Construct validity and reliability of the Spanish version of the Undergraduate Nursing Student Academic Satisfaction Scale (UNSASS)

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Abstract

Background

Currently, there is no gold standard scale for assessing academic satisfaction among undergraduate nursing students. The aim of this study was to evaluate the construct-structural validity and reliability of the Spanish version of the Undergraduate Nursing Student Academic Satisfaction Scale (UNSASS), as well as to assess the academic satisfaction of undergraduate nursing students at the University of Las Palmas de Gran Canaria (ULPGC).

Methods

A cross-sectional study was conducted among nursing students at ULPGC, Spain. Model fit indicators were examined using confirmatory factor analysis (CFA) for both the original four-factor model and a unidimensional model. Additionally, a new three-factor model was tested through exploratory factor analysis (EFA). Internal consistency reliability was evaluated. Bivariate analysis was performed using chi-square, U-Mann-Whitney, and Kruskal-Wallis tests. For each association, effect sizes were calculated using biserial rank correlation and Kelley's squared Epsilon measure. Descriptive and inferential analyses ($p < 0.05$) were performed using Jamovi (v.2.3.28). Factor analysis and model reliability were carried out using FACTOR© (Release 12.06.08, x64). The study was approved by the Research Ethics Committee (No. 2023-499-1).

Results

A total of 226 students participated (n = 226), showing a high level of satisfaction (M = 163.30 [156.70–163.90]; SD = 27.24). Sample adequacy for factor analysis was excellent (KMO = 0.925 [95%CI: 0.868–0.932]; Bartlett's test: $p < 0.001$). The unidimensional model showed poor fit (RMSEA = 0.100 [95%CI: 0.094–0.101]). The three-factor model yielded RMSEA = 0.050 [95%CI: 0.047–0.050] and the four-factor model RMSEA = 0.049 [95%CI: 0.047–0.051]; however, the three-factor model was closer to Kelley's criterion (RMSR = 0.0533 [95%CI: 0.053–0.053], expected RMSR = 0.066). Internal consistency reliability was excellent for the three-factor model (F1: α = 0.948, ω = 0.949; F2: α = 0.910, ω = 0.911; F3: α = 0.900, ω = 0.899) and good for the four-factor model (F1: α = 0.905, ω = 0.906; F2: α = 0.948, ω = 0.949; F3: α = 0.897, ω = 0.897; F4: α = 0.718, ω = 0.610).

Conclusions

The Spanish version of the UNSASS scale demonstrated multidimensionality, with the three-factor model showing a better fit and excellent internal consistency. ULPGC students reported high levels of satisfaction, with "Clinical Teaching" being the most highly rated factor.

1 Background

The training of students during the Undergraduate Nursing Degree (UND) includes a curriculum designed to organize both content and professional competencies [1] with the goal of providing knowledge, skills, and abilities necessary for professional practice. It also aims to develop competencies for problem-solving, effective communication, critical thinking, and adherence to ethical principles and professional responsibilities [2, 3].

However, the key element for achieving professional excellence lies in students' academic engagement, understood as a multidimensional process that encompasses behavioral, emotional, cognitive, motivational [4], and affective aspects through a dynamic pursuit of deep learning [5]. Likewise, social support has a positive effect on students by enhancing their academic engagement through motivation [6], without overlooking the role of instructors as facilitators who provide feedback aimed at increasing educational involvement and fostering professional autonomy [7].

On the other hand, the university support network is not limited to faculty alone, but also includes administrative staff and personnel from other general services. Although the curriculum and social support influence students' academic engagement

during their academic training related to theoretical learning, limitations in the availability of teaching resources may also negatively affect their learning process. For instance, inadequate classroom furniture, lack of technical and simulation materials in laboratory settings, limited space, and high student-to-tutor ratios are all factors that may hinder the study environment and reduce academic satisfaction during theoretical instruction [8].

In addition, clinical training in healthcare institutions can vary greatly depending on the characteristics of different clinical environments, the variability in working dynamics, and the shifting work conditions of nursing staff—all of which can also significantly impact students' satisfaction with their nursing education.

Satisfaction is a psychological state derived from the comparison between expectations and actual experiences [9], which includes pleasurable responses from clients regarding the services provided by an organization. It is a key element in assessing service quality [10].

In the context of higher education, students are considered clients and universities are the organizations responsible for ensuring their satisfaction [11]. Accordingly, academic satisfaction can be understood as the students' personal perspective on the educational content of the program, available resources, and the support received from both academic and administrative staff [1, 12]. However, satisfaction is also influenced by other factors such as the learning environment, the responsibilities of both instructors and students, assessment approaches, student motivation, and classroom diversity [13]. Despite numerous studies linking these factors with academic satisfaction, there is no clear consensus on which ones have the greatest influence, highlighting the need for further research into this educational experience [1].

Despite the diversity between countries, nursing curricula typically include theoretical classes, laboratory practice—including simulation activities—and clinical placements in real healthcare settings. These modalities require the reorganization of students into smaller groups, and in the case of clinical practice, the presence of a supervising tutor responsible for personalized oversight of student performance in small groups [13, 14]. Therefore, academic satisfaction in nursing programs should be evaluated comprehensively, differentiating between theoretical teaching, lab-based learning, and clinical practice—without neglecting the academic program, institutional resources, and the support provided by the university, faculty, and administrative personnel [15]. All of these elements, when properly integrated, promote educational excellence [1] and foster greater student participation and engagement [13, 16].

