

Literature Review

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Measuring academic satisfaction in nursing students: a systematic review of the instruments

<https://doi.org/10.1515/ijnes-2021-0159>

Received December 8, 2021; accepted July 26, 2022; published online September 19, 2022

Abstract: Student academic satisfaction is one of the most important factors affecting the success and quality of a higher education institute and is an indicator about teaching and learning. This study aims to summarize and critically evaluate the instruments assessing academic satisfaction in nursing education. A systematic review was undertaken, PRISMA were used for the screening of studies. MEDLINE, Cochrane, Scopus and CINAHL were searched using MeSH terms; seven eligible articles were identified referring to five assessment tools. COSMIN was used for evaluation of the methodological of the instruments. The systematic review identified five satisfaction measurement tools used in nursing education. The analysis of the instruments rarely considered a confirmative validity structure, measurement error or criterion validity. The best available instrument was the Nursing Students Satisfaction Scale (NSSS) for validation methodology; however, it needs further validation studies that consider CFA, reliability, criteria validity, hypothesis testing and measurement error.

Keywords: education nursing; personal satisfaction; psychometrics; students nursing; surveys and questionnaires; systematic review.

Introduction

Academic satisfaction refers to the subjective evaluation of an educational experience by the students (Chen & Lo, 2012; Jaradeen et al., 2012; Smith et al., 2018). It is a complex, multidimensional (DiBiase, 2004; García-Aracil, 2009), dynamic construct (Chen & Lo, 2012; Smith et al., 2018) determined by the difference between the student's expectations and the perception of the educational experiences received (Liegler, 1997).

The Accreditation Commission for Nursing Education (ACEN) and the Commission for Collegiate Nursing Education (CCNE), two national accreditation agencies for nursing education recognized in the USA, consider

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academic satisfaction as an outcome of quality in nursing education, and the accreditation of the programme ensures the competitive positions of higher education institutes (HEIs) in the education market (Brown & Marshall, 2008). Academic satisfaction influences student engagement and retention (Cameron et al., 2011; Freeman et al., 2007; Suhre et al., 2007), student performance, clinical learning and social interactions (Ramos et al., 2015). Satisfied students are likely to exert more effort in their educational studies, regularly attend classes and become more involved in their course work and the institution itself (Bryant, 2006; Özgüngör, 2010). Therefore, it is very useful for Bachelor of Science in Nursing Degree programmes to assess student satisfaction for the economic impact on the university, labour market and student learning (Cameron et al., 2011; Liegler, 1997; Ramsden, 1992; Ramsden & Entwistle, 1981; Story et al., 2010; Suhre et al., 2007), as well as for providing information about specific areas for improvement (Altuntaş, 2014; Long et al., 1999; Story et al., 2010).

Student nursing satisfaction depends on many variables. The variables that positively predict academic satisfaction can be largely placed in four macro-categories: *curriculum*, *faculty*, *academic development*, and *social integration*. The *curriculum* dimension assesses satisfaction with the programs, the relevance of the content, the orientation toward the development of communication skills, problem solving, the nursing process, professional skills, and the clarity of expectations of student (Chen et al., 2012). The *faculty* dimension refers to the satisfaction with the preparation of teachers in terms of subject knowledge, teaching skills, course stimulation and academic advice (Chen et al., 2012; Liegler, 1997). The *academic development* dimension concerns the adequacy of the educational offer, programs and support services (Liegler, 1997; Ramos et al., 2015); hence, it refers to the ability of nursing programs to promote students' intellectual development (Liegler, 1997). Social factors related to the *social integration* dimension include mutual respect, trust, support and positive interactions (Chen et al., 2012) that take place between peers and between student-faculty (Liegler, 1997). Previous studies on academic satisfaction in nursing students identified positively correlated variables including: being in a relationship, not having dependent children (Freeman-Gibb et al., 2017), and academic development of the students and teaching staff (Liegler, 1997).

In recent years, the great majority of the studies have focused on assessing students' perceptions of their learning experiences (Ansari, 2002; Freeman-Gibb et al., 2017; Löfmark et al., 2012; Papastavrou et al., 2016; Smith et al., 2018). To date, there is a lack of studies summarizing and assessing the validity of existing academic satisfaction assessment tools. Further, no comprehensive synthesis of existing instruments used to evaluate nursing students' academic satisfaction has been generated.

Aim

The aim of this systematic review was to compare the psychometric properties of instruments that measure academic nursing students' satisfaction.

Methods

A systematic review was employed in accordance with the Preferred Reporting Items for Systematic Reviews (PRISMA) guidelines (Page et al., 2021).

Sources of information

To identify relevant studies, we searched the following databases: PubMed, Cochrane, Scopus and Cumulative Index of Nursing and Allied Health (CINAHL) combining the follow MeSH terms: "Satisfaction" OR "Personal Satisfaction", OR "Perception" AND: "Education, Nursing, Baccalaureate/organization & administration", Education, Nursing, Baccalaureate", "Students", "Students, Nursing", "Survey and Questionnaires", "Psychometrics", "Factor Analysis, Statistical". The MESH terms were combined with free terms and Boolean operators (AND, OR) to include all possible combinations. For manual searches, the forward snowballing method (Watson & Webster, 2020) was used to single out new documents based on those cited in each examined paper. The search was conducted from December 2020 to March 2021 and was updated on 30 May 2021. Both the manual and electronic searches were

limited to primary studies published in English between January 2000 and March 2021 in peer-reviewed journals with available abstracts. The year 2000 limit was set starting from a previous literature review which highlighted that the conceptualization of academic satisfaction in nursing education and scientific production on this issue develops after this date (Rossini et al., 2021).

