EPQp9	.720	.574	.915
EPQp10	.517	.493	.920
EPQp11	.720	.832	.916
EPQp12	.704	.818	.918
EPQp13	.704	.564	.915
EPQp14	.606	.593	.918
EPQp15	.697	.572	.915
EPQp16	.715	.569	.914
EPQi1	.599	.507	.912
EPQi2	.534	.481	.913
EPQi3	.576	.552	.912
EPQi4	.656	.546	.910
EPQi5	.588	.403	.912
EPQi6	.428	.382	.918
EPQi7	.674	.601	.909
EPQi8	.790	.724	.906
EPQi9	.656	.490	.910
EPQi10	.585	.476	.912
EPQi11	.665	.681	.910
EPQi12	.548	.599	.915
EPQi13	.594	.470	.912
EPQi14	.645	.556	.910
EPQi15	.659	.615	.910
EPQi16	.688	.666	.909
SSC1	.775	.687	.882
SSC2	.682	.580	.885
SSC3	.665	.566	.886
SSC4	.685	.658	.884
SSC5	.749	.640	.881
SSC6	.572	.420	.890
SSC7	.647	.581	.886
SSC8	.700	.626	.884

(continued)

Table 1 (Continued)

	Corrected ítem-total correlation	Squared multiple correlation	Cronbach's Alpha if ítem deleted
SSC9	.731	.666	.883
SSC10	.491	.307	.893
SSC11	.416	.463	.897
SSC12	.596	.561	.889
SSC13	.155	.088	.911
SDS1	.618	.556	.955
SDS2	.722	.630	.954
SDS3	.689	.628	.954
SDS4	.794	.734	.953
SDS5	.728	.694	.954
SDS6	.725	.698	.954
SDS7	.699	.658	.954
SDS8	.768	.757	.953
SDS9	.808	.775	.952
SDS10	.778	.692	.953
SDS11	.758	.650	.953
SDS12	.664	.568	.954
SDS13	.672	.639	.954
SDS14	.695	.671	.954
SDS15	.728	.748	.954
SDS16	.787	.805	.953
SDS17	.669	.615	.954
SDS18	.679	.568	.954
SDS19	.568	.623	.957
SDS20	.691	.688	.954

		EPQi	EPQp	SDS	SSC
EPQi	r	1	.628**	.525**	.646**
EPQp	r	.628**	1	.711**	.806**
SDS	r	.525**	.711**	1	.672**
SSC	r	.646**	.806**	.672**	1

EPQi: Educational Practices Questionnaire (importance). EPQp: Educational Practices Questionnaire (presence); SDS: Simulation Design Scale SSC: Satisfaction and Self-Confidence.
**Correlation is significant at the 0.01 level (2-tailed).

A total of 181 fourth-year students took part in the study, providing a total of 173 responses. Eight cases were lost due to incomplete answers. 68.5% (n = 124) of the participants were women and 27.1% (n = 49), men. The average age of the students was 23.4 years (SD: 4.05). In all cases, the mean scores provided were greater than 3 (range 1-5).

Although minor semantic discrepancies were observed (in item 3), the original and translated versions were similar. Thus, with respect to "*I enjoyed how my instructor taught the simulation*", vs. "*I enjoyed how the instructors used the simulation in teaching*", the first sentence could be translated into Spanish as"... *disfruté como mi instructor enseñó la simulación*", but this might be confusing given the similarity between "*enseñar*" and "*mostrar*" in Spanish (both can mean "show"); therefore, the second sentence was considered more appropriate, since it clarifies the use of simulation in teaching. Item 8 in the original version is formulated in the present tense and refers to the clinical setting: "*I am confident that I am developing the skills and obtaining the required knowledge from this simulation to perform necessary tasks in a clinical setting*". In the translated final version, the tense has been adapted, since it refers to how the student will feel in the future in relation to the acquisition of curricular competences. Finally, the discrepancy regarding item 11: "*I was encouraged to explore the possibilities of the simulation*" concerned the prepositions "*en*" and "*de*", which can be used indiscriminately in Spanish.

The highest scores obtained corresponded to the design of the simulation (importance 89.23 and assessment 81.4) and the lowest, to satisfaction and self-confidence (53.01). There was no floor effect. The maximum endorsement frequency was 27.7% (item 12 in the survey of educational practices). No item presented endorsement rates >80% (the highest value being 61.5%, for item 5 of the same questionnaire).

Table 2
CFA adjustment indexes for NLN questionnaires

	Satisfaction and self-confidence	Educational practices questionnaire importance	Educational practices questionnaire presence	Simulation design scale
CMIN/DF	1.34	2.15	1.87	1.99
GFI	.95	.88	.90	.86
NFI	.95	.87	.1	.88
CFI	.98	.93	.95	.94
RMSEA	.04	.08	.07	.07
90%CI	.00 to .07	.06 to .09	.05 to .09	.06 to .08

The correlations between the NLN questionnaire scores ranged from 0.53 to 0.81, with those between self-confidence and the importance of the educational practice exceeding 0.8 (Table 1).

Regarding internal consistency of the questionnaires, according to Cronbach's alpha, was 0.92 for educational practices, 0.95 for the design of the simulation and 0.90 for satisfaction and self-confidence. In this questionnaire, item 13 ("*It is the instructor's responsibility to tell me what I need to learn of the simulation activity content during class time*") obtained a very low item-total correlation, with an evident impact on the Cronbach's alpha score (Table 1).