Various tools have been developed in the literature to assess the learning environment of nursing students [16]. For example, Chen et al. developed the *Nursing Student Satisfaction Scale* (NSSS), composed of four subscales: "Curriculum" (9 items), "Faculty" (8 items), "Social Interaction" (6 items), and "Learning Environment" (7 items), using a 6-point Likert scale ranging from 1 (not satisfied) to 6 (very satisfied), with excellent reliability ($\alpha = 0.96$) [17]. However, the NSSS does not assess other relevant aspects related to the clinical setting, resources, or institutional support, which are also important for a comprehensive evaluation of nursing students' satisfaction. In contrast, Asadizaker et al. developed the *First Clinical Practical Education* (SFCPE) instrument, which focuses solely on the clinical domain and lacks items related to classroom teaching [18]. Other authors have used alternative approaches, such as Barraza and Ortiz, who employed the *Quality of Life and Satisfaction* (Q-LES-Q) instrument to assess quality of life in undergraduate nursing students [19].

Because existing instruments do not cover all factors influencing nursing students' satisfaction with their undergraduate education, several authors have attempted to develop new tools that allow for more complete and specific assessments. In 2012, Dennison and El-Masri developed the *Undergraduate Nursing Student Academic Satisfaction Scale* (UNSASS), structured into four subscales: "In-Class Teaching," "Clinical Teaching," "Program Design and Delivery," and "Support and Resources," with excellent internal consistency ($\alpha = 0.96$) [15], and validated in several international contexts [20, 21].

Guerra-Martín et al. [22] translated, culturally adapted, and conducted a confirmatory factor analysis (CFA) of the Spanish version of the UNSASS, naming it the *Escala de Satisfacción Académica del Estudiante de Enfermería* (ESAEE). They reported high reliability values, with Cronbach's alpha coefficients above $\alpha = 0.90$ for each of the four subscales. However, these authors did not report model fit indices or the sample size used for the CFA.

For this reason, and in order to clarify the structure of the Spanish version of the UNSASS (ESAEE) and provide additional evidence of its reliability and validity, the main objective of this study was to evaluate the construct validity and reliability of the Spanish

version of the UNSASS. A secondary objective was to assess the academic satisfaction of nursing students at the University of Las Palmas de Gran Canaria (ULPGC).

2 Method

2.1. Design

A cross-sectional descriptive observational study was conducted to obtain a validation sample, following the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines [23].

2.2. Study Population and Context

The population consisted of third- and fourth-year nursing students enrolled in the Undergraduate Nursing Degree (UND) program across the three campuses of the University of Las Palmas de Gran Canaria (ULPGC). A total of 430 students were enrolled in the 2023/2024 academic year (n = 430), distributed as follows: 268 students at the Gran Canaria campus, 82 at the Fuerteventura campus, and 80 at the Lanzarote campus.

2.3. Inclusion and Exclusion Criteria

The inclusion criterion was being enrolled as a third- or fourth-year UND student during the 2023/2024 academic year. Students participating in academic mobility programs (e.g., SICUE, Erasmus) during the study period were excluded.

2.4. Sample Size

Based on the recommendations of Ferrando et al. [24] and Hair et al. [25], a minimum sample size of 200 participants was established to ensure the feasibility of conducting a factor analysis (FA).

2.5. Study Variables, Instruments, and Data Collection

The following sociodemographic variables were collected: Gender (female, male, prefer not to answer), Campus (Gran Canaria, Fuerteventura, Lanzarote), Academic year (third, fourth), and Age (in years, quantitative variable).

The administered instrument was the Spanish version of the ESAEE scale [20], which contains 48 items organized into four subscales: In-Class Teaching (items nº 1 to nº 16), Clinical Teaching (items nº 17 to nº 31), “Program Design and Delivery” (items nº 32 to nº 43) y “Support & Resources” (items nº 44 to nº 48). Each item uses a five-point Likert scale, where a score of 1 indicates “strongly disagree” and a score of 5 indicates “strongly agree.” Thus, higher scores reflect greater levels of satisfaction. The total score ranges from 48 (minimum satisfaction) to 240 (maximum satisfaction). Subscales-specific scores can also be calculated by summing the scores of the corresponding items.

The instrument was administered via an online questionnaire using the Google Forms® platform, distributed through the institutional email addresses of eligible students. The data collection period extended from December 2023 to March 2024.

2.6. Statistical Analysis Strategy

2.6.1. Descriptive Analysis

A descriptive statistical analysis was performed. Categorical variables were expressed as frequencies and percentages, and quantitative variables using means and standard deviations. Based on the total score of the scale, five levels of satisfaction were established: very low (48–86), low (87–124), moderate (125–162), high (163–200), and very high (201–240). To allow comparisons across dimensions, scores were normalized using the Min-Max scaling technique with the formula: $X_{norm} = (X - X_{min}) / (X_{max} - X_{min})$.

2.6.2. Structural Construct Validity and Internal Consistency Reliability

To assess the structural construct validity of the ESAEE instrument, a factor analysis (FA) was conducted. Means, standard deviations, skewness, and kurtosis were calculated for each item. According to Mardia’s test, a Pearson correlation matrix was used for the FA. After evaluating the Measure of Sampling Adequacy (MSA) (values of MSA below 0.500 suggest that the item

does not measure the same domain as the remaining items in the pool), overall data adequacy was assessed using the Kaiser-Meyer-Olkin (KMO) index and Bartlett's test of sphericity. Values above 0.75 for KMO and $p \leq 0.05$ for Bartlett's test were considered acceptable [24–26]. Factor extraction was performed using Unweighted Least Squares (ULS) with PROMIN oblique rotation. Bootstrapping was used to calculate 95% confidence intervals for item scores and model measures.

Model fit was evaluated using the Root Mean Square of Residuals (RMSR), Root Mean Square Error of Approximation (RMSEA), Non-Normed Fit Index (NNFI), Comparative Fit Index (CFI), and Goodness of Fit Index (GFI). An RMSR value of 0.05 was considered an acceptable fit, and RMSEA values below 0.05 were considered a good fit, while values between 0.05–0.08 were considered a reasonable fit. NNFI and CFI values ≥ 0.95, and GFI values > 0.90 were regarded as indicators of good model fit. For RMSR, Kelley's criterion was used, in which the RMSR is compared to the typical error of a correlation of 0 in the population [24, 27]. The Bayesian Information Criterion (BIC) was also used to compare model solutions.