Eligibility criteria

Inclusion: Primary studies using quantitative designs that focused on the validation of an instrument measuring academic satisfaction among nursing students.

Exclusion: Studies published before January 2000 in non-peer reviewed academic journals or written in languages other than English were excluded. Moreover, studies evaluating the satisfaction of different programmes or course topics and investigating the perception of the quality of the course were also excluded.

Screening: A total of 465 records were found - three records through electronic and manual searches via the snowballing method (Watson & Webster, 2020). Three researchers analysed the titles and abstracts. A total of 297 duplicate records were removed, the remaining 168 records were subjected to screening. At this stage, 157 articles were excluded because they were not focused on academic satisfaction. The 11 remaining full texts were analysed; among them, three texts were excluded because they addressed satisfaction in populations other than nursing students (undergraduate, health care and medical students), two texts were excluded because they proposed instruments to address topics other than students’ academic satisfaction and two texts were excluded because they proposed instruments to evaluate quality. The three records identified with the snowballing method were full-text analysed and included in the review. The total studies included were seven (Figure 1). The studies were independently evaluated by three researchers and subsequent discrepancies were discussed and resolved by consensus.

Quality appraisal: To consider the methodological quality of the instruments, the COSMIN tool (Mokkink et al., 2010) was used. The COSMIN checklist consists of 12 points, of which 10 assess the methodological quality of the study. Standards for measurement properties include internal consistency, reliability, measurement error, content validity (including face validity), structural validity, hypothesis testing and cross-cultural validity, criterion validity and responsiveness. Each item is scored on a four-point scale

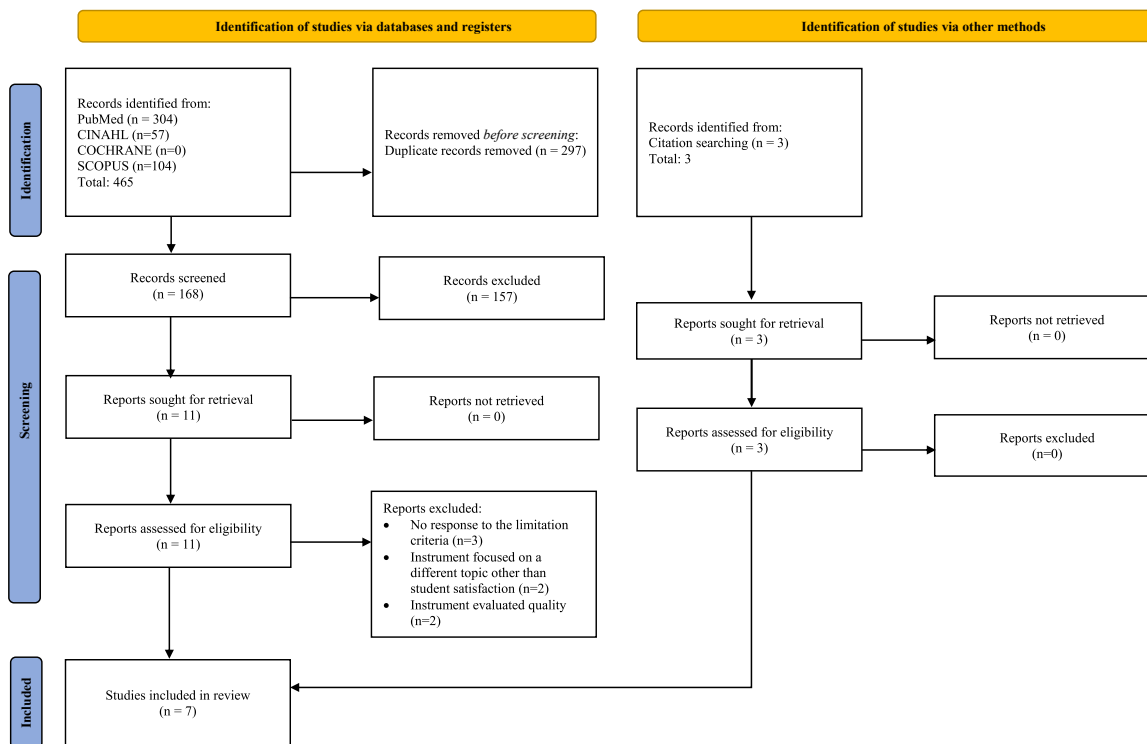


Figure 1: PRISMA flow diagram (Page et al., 2021).

(1=poor; 2=fair; 3=good; and, 4=excellent). The overall assessment of the methodological quality is based on the worst score method, whereby it is obtained by taking the lowest score of any of the items (Mokkink et al., 2010).

Data extraction: As a first step of the data analysis, the articles were read several times to get an overview of the content. Subsequently, the data were extracted and entered into a table, including authors, country, year, purpose, methodology and results. In addition, information regarding the tools used was extracted, including the name of the tool and its author, the number of items, the response scale and the methods used by the study to validate the questionnaire (content validity, structural validity and reliability) (Table 1).