The CFA results reflected an inadequate fit in all cases, except in the questionnaire items for satisfaction and self-confidence, with values for CFI, NFI and GFI <0.95 and RMSEA >0.05 (Table 2). Fig. 1 shows the factorial structure of the Spanish version of these instruments.

Discussion

The aim of this study was to culturally adapt the NLN questionnaires to teaching practice in a nursing degree program at a Spanish university and to empirically validate their use in this context.

Analysis of the results obtained in this empirical study suggests that the Spanish versions obtained are culturally equivalent and they maintain semantic coherence. The translation and back-translation of the questionnaires is a fundamentally qualitative means of obtaining a semantic translation that retains the meaning of the original items and does not alter their validity.

As regards internal consistency, the results obtained coincide with those reported in other cultural contexts for the original questionnaires (Klein, 2012), and with those of the Turkish-language version, for which Cronbach's alpha values of 0.77-0.85 have been reported for satisfaction and self-confidence, 0.73-0.86 for design and 0.61-0.86 for educational practices (Unver et al., 2017). In the original study by Franklin et al. (2014), the Cronbach's alpha values were 0.90-0.96 for each of the subscales. Coinciding with our own conclusions, the latter authors suggested modifying this scale, eliminating item 13 and reducing it to 12 items, to improve the overall fit. In our study, however, the authorization granted by the NLN expressly forbade making any modifications to the questionnaires.

The provision of simulation learning experiences requires considerable investment in material and human resources (equipment, spaces, teachers, and support staff). The choice of a theoretical framework can help educators select appropriate simulation learning experiences and enable researchers to devise relevant study questions, interpret the results obtained and compare the findings of different studies (Wilson et al., 2015). The NLN framework offers educators a structure with which to build and implement simulation experiences that produce positive learning outcomes (LaFond & Van Hulle, 2013).

In the study by Franklin et al. (2014) the concordant validity obtained was >0.7 and the discordant validity was >0.5. Discordant validity is an important characteristic of this study, since the questionnaires were designed to be used in combination and, most importantly, should not measure the same concept. However, the subscales of self-confidence and satisfaction had little discordant validity with respect to the scales of design and educational practices, which suggests that they evaluate similar concepts and that the latent constructs are closely related.

In the questionnaire on satisfaction and self-confidence in learning, the highest score corresponded to the item "*It is my responsibility as a student to learn what I need to know from this simulation activity*", while the lowest score was for the item "*It is the instructor's responsibility to tell me what I need to learn of the simulation activity content during class time*". In the evaluation of the simulation design, the highest score was obtained for the item "*The feedback provided was constructive*". These data suggest that students understand that the fundamental objective of simulation is to promote reflection and the ability to develop clinical judgment, and that the teacher is a facilitator in this process. This study was unable to evaluate the possible influence of teachers' facilitating behaviors in the final scores. It would be useful to conduct further research to identify strategies for developing the capacity of clinical educators and tutors to generate high-level learning situations (Phillips et al., 2017), and to determine which styles of mentoring and facilitating strategies are most effective from the students' standpoint (Muthathi et al., 2017; Warburton et al., 2016), in order to provide high-quality clinical experiences for undergraduate nursing students (Warburton et al., 2016).

The lowest average score obtained was for the collaboration item, "*During the simulation, my classmates and I had to work together on the clinical scenario*", although in the importance given to the item, low scores were also obtained for the items "*I had the opportunity to work with my classmates during the simulation*" and "*The simulation offered several ways to learn the material*". The fact that this item obtained a low average score in the evaluation is not surprising, since the scenarios had to be addressed by the students individually, and they did not have the opportunity to work with others except in the debriefing. Consequently, we had a limitation regarding this issue, since other studies have included collaborative (Berndt et al., 2015) and interdisciplinary (New et al., 2015; Reese et al., 2010) simulation designs, highlighting the enrichment of the learning experience when the opportunity is provided for collaboration with others and when an interdisciplinary approach is adopted.

The students awarded the highest total scores in the evaluation questionnaire to the item concerning simulation design, both in importance and in assessment, and the lowest ones for satisfaction and self-confidence. The fact that the lowest scores were obtained in the questionnaire on satisfaction and self-confidence contrasts with the findings of other studies (Lubbers & Rossman, 2017). However, these measures are subjective, and so they have great potential for variability due to experience (Woodruff et al., 2017) and may not correspond with clinical knowledge, as has been reported previously (Cant & Cooper, 2017).

Future research should be undertaken to assess the extent to which the results obtained in the simulation are transferable to clinical practice. Moreover, more studies to explore how satisfaction outcomes and clinical competencies acquisition relate each other (García-Mayor et al., 2021). Additionally, to obtain a better generalizability of results, further studies are necessary to determine the factorial invariance of these instruments and the modifications that may be needed.

Conclusions

This study has obtained equivalent versions of the three NLN instruments for its use in the Spanish educational context. Nevertheless, only the questionnaire on satisfaction and self-confidence obtained adequate construct validity, in terms of the factors originally validated. Further studies are needed in the Spanish educational setting to evaluate if the construct validity of the two instruments that did not obtain adequate goodness of fit could be affected by the structure of the Nursing Degree in Spain. Moreover, variations in teaching styles and competency in teaching methods could be an important determining factor in satisfaction scores that should be systematically evaluated.

The use of standardized instruments for the evaluation of simulation programs should also guide future research aimed at evaluating the cost-benefit outcomes of different designs, and at analyzing the improvements in learning, satisfaction and self-confidence derived from simulation-based learning in nursing degree studies.

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Declarations of interest

None.

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