The analysis strategy involved performing a confirmatory factor analysis (CFA) of the initial four-factor model proposed by Guerra-Martín et al. [22] (using a semi-specified matrix) and a unidimensional model. Additionally, to assess unidimensionality, the following indices were used: Unidimensional Congruence (UniCo), Explained Common Variance (ECV), and Mean of Item Residual Absolute Loadings (MIREAL). UniCo values above 0.95, ECV values above 0.85, and MIREAL values below 0.30 indicate that the data may be considered essentially unidimensional [28]. Since parallel analysis suggested a possible three-factor solution, an exploratory factor analysis (EFA) was conducted to assess the fit of this proposed three-factor model.

The consistency of the factors in each model was assessed using the Overall Reliability of fully-Informative prior Oblique N-EAP scores (ORION) and the Factor Determinacy Index (FDI) [29]. The Sensitivity Ratio (SR) and Expected Percentage of True Differences (EPTD) were also calculated. SR reflects the number of distinct factor levels that can be differentiated based on the estimated factor scores. EPTD refers to the estimated percentage of differences between observed and true factor scores that are in the same direction. Recommended values are FDI > 0.90, Oblique N-EAP scores > 0.80, SR > 2, and EPTD > 90% [28].

Finally, reliability (internal consistency) was assessed using McDonald's Omega and Cronbach's Alpha coefficients, with 95% confidence intervals calculated for both.

2.6.3. Bivariate Analysis

The Kolmogorov-Smirnov test indicated non-normal distribution for quantitative variables; therefore, the non-parametric Mann-Whitney U test was used to compare means between two groups, and the Kruskal-Wallis test for comparisons involving more than two groups. In the latter case, Dwass-Steel-Critchlow-Fligner (DSCF) post hoc tests were applied. To assess differences between categorical variables, the Chi-square test (χ^2) was used. For each association examined, the effect size was calculated: for the Mann-Whitney U test, it was measured using the rank-biserial correlation, and for the Kruskal-Wallis test, Kelley's squared epsilon was applied. Coefficients between 0.10 and 0.30 were interpreted as small effect sizes, between 0.30 and 0.50 as medium, and values greater than 0.50 as large effect sizes [30].

Descriptive and inferential analyses were conducted using Jamovi software (version 2.3.28), with statistical significance set at $p < 0.05$. Factor analysis and model reliability assessments were performed using FACTOR© software (Release 12.06.08, x64).

2.7. Ethical Considerations

Authorization was obtained from the original authors (Date: October 31, 2023) to use the Spanish version of the ESAEE scale, as well as from the corresponding Dean's Office at the University of Las Palmas de Gran Canaria (ULPGC).

The study was conducted in accordance with the Declaration of Helsinki. Although the questionnaire was anonymous, participants were informed about the general aspects of the study, including its aims and characteristics. Prior to accessing the questionnaire, participants had to accept an informed consent form. This research was approved by the Research Ethics Committee (CEI/CEIm) of Hospital Dr. Negrín, Las Palmas (approval number: 2023-499-1).

3 Results

3.1. Sample Description

The response rate was 52.5%. A total of 226 students (n = 226), with a mean age of 24.03 years (SD = 7.09), participated in the study. Among the participants, 82.3% (n = 186) identified as female and 17.7% (n = 40) as male. Of the total, 58.0% (n = 131) were in their third year of study, and 42.0% (n = 95) were in their fourth year. Regarding campus affiliation, 73.9% (n = 167) were from the Gran Canaria campus, 16.8% (n = 38) from the Fuerteventura campus, and 9.3% (n = 21) from the Lanzarote campus. Table 1 shows the frequencies and percentages of the variables considered by campus. Statistically significant differences were found between campuses for the academic year variable (p = 0.010), as well as for age (Table 1).

Table 1
Socio-demographic variables and differences between groups according to the campuses.

Variable	**Total** **n = 226 (100%)**	**Campus** **Gran Canaria** **n = 167 (73.9%)**	**Campus** **Fuerteventura** **n = 38 (16.8%)**	**Campus** **Lanzarote** **n = 21 (9.3%)**	
	n (%)	n (%)	n (%)	n (%)	p-value[1]
Gender					p = 0.588
Women	186 (82.3%)	136 (60.2%)	31 (13.7%)	19 (8.4%)	
Men	40 (17.7%)	31 (13.7%)	7 (3.1%)	2 (0.9%)	
Academic year					p = 0.010*
3rd year	131 (58%)	99 (43.8%)	26 (11.5%)	6 (2.7%)	
4th year	95 (42%)	68 (30.1%)	12 (5.3%)	15 (6.6%)	
					p-value[3]
Age[2]	M (SD)	M (SD)	M (SD)	M (SD)	p = 0.120
	24.03 (7.09)	23.7 (6.66)	26.5 (9.76)	22 (1.97)	

*1 p-value obtained with Chi-Square; 2 expressed in means and standard deviations; 3 p-value obtained with Kruskall Wallis * Statistically significant p-value.*

3.2 Structural Construct Validity and Internal Consistency Reliability

Descriptive item analysis is shown in Table 2.