Results

This study aimed to summarize and critically evaluate the instruments assessing academic satisfaction in nursing education. The systematic review identified five satisfaction measurement tools used in nursing education: the *Nursing Student Satisfaction Scale* (NSSS) by Chen et al. (2012); the *Student Satisfaction and Self-Confidence in Learning Scale* (SCLS) by Jeffries and Rizzolo (2006); the *Undergraduate Nursing Student Academic Satisfaction Scale* (UNSASS) by Dennison and El-Masri (2012); the *Course Experience Questionnaire* (CEQ) by Ramsden and Entwistle (1981); and the *Nursing Clinical Facilitators Questionnaire* (NCFQ) by the Centre for Learning and Teaching, University of Technology, Sydney.

All these tools have been validated on nursing students with similar characteristics; many validation studies include students from all course years, while the SCLS has been tested on students in different years of study: first year (Franklin et al., 2014), second year (Tosterud et al., 2014) and last year (Unver et al., 2017). The selection methodology was by convenience, and no studies reported a power analysis.

Questionnaires were tested in different countries, including the United States (Chen et al., 2012; Franklin et al., 2014), Canada (Dennison & El-Masri, 2012), Brazil (Hirsch et al., 2016), Turkey (Unver et al., 2017) and Norway (Espeland & Indrehus, 2003; Tosterud et al., 2014).

The study design used for the validation of the questionnaires was predominantly cross-sectional (Dennison & El-Masri, 2012; Espeland & Indrehus, 2003; Franklin et al., 2014; Hirsch et al., 2016; Tosterud et al., 2014); only Chen et al. (2012) and Unver et al. (2017) used a longitudinal design.

Description of the instruments

The NSSS was developed by Chen et al. (2012) from the *Curriculum, Faculty, Social Interaction and Environment* (CFSE) conceptual model. The focus of this scale was general student satisfaction with the course. According to Chen and Lo (2012), student satisfaction is a dynamic process involving the interaction between the student, faculty, and teaching and learning environments. The NSSS is composed of 30 items and uses a 6-point Likert scale (1=not satisfied; 6=very satisfied). The scale has three dimensions: *Curriculum and Teaching*, *Environment and Professional*, and *Social Interactions*. In their model, Chen et al. (2012) focused on student satisfaction in relation to the curriculum of the nursing programme; faculty use of technology; the role model/mentor of the teachers; and social interaction in terms of respect, trust, support and the environment. The NSSS originated in the United States and was then adapted to the Brazilian context by Hirsch et al. (2016).

The SCLS was developed by Jeffries and Rizzolo (2006) and used by Franklin et al. (2014), Tosterud et al. (2014) and Unver et al. (2017). For the SCLS, Jeffries and Rizzolo (2006) developed a theoretical framework that considered the following components: educational practices, facilitators, participants, simulation design characteristics and expected outcomes. The scale has 13 items and uses a 5-point Likert scale (1=strongly disagree; 5=strongly agree). Subsequently, the SCLS was tested by other authors to evaluate its validity (Franklin et al., 2014) and its adaptability in different contexts, such as Norway and Turkey (Tosterud et al., 2014; Unver et al., 2017). Two main dimensions were covered by the SCLS instrument: *Satisfaction with Instruction*, and *Self-Confidence with Learning*. The *Satisfaction with Instruction* measured perceived satisfaction with teaching methods, diversity of learning materials, facilitation, motivation and simulation. *The Self-*

Table 1: Description of the studies.

Author(s), year, country of the study	Aim	Study design and methods	Instrument (name and author(s), item number and likert scale)	Results
Chen et al. (2012), United States	To develop an instrument to measure nursing student satisfaction and perform psychometric testing on it	Longitudinal study 303 students <i>Data:</i> 26.1% male, 75.7% married, 85.1% employed, mean age=29 (20–52) years	Nursing student satisfaction scale (NSSS) (Chen et al., 2012) 30 items 6-Point likert scale: (1=not satisfied, 6=very satisfied)	<i>Content validity:</i> Performed with four experts. The average congruency percentage (ACP) scores among experts were 0.96 for relevance, 0.97 for representativeness and 0.93 for clarity. The item-level content validity index (I-CVI) was set within 0.99 and 1.0. A pilot test was conducted with 51 nursing students. <i>Structural validity:</i> EFA revealed three factor structures: Curriculum and teaching, environment and professional social interaction. CFA was not performed. <i>Reliability:</i> Cronbach's α was 0.91 for professional social interaction, 0.90 for curriculum and teaching, 0.86 for environment and 0.93 for the total scale.
Dennison and El-Masri (2012), Canada	To develop and examine the psychometric properties of the undergraduate nursing student academic satisfaction scale (UNSASS)	Cross-sectional study 477 students <i>Data:</i> 12.1% male, 77% white, 27.8% in the first year, 26.8% in the second year, 33.5% in the third year and 11.8% in the fourth year; 69% have a job outside of school hours and 6.7% have never failed a course in the nursing programme.	Undergraduate nursing student academic satisfaction scale (UNSASS) (Dennison & El-Masri, 2012) 48 items 5-Point likert scale (1=strongly irrelevant to satisfaction, 5=strongly relevant to satisfaction)	<i>Content validity:</i> Performed with four experts and 22 nursing students. Validity testing revealed a CVI of 0.83. A pilot test was conducted with 22 nursing students. <i>Structural validity:</i> EFA revealed four factors (clinical teaching, in-class teaching, programme and support and resources). CFA was not performed. <i>Reliability:</i> Cronbach's α was 0.74–0.92 and 0.96 for the total scale. Test-retest reliability using Pearson's (r) coefficients, with 2 weeks of time lapse, ranged from 0.7 to 0.86. The overall scale of the test-retest correlation coefficient was 0.88.
Franklin et al. (2014), United States	To establish the psychometric properties of the student satisfaction and self-confidence in learning scale (SCLS)	Cross-sectional study 2,200 novice nurses <i>Data:</i> Mean age=22.8 \pm 4.5 years, 54% junior year	Student satisfaction and self-confidence in learning scale (SCLS) (Jeffries and Rizzolo, 2006) 12 items 5-Point likert scale	<i>Content validity:</i> Not performed. <i>Structural Validity:</i> EFA revealed two-factor model (satisfaction with instruction and self-confidence with learning). At the CFA, $\chi^2=875.711$, $p<0.001$,