Table 2
Descriptive analysis of the items and values of Measure of Sampling Adequacy

Variable	M [CI95%][1]	SD[2]	Skewness	Kurtosis	Normed MSA[3] [CI95%]
Item 1. I can freely express my academic and other concerns to faculty members	3.29 [3.12–3.46]	1.01	-0.129	-0.500	0.876 [0.697–0.904]
Item 2. Faculty members are easily approachable	3.23 [3.07–3.38]	0.90	-0.163	-0.237	0.933 [0.837–0.939]
Item 3. Faculty members make every effort to assist students when asked	3.21 [3.05–3.37]	0.93	-0.534	0.167	0.951 [0.837–0.944]
Item 4. Faculty members make an effort to understand difficulties I might be having with my course work	2.88 [2.73–3.03]	0.86	-0.267	-0.144	0.934 [0.818–0.937]
Item 5. Faculty members are usually available after class and during office hours	3.39 [3.23–3.54]	0.91	-0.532	0.293	0.949 [0.808–0.943]
Item 6. I can freely express my academic and other concerns to the administration	3.26 [3.08–3.44]	1.08	-0.192	-0.501	0.948 [0.839–0.949]
Item 7. Faculty are fair and unbiased in their treatment of individual students	3.00 [2.82–3.19]	1.08	-0.267	-0.686	0.868 [0.627–0.901]
Item 8. Faculty members provide adequate feedback about students' progress in a course	2.98 [2.82–3.14]	0.94	-0.225	-0.342	0.923 [0.791–0.928]
Item 9. I receive detailed feedback from faculty members on my work and written assignments	2.81 [2.64–2.99]	1.02	0.051	-0.723	0.880 [0.666–0.901]
Item 10. Channels for expressing students' complaints are readily available	2.71 [2.52–2.89]	1.08	0.134	-0.717	0.920 [0.735–0.918]
Item 11. Faculty members are good role models and motivate me to do my best	2.99 [2.83–3.15]	0.96	-0.284	-0.282	0.923 [0.824–0.936]
Item 12. The administration shows concern for students as individuals	2.44 [2.24–2.64]	1.17	0.651	-0.334	0.896 [0.696–0.905]
Item 13. Faculty members demonstrate a high level of knowledge in their subject area	4.00 [3.85–4.15]	0.88	-0.931	1.104	0.938 [0.824–0.940]
Item 14. Faculty members take the time to listen/discuss issues that may impact my academic performance	2.82 [2.66–2.99]	0.96	0.056	-0.504	0.955 [0.859–0.951]
Item 15. Faculty members create a good overall impression	3.55 [3.40–3.70]	0.88	-0.736	0.739	0.957 [0.865–0.953]
Item 16. I am generally given enough time to understand the things I have to learn	3.06 [2.89–3.22]	0.98	-0.491	-0.240	0.932 [0.814–0.938]
Item 17. Clinical instructors are approachable and make students feel comfortable about asking questions	3.77 [3.59–	1.03	-0.745	0.239	0.907 [0.816–

Variable	M [CI95%][1]	SD[2]	Skewness	Kurtosis	Normed MSA[3] [CI95%]
	3.95]				0.925]
Item 18. Clinical instructors provide feedback at appropriate times, and do not embarrass me in front of others (classmates, staff, patients and family members)	3.64 [3.46–3.82]	1.07	-0.759	0.182	0.936 [0.841–0.940]
Item 19. Clinical instructors are open to discussions and difference in opinions	3.61 [3.43–3.79]	1.05	-0.673	0.067	0.942 [0.862–0.949]
Item 20. Clinical instructors give me sufficient guidance before I perform technical skills	3.63 [3.45–3.80]	1.03	-0.729	0.133	0.920 [0.817–0.936]
Item 21. Clinical instructors view my mistakes as part of my learning	3.69 [3.50–3.89]	1.12	0.873	0.138	0.941 [0.859–0.940]
Item 22. Clinical instructors give me clear ideas of what is expected from me during a clinical rotation	3.73 [3.54–3.91]	1.11	-0.712	-0.182	0.950 [0.860–0.949]
Item 23. Clinical instructors facilitate my ability to critically assess my client's needs	3.61 [3.43–3.79]	1.04	-0.714	0.205	0.935 [0.841–0.941]
Item 24. Clinical instructors assign me to patients that are appropriate for my level of competence	3.53 [3.33–3.73]	1.17	-0.614	-0.298	0.945 [0.826–0.944]
Item 25. Clinical instructors give me verbal and written feedback concerning my clinical experience	3.65 [3.46–3.83]	1.07	-0.630	-0.115	0.930 [0.827–0.935]
Item 26. Clinical instructors demonstrate a high level of knowledge and clinical expertise	4.03 [3.87–4.19]	0.94	-1.160	1.616	0.949 [0.839–0.949]
Item 27. Clinical instructors are available when needed	3.58 [3.41–3.75]	1.00	-0.690	0.441	0.935 [0.828–0.941]
Item 28. Clinical instructors provide enough opportunities for independent practice in the lab and clinical sites	3.59 [3.41–3.77]	1.06	-0.663	0.024	0.940 [0.829–0.940]
Item 29. Clinical instructors encourage me to link theory to practice	3.79 [3.64–3.94]	0.88	-0.675	0.585	0.955 [0.855–0.949]
Item 30. Instructions are consistent among different clinical and lab instructors	3.33 [3.14–3.51]	1.08	-0.403	-0.419	0.951 [0.842–0.949]
Item 31. Faculty members behave professionally	3.93 [3.78–4.07]	0.86	-1.062	2.001	0.964 [0.867–0.958]
Item 32. This program provides a variety of good and relevant courses	3.04 [2.88–3.19]	0.92	-0.446	-0.346	0.911 [0.771–0.919]
Item 33. The program enhances my analytical skills	3.30 [3.15–3.44]	0.87	-0.531	0.220	0.927 [0.816–0.933]
Item 34. Most courses in this program are beneficial and contribute to my overall	3.43 [3.29–3.57]	0.82	-0.490	0.295	0.930 [0.779–0.931]

Variable	M [CI95%][1]	SD[2]	Skewness	Kurtosis	Normed MSA[3] [CI95%]
professional development					
Item 35. The quality of instruction I receive in my classes is good and helpful	3.28 [3.14–3.42]	0.84	-0.608	0.599	0.950 [0.837–0.953]
Item 36. I usually have a clear idea of what is expected of me in this program	3.40 [3.26–3.55]	0.86	-0.624	0.429	0.918 [0.786–0.931]
Item 37. The program is designed to facilitate team work among students	3.43 [3.27–3.60]	0.96	-0.624	0.179	0.902 [0.760–0.920]
Item 38. The program enhances my problem solving or critical thinking skills	3.31 [3.17–3.46]	0.85	-0.559	0.274	0.903 [0.773–0.924]
Item 39. There is a commitment to academic excellence in this program	3.27 [3.11–3.44]	0.95	-0.416	-0.033	0.904 [0.750–0.920]
Item 40. As a result of my courses, I feel confident about dealing with clinical nursing problems	3.01 [2.83–3.18]	1.03	-0.240	-0.643	0.908 [0.771–0.923]
Item 41. Going to class helps me better understand the material	3.47 [3.27–3.67]	1.17	-0.471	-0.591	0.911 [0.768–0.923]
Item 42. I am able to experience intellectual growth in the program	3.59 [3.43–3.75]	0.96	-0.772	0.602	0.914 [0.807–0.923]
Item 43. Overall, the program requirements are reasonable and achievable	3.52 [3.38–3.66]	0.81	-0.763	1.138	0.947 [0.847–0.948]
Item 44. The secretaries are caring and helpful	2.94 [2.74–3.13]	1.15	0.015	-0.679	0.829 [0.675–0.862]
Item 45. The secretaries behave professionally	3.59 [3.42–3.75]	0.98	-0.481	0.109	0.865 [0.720–0.893]
Item 46. Support at the clinical and computer labs is readily available	2.96 [2.78–3.13]	1.02	-0.216	-0.477	0.857 [0.684–0.885]
Item 47. Computer and clinical labs are well equipped, adequately staffed, and are readily accessible to meet	2.80 [2.61–2.98]	1.09	-0.046	-0.757	0.797 [0.591–0.843]
Item 48. The facilities (class rooms, clinical and computer labs) facilitate my learning	3.23 [3.06–3.41]	1.05	-0.177	-0.343	0.885 [0.659–0.903]
1: Mean [Confident Inteval 95%]/ 2: Standard Deviation/ 3: Measure of Sampling Adequacy					

All MSA values were above the 0.500 threshold. The KMO index and Bartlett's test of sphericity (n = 226) indicated excellent sampling adequacy (KMO = 0.925 [95%CI: 0.868–0.932]; Bartlett's test $p \leq 0.001$). The expected RMSR according to Kelley's criterion for an acceptable model was 0.066. The unidimensionality analysis produced the following results: UniCo = 0.958 [95%CI: 0.945–0.978], ECV = 0.790 [95%CI: 0.740–0.850], MIREAL = 0.272 [95%CI: 0.235–0.300], indicating that the results were inconclusive regarding essential unidimensionality.

Two CFAs were initially performed (a four-factor model and a unidimensional model). Since the parallel analysis suggested a three-factor solution, an EFA was also conducted to assess the fit of this model. Fit indices for the three models tested through FA are presented in Table 3, along with reliability indices for the factors in each model.

Table 3
Fit and reliability indices of the factors of the models tested

	EFA Three Factor Model			CFA Four Factor Model				CFA One Factor Model
RMSEA[95%CI][1]	0.050 [0.047–0.050]			0.049 [0.047–0.051]				0.100 [0.094–0.101]
X^2 (p)[2]	1543.532 (P = 0.000010)			1452.597 (p = 0.000010)				3527.202 (p = 0.000010)
NNFI [95%CI][3]	0.978 [0.975–0.987]			0.979 [0.972–0.987]				0.910 [0.908–0.933]
CFI [95%CI][4]	0.980 [0.978–0.989]			0.982 [0.976–0.989]				0.914 [0.912–0.935]
GFI [95%CI][5]	0.979 [0.956–0.981]			0.985 [0.966–0.987]				0.921 [0.857–0.943]
BIC[95%CI][6]	2584.275 [2525.265- 2590.831]			2753.526 [2715.601-2797.043]				4047.573 [3854.761-4068.997]
RMSR [95%CI][7]	0.0533 [0.053–0.053]			0.0461 [0.036–0.036]				0.1046 [0.092 0.111]
	F1 Satisfaction with Clinical Teaching	F2 Satisfaction with Faculty and Human Resources	F3 Satisfaction with Academic Program and Support Resources	F1 In-Class Teaching	F2 Clinical Teaching	F3 Program Design and Delivery	F4 Support & Resources	F1
Proportion of Variance	33.92%	9.24%	5,14%	33.92%	9.24%	5,14%	3.84%	33.92%
% Cumulative Proportion of Variance	33.92%	43.16%	48.30%	33.92%	43.16%	48.30%	52.14%	33.92%
Factor Determinacy Index (FDI)	0.977	0.965	0.955	0.961	0.977	0.962	0.914	0.980
ORION marginal reliability	0.954	0.930	0.912	0.924	0.954	0.926	0.835	0.961
Sensitivity ratio (SR)[a]	4.554	3.656	3.213	3.483	4.567	3.548	2.253	4.943
Expected percentage of true differences (EPTD)[b]	95.6%	94.1%	93.1%	61.7%	64.7%	61.9%	58.1%	96.1%

[Confident Inteval 95%]

1:Root Mean Square Error of Approximation/2:LOSEFER empirically corrected Chi-square/3:Non-Normed Fit Index/4: Comparative Fit Index/5: Goodness of Fit Index/6: Schwarz s Bayesian Information Criterion/7: Root Mean Square of Residuals

	EFA	CFA	CFA
	Three Factor Model	Four Factor Model	One Factor Model

a = The sensitivity ratio (SR) can be interpreted as the number of different factor levels than can be differentiated on the basis of the factor score estimates.

b = expected percentage of true differences (EPTD) is the estimated percentage of differences between the observed factor score estimates that are in the same direction as the corresponding true differences.