Table 1: (continued)

Author(s), year, country of the study	Aim	Study design and methods	Instrument (name and author(s), item number and likert scale)	Results
			(1=strongly disagree, 5=strongly agree)	CFI=0.98, TLI=0.97, NFI=0.98, AGFI=0.97, RMSEA=0.12 and SRMR=0.03. <i>Concordant validity:</i> There was strong concordant validity ($r=0.78$, $p=0.000$) and discordant validity ($r=0.66$, $p=0.000$). <i>Reliability:</i> Cronbach's α was 0.93 for the satisfaction subscale, 0.91 for the self-confidence scale and 0.94 for the overall scale.
Tosterud et al. (2014), Norway	To test student satisfaction and the SCLS for psychometric properties	Cross-sectional study 123 students <i>Data:</i> age=19–51 years, median=22 years	Student satisfaction and self-confidence in learning scale (SCLS) (Jeffries and Rizzolo, 2006) 11 items 5-Point likert scale (1=strongly disagree, 5=strongly agree)	<i>Content validity:</i> Back translation model by Brislin (1970). The content validity was performed with three experts in simulation and nurse education. A pilot study was conducted with 14 students. <i>Structural validity:</i> EFA revealed two subscales (satisfaction with instruction and self-confidence with learning) that were tested separately. The analysis for satisfaction with current learning suggested a one-component solution. Regarding self-confidence in learning, no stable solution was achieved. <i>Reliability:</i> Cronbach's α was 0.84 for satisfaction with current learning and 0.72 for self-confidence in learning.
Hirsch et al. (2016), Brazil	To adapt and validate the NSSS for use with nursing students in a Brazilian context	Cross-sectional study 123 students <i>Data:</i> 8.9% male, mean age=25.4 (18–50) years, 79.7% single, 81.3% did not have children, 77.2% did not work, 59.4% performed extra-curricular activities	Nursing student satisfaction scale (NSSS) (Chen et al., 2012) 30 items 5-Point likert scale (1=not satisfied, 6=very satisfied)	<i>Content validity:</i> Cross-cultural adaptation. Content validity performed with expert committee and pilot test with 30 nursing students. <i>Structural validity:</i> EFA revealed three dimensions (curriculum and teaching, environment, and professional social interaction). The three dimensions of the instrument accounted for 54.20% of the total variance. CFA was not performed. <i>Reliability:</i> Cronbach's α was

Table 1: (continued)

Author(s), year, country of the study	Aim	Study design and methods	Instrument (name and author(s), item number and likert scale)	Results
Unver et al. (2017), Turkey	To adapt SCLS	Longitudinal study 87 students <i>Data:</i> NR	Student satisfaction and self-confidence in learning scale (SCLS) (Jeffries and Rizzolo, 2006) 13 items 5-Point likert scale (1=strongly disagree, 5=strongly agree)	0.88–0.89 for the constructs and 0.93 for all instruments. <i>Content validity:</i> Performed with experts. A pilot survey was conducted with 20 nursing students. <i>Structural validity:</i> EFA revealed two factors (satisfaction with instruction and self-confidence with learning). CFA was not performed. <i>Criterion validity:</i> With other scales, there was a positive but weak correlation between the scores ($p < 0.05$). <i>Reliability:</i> Cronbach's α was 0.85 for satisfaction with instruction, 0.77 for self-confidence with learning and 0.89 for the total scale. The test-retest reliability, with 3 weeks of time lapse, was 0.498 for satisfaction with instruction and 0.324 for self-confidence with learning ($p < 0.01$).
Espeland and Indrehus (2003), Norway	To test the course experience questionnaire (CEQ) and the nursing clinical facilitators questionnaire (NCFQ) to measure students' satisfaction with the course	Cross-sectional study 276 students <i>Data:</i> 67.1% female, mean age=25 (20–51) years	Course experience questionnaire (CEQ) (Ramsden and Entwistle, 1981) 25 items 5-Point likert scale (1=strongly disagree, 4=strongly agree) Nursing clinical facilitators questionnaire (NCFQ) (centre for learning and teaching, university of technology, Sydney) 26 items 5-Point likert scale (1=strongly disagree, 4=strongly agree)	<i>Content validity:</i> Not performed. <i>Structural validity:</i> EFA revealed five factors (appropriate assessment, appropriate workload, clear goals and standards, good teaching and overall satisfaction) for the CEQ. CFA was not performed. <i>Reliability:</i> For the CEQ, Cronbach's α ranged from 0.37 to 0.79. <i>Content validity:</i> Not performed. <i>Structural validity:</i> EFA revealed three factors (challenging behaviour, preparatory behaviour, and supportive behaviour) for the NCFQ. CFA was not performed. <i>Reliability:</i> For the NCFQ, Cronbach's α ranged from 0.41 to 0.94.