If factor scores are to be used for individual assessment, FDI values above 0.90, marginal reliabilities above 0.80, SR above 2, and EPTDs above 90% are recommended.

Fit coefficients for the three- and four-factor models were very similar, with RMSEA values of 0.050 [95%CI: 0.047–0.050] and 0.049 [95%CI: 0.047–0.051], respectively. However, the three-factor model had a slightly lower BIC and a RMSR value closer to Kelley's criterion (RMSR = 0.0533 [95%CI: 0.053–0.053] versus RMSR = 0.0461 [95%CI: 0.036–0.036]). Although reliability coefficients (FDI, ORION, and SR) were adequate for both models, the three-factor model showed clearly superior values in terms of EPTD. In contrast, the unidimensional model showed poor fit indices (RMSEA = 0.100 [95%CI: 0.094–0.101]), supporting the suitability of adopting a multidimensional model, consistent with the unidimensionality analysis.

The rotated matrix with the factor loadings for the newly proposed three-factor model is shown in Table 4.

Table 4
Factor loadings of the matrix after rotation of the three-factor model

Items	Factor 1 Satisfaction with Clinical Teaching	Factor 2 Satisfaction with Faculty and Human Resources	Factor 3 Satisfaction with Academic Program and Support Resources
Item 1		0.514 [0.284–0.698]	
Item 2		0.711 [0.593–0.856]	
Item 3		0.679 [0.532–0.830]	
Item 4		0.722 [0.550–0.902]	
Item 5		0.537 [0.371–0.743]	
Item 6		0.744 [0.597–0.920]	
Item 7		0.411 [0.078–0.633]	
Item 8		0.584 [0.451–0.781]	
Item 9		0.530 [0.340–0.699]	
Item 10		0.441 [0.225–0.616]	
Item 11		0.544 [0.330–0.719]	
Item 12		0.685 [0.446-0.900]	
Item 13			0.395 [0.095–0.603]
Item 14		0.653 [0.522–0.814]	
Item 15		0.421 [0.171–0.592]	
Item 16		0.697 [0.550–0.902]	
Item 17	0.754 [0.653–0.857]		
Item 18	0.796 [0.687–0.894]		
Item 19	0.840 [0.773–0.921]		
Item 20	0.743 [0.629–0.836]		
Item 21	0.867 [0.801–0.952]		
Item 22	0.766 [0.670–0.850]		
Item 23	0.807 [0.708–0.891]		
Item 24	0.663 [0.495–0.788]		

[Confident Inteval 95%]

Items	Factor 1 Satisfaction with Clinical Teaching	Factor 2 Satisfaction with Faculty and Human Resources	Factor 3 Satisfaction with Academic Program and Support Resources
Item 25	0.775 [0.559–0.871]		
Item 26	0.759 [0.666–0.865]		
Item 27	0.757 [0.643–0.857]		
Item 28	0.693 [0.554–0.802]		
Item 29	0.640 [0.520–0.749]		
Item 30	0.553 [0.419–0.697]		
Item 31	0.575 [0.368–0.714]		
Item 32			0.597 [0.387–0.813]
Item 33			0.685 [0.499–0.892]
Item 34			0.804 [0.656–0.977]
Item 35			0.580 [0.408–0.784]
Item 36			0.484 [0.272–0.692]
Item 37			0.344 [0.139–0.518]
Item 38			0.642 [0.489–0.872]
Item 39			0.565 [0.375–0.783]
Item 40			0.497 [0.344–0.750]
Item 41			0.409 [0.178–0.635]
Item 42			0.521 [0.205–0.755]
Item 43			0.437 [0.194–0.622]
Item 44		0.739 [0.474–1.001]	
Item 45		0.623 [0.330–0.861]	
Item 46			0.425 [0.252–0.572]
[Confident Inteval 95%]			

Items	Factor 1 Satisfaction with Clinical Teaching	Factor 2 Satisfaction with Faculty and Human Resources	Factor 3 Satisfaction with Academic Program and Support Resources
Item 47			0.425 [0.252–0.572]
Item 48			0.425 [0.252–0.572]
[Confident Inteval 95%]			

This model retains all items from the original Clinical Teaching dimension (items 17–31) within Factor 1. Factor 2 includes all items from In-Class Teaching (items 1–16), plus items 44 and 45, excluding item 13. Factor 3 incorporates the remaining items, originally from Program Design and Delivery and Support & Resources. In this model, no item had cross-loadings above 0.400 in more than one factor, except for item 13, which had a loading of 0.395. Based on item distribution, the factors were renamed as follows: Factor 1 – Satisfaction with Clinical Teaching (items 17–31); Factor 2 – Satisfaction with Faculty and Human Resources (items 1–12, 14–16, 44, and 45); Factor 3 – Satisfaction with Academic Program and Support Resources (item 13, items 32–43, 46–48).

Finally, regarding internal consistency reliability, Table 5 presents the values of Cronbach's Alpha and McDonald's Omega coefficients for both the three- and four-factor models.

Table 5
Values of cronbach's alpha and omega coefficients of the three- and four-factor models.

	Three Factor Model			Four Factor Model			
	Factor 1 Satisfaction with Clinical Teaching	Factor 2 Satisfaction with Faculty and Human Resources	Factor 3 Satisfaction with Academic Program and Support Resources	Factor 1 In-Class Teaching	Factor 2 Clinical Teaching	Factor 3 Program Design and Delivery	Factor 4 Support & Resources
Coeficiente Alfa de Cronbach (α)	α = 0.948 [0.935–0.961]	α = 0.910 [0.889–0.931]	α = 0.900 [0.874–0.927]	α = 0.905 [0.883–0.927]	α = 0.948 [0.935–0.961]	α = 0.897 [0.869–0.924]	α = 0.718 [0.647–0.789]
Coeficiente Omega de MacDonald (Ω)	ω = 0.949 [0.939 – 0.938]	ω = 0.911 [0.894–0.928]	ω = 0.899 [0.880–0.919]	ω = 0.906 [0.888–0.924]	ω = 0.949 [0.939–0.958]	ω = 0.897 [0.877–0.917]	ω = 0.610 [0.537–0.682]
[Confident Inteval 95%]							

3.3 Analysis of Nursing Students' Satisfaction at ULPGC

The overall mean score on the ESAEE scale indicated a high level of satisfaction (M = 163.30 [156.70–163.90]; SD = 27.24). The scores obtained for each factor were as follows: Factor 1 (M = 55.10 [53.50–56.60]; SD = 11.81), Factor 2 (M = 52.20 [50.70–53.60]; SD = 10.85), and Factor 3 (M = 53.00 [51.80–54.30]; SD = 9.59). The normalized mean values were Xnorm = 1.00 for Factor 1, Xnorm = 0.00 for Factor 2, and Xnorm = 0.28 for Factor 3.

Bivariate analysis revealed statistically significant differences according to gender in Item 8 (p = 0.023) and Item 16 (p = 0.002), as shown in Supplementary File 1.

Regarding the academic year, statistically significant differences were found in Item 8 (p = 0.021), Item 13 (p = 0.043), Item 24 (p = 0.040), Item 33 (p = 0.001), Item 39 (p = 0.004), and in Factor 3 (p = 0.049), as shown in Supplementary File 2.

As for the campus variable, significant differences were found in the following comparisons: Item 2 GC–FTV (p < 0.001); Item 3 GC–FTV (p = 0.016); Item 6 GC–FTV (p < 0.001), GC–LNZ (p = 0.037), FTV–LNZ (p = 0.007); Item 7 FTV–LNZ (p = 0.047); Item 11

GC–FTV (p = 0.043); Item 12 GC–FTV (p < 0.001), FTV–LNZ (p = 0.013); Item 14 GC–FTV (p = 0.008), GC–LNZ (p = 0.012); Item 16 GC–FTV (p = 0.005); Item 44 GC–FTV (p < 0.001), FTV–LNZ (p < 0.001); Item 45 GC–FTV (p < 0.001), FTV–LNZ (p < 0.001); Item 46 GC–FTV (p < 0.001), FTV–LNZ (p = 0.022); Item 47 GC–FTV (p < 0.001); Item 48 GC–FTV (p = 0.015), GC–LNZ (p = 0.010); and Factor 2 GC–FTV (p < 0.001), as detailed in Supplementary File 3.

4 Discussion

A large number of scales have been developed to assess nursing students' satisfaction [16, 21]. However, according to Rahmatpour et al. [21], these instruments do not meet "excellent" quality standards across all psychometric properties, as defined by the COSMIN initiative [31]. Therefore, no single robust and valid instrument currently exists that is considered the gold standard for measuring student satisfaction [21].

This is applicable to the UNSASS scale. Although it was one of the first instruments developed to assess nursing student satisfaction, we believe that the information provided on its structure and psychometric properties in both the original and subsequent validation studies has been insufficient. For example, in the original study by Dennison and El-Masri, the initial development of the scale was presented, and face, content, and construct validity, as well as internal consistency reliability, were assessed in a sample of 313 Canadian students [15]. However, construct validity was only examined through exploratory factor analysis (EFA), meaning the originally proposed four-factor structure—subsequently adopted in other studies [20, 22]—was not formally tested using confirmatory factor analysis (CFA), and no fit indices were reported. Victor et al. [20], in their study conducted in Pakistan, directly adopted this model without formally validating it for their context, performing only a pretest with 10 students. More recently, the study by Guerra-Martín et al. [22] in Spain attempted to confirm this four-factor model via CFA, but again no fit indices were reported. The claim of good model fit was based solely on factor loadings above 0.4, which is an oversimplified interpretation [32].

Perhaps the most rigorous validation of the UNSASS to date is the Iranian version by Rahmatpour et al. [21], which provided more detailed evidence on its structure, using a sample of 237 students for EFA and 200 for CFA. Their three-factor model (named "University factors", "Clinical factors", and "Faculty factors") yielded acceptable fit indices (RMSEA = 0.052; CFI = 0.918). Although we did not perform a CFA in our study, our results are aligned in indicating better fit for a three-factor model over the four-factor version, and we also observed greater reliability for the factors. Regarding item clustering, our findings also closely resemble those reported by Rahmatpour et al. [21].

Two key considerations must be acknowledged when evaluating the various factor analyses conducted with UNSASS. First, most validations used methodological approaches that are now considered outdated. For instance, the original study by Dennison and El-Masri [15] used the common but discouraged method of principal component extraction and Varimax rotation—an approach also employed by Guerra-Martín et al. [22]. This methodology does not adequately distinguish between common and specific variance, which may compromise the construct validity of scales, although it remains widely used [24, 32]. Second, the influence of sample size on factor analysis results must be considered. While most validations—including the present study—have been conducted with sample sizes ranging from sufficient (n = 200) to very good (n = 500) [33, 34], factors such as sample variability, ambiguous items, or restricted response ranges should be considered when determining adequate sample size for factor analysis [24, 32, 35]. In our case, although the sample size was considered sufficient and sampling adequacy was excellent (KMO > 0.90), it did not allow us to perform a CFA, following the recommendation to use different samples for EFA and CFA [24]. Therefore, a CFA remains pending to confirm the proposed three-factor structure of the Spanish version of UNSASS.