EFA, exploratory factor analysis; CFA, confirmatory factor analysis; CFI, comparative fit index; TLI, Tucker-Lewis index; NFI, normed fit index; AGFI, adjusted goodness of fit index; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual index; NR, not reported.

Confidence with Learning scale measured self-confidence in content mastery, content necessity, skills development, resources and knowledge about how to obtain help to solve clinical problems.

The UNSASS was developed by Dennison and El-Masri (2012), and it has 48 items with a 5-point Likert scale (1=strongly irrelevant to satisfaction; 5=strongly relevant to satisfaction). Dennison and El-Masri (2012) said that the development of the scale was not based on a particular theoretical framework, but the conceptual basis for the development of this instrument was derived from the understanding of the literature and the input from both students and faculty. The focus of this scale was general student satisfaction with the course. The dimensions included are Clinical Teaching, In-Class Teaching, Programme and Support and Resources.

The CEQ (Ramsden & Entwistle, 1981) was designed to measure differences in the quality of teaching between comparable academic organizational units at the level of the complete course or degree. The tool has five factors: *Appropriate Assessment, Appropriate Workload, Clear Goals and Standards, Good Teaching, and Overall Satisfaction*. The scale has 25 items (Generic Skills) and a 5-point Likert scale (1=strongly disagree; 5=strongly agree). The CEQ was used by Espeland and Indrehus (2003) together with the NCFQ for the creation and validation of a single tool for evaluating the satisfaction of clinical practice and the nursing programme. The NCFQ was found by the authors through an Internet search; the NCFQ has 26 elements and a 5-point Likert scale (1=strongly disagree; 5=strongly agree). As highlighted by Espeland and Indrehus (2003), the NCFQ evaluates the nursing clinical facilitators and revealed three factors: *Challenging Behaviour, Preparatory Behaviour and Supportive Behaviour*.

Methodological quality evaluation and comparison of the psychometric properties

All instruments were evaluated for internal consistency and structural validity. No instrument has been evaluated for measurement error (see Table 2). Content validity was assessed for most of the tools, except for the CEQ-NCFQ (Espeland & Indrehus, 2003). The development process, reliability, criterion validity and hypotheses testing were evaluated in only a few instruments (one or two studies depending on the test). The methodological quality of the individual psychometric properties tested during the validation process ranged from fair to excellent. The results are presented below and organized by psychometric analysis.

The development process evaluates the general design requirements (origin and clarity of the construct description, definition of the target population and context and study performed in the target population) and relevance and comprehensiveness of the concept (data collection method, skilled group moderators/interviewers, topic and guide of interview appropriate, interview recording/transcript, appropriateness of data analysis and sample size) (Mokkink et al., 2010). Only the NSSS (Chen et al., 2012) and UNSASS (Dennison & El-Masri, 2012) have described the development process. The NSSS (Chen et al., 2012) is based on the CFSE theoretical model, of which the authors have described the elaboration and development process. The item generation process included experts; more than 50 students participated in the item generation process and the pilot test. Despite Dennison and El-Masri (2012) stating that the development of the questionnaire was not based on a particular theoretical framework, the UNSASS based its construct on a solid review of the literature. For the generation of the items and for the pilot test, the authors involved the students. Both the NSSS and UNSASS were designed for undergraduate nursing students and have been tested in this context.

The content validity was defined as the degree to which the content of the tool adequately reflects the construct to be measured (Mokkink et al., 2010). This test was performed for three instruments using a good quality methodological approach. The content validity of the NSSS was performed with four experts (Chen et al., 2012). The average congruency percentage (ACP) scores among experts were 0.96 for relevance, 0.97 for representativeness and 0.93 for clarity. The item-level content validity index (I-CVI) was set within 0.99 and 1.0. A pilot test was conducted with 51 nursing students. Furthermore, Hirsch et al. (2016) performed validity of contents with an expert committee and pilot tests with 30 nursing students. The content validity of the SCLS was performed with three experts, and a pilot study was conducted with 14 students (Tosterud et al., 2014). The SCLS was adapted to the Turkish context; Unver et al. (2017) carried out content analysis using experts and a pilot study consisting of 20 nursing students. The UNSASS was assessed with four experts and 22 nursing

Table 2: Instruments evaluating satisfaction in the nursing student academic context: methodological quality evaluation.