In our study, factor reliability was assessed using multiple coefficients, including ORION Marginal Reliability (Overall Reliability of fully Informative prior Oblique N-EAP scores), Sensitivity Ratio (SR), and Expected Percentage of True Differences (EPTD) [28]. The ORION coefficient, an IRT-based alternative to Cronbach's alpha, measures the precision of estimated latent scores for each factor. Values close to 1.00 indicate very high reliability, with values above 0.80 considered acceptable. Unlike Cronbach's alpha, ORION does not require assumptions of tau-equivalence or factor independence [28]. SR (ratio of true score variance to measurement error) assesses the instrument's ability to discriminate between individuals with different true scores; values above 2 indicate good sensitivity. EPTD estimates the proportion of observed score differences that reflect true differences rather than measurement error. Values above 90% are desirable, indicating strong discriminative fidelity. Although not yet widely used, these indices should be considered standard practice for high-quality psychometric evaluations. We also calculated classic internal consistency

indicators such as Cronbach's alpha and McDonald's omega [36]. Although Cronbach's alpha has been increasingly criticized, it remains the most commonly used index for internal consistency. McDonald's omega is now recognized as a more robust alternative [37–39]. In our study, both coefficients were calculated to allow comparison with previous validations. Only Rahmatpour et al. [21] reported omega in their study, and similarly to our results, they obtained coefficients above 0.900 for the three model dimensions, supporting strong internal consistency.

With regard to the application of the instrument, our students' overall satisfaction was high (M = 163.30; SD = 27.24), although lower than that observed in Canada [15] (M = 175.12; SD = 25.88). Global results could not be compared with other applications of UNSASS [20–22] due to the absence of total and subscale scores in those studies. After normalizing the means, the highest satisfaction was found in Factor 1 "Satisfaction with Clinical Teaching" (Xnorm = 1.00), while the lowest was in Factor 2 "Satisfaction with Faculty and Human Resources" (Xnorm = 0.00). Normalized means could not be compared due to our restructured three-factor model. However, in the Canadian study [15], the highest satisfaction was for "In-Class Teaching" (Xnorm = 1.00), and the lowest for "Support and Resources" (Xnorm = 0.00). In this regard, mentoring programs have been shown to enhance educational outcomes and increase satisfaction among both students and faculty [40, 41]. The highest-rated items were Item 26 "Clinical instructors demonstrate a high level of knowledge and clinical expertise" (M = 4.03; SD = 0.94) and Item 13 "Faculty members demonstrate a high level of knowledge in their subject area" (M = 4.00; SD = 0.88), reflecting students' high appreciation of faculty knowledge [41]. Nonetheless, improvements in curriculum structure, evaluation strategies, teaching resources, and alumni follow-up systems are needed to improve educational quality [42]. The lowest-rated item was Item 12 "The administration shows concern for students as individuals" (M = 2.44; SD = 1.17). Transformational leadership experiences in organizational culture have shown promise in promoting significant changes in institutional systems and staff dynamics, which are crucial for effective transformation [43, 44].

Although some statistically significant differences were observed based on gender and academic year, the most relevant influence was that of the ULPGC campus. This variable is relevant because, for example, the GC campus has a larger student-to-classroom ratio. As noted by Walker et al. [41], smaller class sizes improve faculty-student interaction and enhance the learning process. Likewise, the smaller clinical hospitals associated with the FTV campus are linked to reduced faculty workload and fewer assigned students, allowing for more personalized teaching, more effective learning, and greater student motivation [8]. According to Cant and Gazula [1], student interaction with peers and university staff—especially faculty—directly influences motivation and engagement in learning.

Among the limitations of this study, the most significant was the sample size used for the analysis of construct validity. Although the KMO index indicated excellent sampling adequacy, the sample did not allow for a CFA, following the recommendation to use separate samples for EFA and CFA. A CFA using an independent sample remains necessary to confirm the proposed three-factor structure of the Spanish version of the UNSASS instrument.

One of the strengths of this study lies in the rigorous analysis of structural construct validity, employing fit indices and statistical tests that provide evidence of the instrument's multidimensionality and support the proposal of a new three-factor model. Additionally, the estimation of reliability through internal consistency using McDonald's omega—considered a more robust alternative to Cronbach's alpha—is noteworthy, along with the calculation of additional reliability coefficients for the model's factors.

5 Conclusions

This study contributes to improving the understanding of the psychometric properties of the Spanish version of the UNSASS scale, confirming it as a valid and reliable instrument for assessing nursing students' satisfaction in the Spanish context. A multidimensional model is proposed for the Spanish version of the UNSASS scale, showing a better fit for a three-factor model compared to the classic four-factor structure, along with excellent internal consistency. The satisfaction of ULPGC students was high, with the "Clinical Teaching" factor standing out as the most highly rated subscale.

Declarations

Ethics approval and consent to participate.

Participants provided informed consent before completing the questionnaire. The study was approved by the Research Ethics Committee of Hospital Dr. Negrín, Las Palmas (approval number: 2023-499-1).

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Clinical trial declaration

Not applicable.

Authors' contributions

Conceptualization: M.IS, CA.RS, H.GT; Data curation; M.IS, CA.RS; Formal analysis: CA.RS, H.GT; Investigation: M.IS, CM.DG, M.RH; Methodology: M.IS, CA.RS, H.GT; Software: CA.RS, H.GT; Supervision: CA.RS; Validation: H.GT; Visualization: M.IS, CM.DG, M.RH; Writing – original draft: M.IS, CA.RS, H.GT, CM.DG, M.RH; Writing – review & editing; CA.RS, H.GT, CM.DG.

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