Instrument/ author	Nursing student satisfaction scale (NSSS), Chen et al. (2012)	Student satisfaction and self-confidence in learning scale (SCLS), Jeffries and Rizzolo (2006)	Undergraduate nursing student academic satis- faction scale (UNSASS)	Course experience questionnaire (CEQ), Ramsden and Entwistle (1981)	Nursing clinical facilitators ques- tionnaire (NCFQ)
Author, year, country	Chen et al. (2012), United States	Franklin et al. (2014), United States	Tosterud et al. (2014), Norway	Unver et al. (2017), Turkey	Dennison and El-Masri (2012), Canada
Development process	Yes	NR	NR	NR	NR
Content validity	Yes CVI=0.99–1.0	Yes	Yes	Yes CVI = 0.83	NR
Structural validity	Yes EFA total variance=52.8%	Yes EFA, CFA total variance=76%	Yes EFA total variance=64.4%	Yes EFA total variance=51.02%	Yes EFA total variance=51%
Internal consistency	Yes Total Cronbach's $\alpha=0.93$	Yes EFA total variance=54.2%	Yes EFA total variance=64.4%	Yes EFA total variance=51.02%	Yes EFA total variance=58%
Cross-cultural validity	NR $\alpha=0.86-0.91$	NR $\alpha=0.91-0.93$	NR $\alpha=0.72-0.84$	NR $\alpha=0.74-0.92$	NR $\alpha=0.41-0.94$
Reliability	NR Cross-cultural adaptation	NR Back translation	NR Back translation	NR Back translation	NR
Measurement error	NR	NR	NR	NR	NR
Criterion validity	NR	NR	NR	NR	NR
		ICC for dimensions: 0.5–0.3 (p<0.01)	ICC for overall scale=0.88 (p<0.001) ICC for di- mensions=0.70–0.86 (p<0.001)	ICC for overall scale=0.88 (p<0.001) ICC for di- mensions=0.70–0.86 (p<0.001)	NR
		Yes With Perceived Learning Scale (Rovai et al., 2009) (p<0.05)	Yes	Yes	NR

Table 2: (continued)

Instrument/ author	Nursing student satisfaction scale (NSSS), Chen et al. (2012)	Student satisfaction and self-confidence in learning scale (SCLS), Jeffries and Rizzolo (2006)	Undergraduate nursing student academic satis- faction scale (UNSASS)	Course experience questionnaire (CEQ), Ramsden and Entwistle (1981)	Nursing clinical facilitators ques- tionnaire (NCFQ)
Hypotheses testing for construct validity	NR	NR	NR	NR	NR
		Yes Concordant val- idity ($r=0.78$, $p=0.000$) Discordant val- idity ($r = 0.66$, $p=0.000$)			

CVI, content validity index; EFA, exploratory factor analysis; CFA, confirmatory factor analysis; ICC, intraclass correlation coefficient; NR, not reported.

students to analyse item relevance and comprehensiveness (Dennison & El-Masri, 2012). Validity testing revealed a CVI of 0.83. A pilot test was conducted with 22 nursing students.

The structural validity measures the degree to which the scores on a scale adequately reflect the dimensionality of the construct to be measured (Mokkink et al., 2010). All instruments have been tested for structural validity with exploratory factor analysis (EFA) (Chen et al., 2012; Dennison & El-Masri, 2012; Espeland & Indrehus, 2003; Hirsch et al., 2016; Tosterud et al., 2014; Unver et al., 2017), and only the SCLS (Franklin et al., 2014) with confirmatory factor analysis (CFA). The structural validity findings, when reported, were concordant with the construct (dimensions) of the instrument. The methodological quality that emerged was poor only in two studies due to insufficient sample size (Hirsch et al., 2016; Unver et al., 2017). The highest explained variance estimated by studies included in this systematic review was 76% (Franklin et al., 2014) and 64.4% (Tosterud et al., 2014) for the SCLS. Furthermore, all instruments reported good variance explained (50%–60%). For the SCLS, Tosterud et al. (2014) confirmed two subscales (Satisfaction with Instruction and Self-Confidence with Learning) tested separately; the analysis for Satisfaction with Learning suggested a one-component solution, while regarding Self-Confidence with Learning, no stable solution was achieved. Tosterud et al. (2014) did not consider two items of the SCLS because the EFA showed low values in the community matrix and no significant values in the correlation matrix (*“I am confident that I am mastering the content of the simulation activity that my instructor presented to me”*; *“It is the instructor’s responsibility to tell me what I need to learn of the simulation activity content during class time”*). For the SCLS, Franklin et al. (2014) performed confirmative factor analysis (CFA) with good fit indices ($\chi^2=875.711$, $p<0.001$, CFI=0.98, TLI=0.97, NFI=0.98, AGFI=0.97, RMSEA=0.12 and SRMR=0.03).

Internal consistency was defined as the interrelatedness among the items (Mokkink et al., 2010). Internal consistency was calculated for all questionnaires, for the whole scale and for the dimensions. For internal consistency, a coefficient α of 0.70 is considered acceptable for adequate reliability (Nunnally & Bernstein, 1994). The NSSS reports a Cronbach’s α of 0.93 for the full scale and values above 0.80 in the subscales in both studies (Chen et al., 2012; Hirsch et al., 2016). The SCLS reports a Cronbach’s α greater than 0.82 for the entire scale and the dimensions have a range of 0.72–0.93 if all studies are considered (Franklin et al., 2014; Tosterud et al., 2014; Unver et al., 2017). The internal consistency of the UNSASS was 0.74–0.92 for the subscales and 0.96 for the total scale (Dennison & El-Masri, 2012). For the CEQ, Cronbach’s α ranged from 0.37 to 0.79; for the NCFQ, Cronbach’s α ranged from 0.41 to 0.94 (Espeland & Indrehus, 2003).

Cross-cultural validity measures the degree to which the performance of items in a translated or culturally adapted questionnaire adequately reflects the items in the original version (Mokkink et al., 2010). Cross-cultural validity should be carried out for questionnaires to be adapted to a context other than that of origin; in this review, it was conducted for the NSSS by Hirsch et al. (2016) and for the SCLS by Tosterud et al. (2014) and Unver et al. (2017). Methodological quality was poor in one study due to insufficient sample size and because the cultural adaptation approach adopted was not clear (Tosterud et al., 2014). Espeland and Indrehus (2003) translated the CEQ and NCFQ into Norwegian; however, they did not perform an independent back translation into English, which they highlighted as a limitation of the study.

Reliability defines the proportion of total variance in measurements that is due to “true” differences between study groups (Mokkink et al., 2010). Test-retest reliability was calculated for two instruments, but the methodological quality was questionable because the intraclass correlation coefficient (ICC) model was not clearly described. The SCLS reported an ICC of 0.5–0.3 ($p<0.01$) for dimensions (Unver et al., 2017). Test-retest reliability was performed for the UNSASS using Pearson’s (r) coefficients, with 2 weeks of time lapse; the UNSASS reported an ICC of 0.88 ($p<0.001$) for overall scale and a range of 0.70–0.86 ($p<0.001$) for dimensions (Dennison & El-Masri, 2012).

Measurement error consists of the random and systematic error of a patient’s score that is not attributed to real changes in the construct to be measured (Mokkink et al., 2010). No instrument has been tested for measurement error. Criterion validity was defined as the degree to which the scores of an instrument are an adequate reflection of a “gold standard” tool (Mokkink et al., 2010). Only Unver et al. (2017) evaluated the validity of the criterion for the SCLS with the Perceived Learning Scale (Rovai et al., 2009) and found a positive but weak correlation between the scores ($p<0.05$).

Hypotheses testing evaluates expected mean differences between groups or expected correlations between instrument scores and other variables, such as the scores of other instruments (Mokkink et al., 2010). Franklin et al. (2014) used Pearson correlations to quantify concordant validity (SCLS satisfaction score and self-confidence) and discordant validity (SCLS, SDS and EPQ) at the summary score level. They found strong concordant ($r=0.78$, $p=0.000$) and discordant ($r=0.66$, $p=0.000$) validity.

Discussion

Academic satisfaction of nursing students: assessment tools

The aim of this systematic review was to compare the psychometric properties of instruments that measure nursing student satisfaction in education. Five instruments on student satisfaction with the nursing programme were found; the NSSS and UNSASS were original tools (Chen et al., 2012; Dennison & El-Masri, 2012), while the SCLS, CEQ and NCFQ came from other contexts and have been subsequently validated on nursing students (Espeland & Indrehus, 2003; Franklin et al., 2014; Tosterud et al., 2014; Unver et al., 2017). Furthermore, the NSSS has been validated for the Brazilian nursing context (Hirsch et al., 2016).

Most of the tools have been validated through cross-sectional studies. This aspect is critical because satisfaction has a dynamic nature (Chen & Lo, 2012) and should be studied over time to be fully understood. Therefore, the cross-sectional design is not able to highlight the dynamism of the phenomenon and makes it difficult to identify resolving intervention strategies (Polit & Beck, 2018).

Analysing the different instruments, we can group them in two classes: the first considering instruments assessing general academic satisfaction of the students; and, the second considering general academic satisfaction with other aspects (e.g., self confidence in learning and simulation). In the first class, we put the NSSS by Chen et al. (2012) and UNSASS by Dennison and El-Masri (2012). The NSSS by Chen et al. (2012) considered the Curriculum and Teaching, Environment, and Professional and Social Interaction dimensions. Similarly, the UNSASS by Dennison and El-Masri (2012) considered the Clinical Teaching and In-Class Teaching dimensions (very similar to the Curriculum and Teaching and Professional and Social Interaction of Chen et al. (2012)) and the Support and Resources dimension (very similar with the Environment in Chen et al. (2012)). In the second group, the SCLS by Jeffries and Rizzolo (2006) considers the Satisfaction with Instruction (simulation activity) and Self-Confidence with Learning dimensions. Therefore, this instrument introduced two new elements as the student self-confidence and the simulation method in nursing curricula. Self-confidence or self-efficacy (the belief in one's own ability to complete a task (Bandura, 1977) is one of the most important psychosocial factors potentially predicting student course satisfaction (Bandura, 1997) and student academic success (Bandura, 1977, 1995; Chamorro-Premuzic et al., 2010; Motlagh et al., 2011; Richardson et al., 2012; Schneider & Preckel, 2017; Winslow et al., 2014; Zimmerman et al., 1992); however, it does not represent academic satisfaction. On the other hand, Jeffries and Rizzolo (2006) introduced the satisfaction with simulation in the SCLS; the simulation is a methodology used with students, which can influence academic satisfaction but does not represent academic satisfaction. The other instruments in the second group, the CEQ by Ramsden and Entwistle (1981) and the NCFQ by the Centre for Learning and Teaching, University of Technology, Sydney, assess elements also considered in the NSSS of Chen et al. (2012) and in the UNSASS of Dennison and El-Masri (2012); however, they do not consider environmental aspects. Therefore, although the tools investigate academic satisfaction, the focus and contents of the topics investigated are heterogeneous. Two tools include the evaluation of clinical training as a specific element to be evaluated (UNSASS and NCFQ), and the others ask for an evaluation of the educational experience in general (NSSS, SCLS and CEQ).

The identified instruments consist of a minimum of 11 (SCLS) to a maximum of 52 items (CEQ and NCFQ). Homogeneity in the metrics emerged: the majority used a 5-point Likert scale to express the rating from strongly disagree to strongly agree.

Population and settings

The sample size represents an important aspect in the validation of an instrument, because it can produce errors if inadequate, such as the wrong identification of the dimensions (Anthoine et al., 2014). Hirsch et al. (2016) considered less than five subjects per element, and for this reason, the validation of the NSSS in the Brazilian context deserves a re-evaluation with an adequate sample. In other studies, researchers involved nursing students from each year of the course, but some authors considered only senior students (Unver et al., 2017), junior students (Franklin et al., 2014), or sophomore students (Tosterud et al., 2014); this could be a limitation. In order for the sample to be representative, it must include all possible recipients (Polit & Beck, 2018), even more so when the topic of study has a dynamic trend (Chen & Lo, 2012). Therefore, it would be advisable to resume the validation process involving students of all course years.

The methodologies of the validation studies

The item generation process involved experts and target population only for the NSSS (Chen et al., 2012) and UNSASS (Dennison & El-Masri, 2012), which involved the students. For the item generation step, there was a deductive method and an inductive method (Hinkin, 1995). The deductive method is based on the description of the construct and the identification of items from the literature or other scales, while the inductive method involves using experts, along with the target population; the best solution should be to combine both deductive and inductive methods (Boateng et al., 2018). Therefore, it is desirable that, for a correct definition of the items, the target population is involved; this represents an element that raises the methodological quality of the validation process.

Content validity is considered the most important measurement property, because first of all, it should be clear that the items of the instrument are relevant, comprehensive and comprehensible with respect to the construct of interest and target population (Terwee et al., 2018). This aspect was evaluated for most of the instruments analysed in this literature review, and the quality is high. However, the CEQ and NCFQ have not been subjected to this evaluation. Furthermore, despite the excellent methodological quality of the UNSASS content assessment, the scale presents items that include the simultaneous assessment of multiple aspects (e.g., “*Clinical instructors provide feedback at the appropriate time and do not embarrass me in front of others*”) that could present difficulty to the student in formulating the answer and determining limits in the validity of the instrument.

All tools have been tested for structural validity; the variance percentages obtained from this measure show that the questionnaires adequately reflected the construct (Mokkink et al., 2010). However, Hirsch et al. (2016) used a small sample to validate an instrument with 30 items, and for this reason, it was considered a poor quality study. The internal consistency of all questionnaires was good/excellent (Nunnally & Bernstein, 1994).

Cross-cultural adaptation is a very complex process. Beaton et al. (2000) advised that instruments should first be forward- and back-translated and then revised by an expert committee to ensure the semantic, idiomatic and conceptual equivalence of the items. This should be followed by a pre-test (Beaton et al., 2000). Tosterud et al. (2014) did not describe their translation process; for this reason, their cross-cultural validation is considered to be poor quality. Similarly, the linguistic translation carried out for the CEQ and NCFQ by Espeland and Indrehus (2003) was also not sufficient. Dennison and El-Masri (2012) and Unver et al. (2017) considered reliability. These studies were of excellent quality in terms of methodology. No authors assessed measurement error, which is the systematic and random error in a patient’s score, not attributed to true changes in the construct measured (Mokkink et al., 2010); therefore, we cannot know the accuracy of every instrument considered by the authors. Criterion validity, which considers the correlation of the scale with external criteria (Cohen & Swerdlik, 2005), was only assessed by Unver et al. (2017), who correlated the SCLS with the *Perceived Learning Scale* (Rovai et al., 2009). Finally, hypothesis testing is the confirmation of a theory, and only Franklin et al. (2014) assessed concordant and discordant validity.

The most used instruments were the NSSS (Chen et al., 2012) and SCLS (Franklin et al., 2014; Tosterud et al., 2014; Unver et al., 2017). The NSSS (Chen et al., 2012) could be considered the best instrument due to its usage of a theoretical model; the concepts were clearly defined; and, the NSSS was focused on nursing students and had a rigorous development process that considered students in the item generation process and in content validity. However, this instrument (NSSS) needs further analysis to confirm its factor structure with the validation in different populations.

Limitations

This review has some limitations. First, an evaluation using the COSMIN guidelines gives a general view of the study's methodology, because the score is the lowest judgment in the box. Future elements should be considered in the methodology analysis of the studies (Terwee et al., 2012). Second, we used PubMed, Cochrane, Scopus and Cumulative Index of Nursing and Allied Health (CINAHL) which represent the majority of, but not all, scientific databases. Therefore, some existing tools may not have been considered (Polit & Beck, 2018). Third, language and time limitations could have affected the comprehensiveness of the studies included in this systematic review (Pollock & Berge, 2017).

Implications

Knowledge of the evaluation of academic satisfaction during university courses is an excellent opportunity to identify strengths and weaknesses from the student's point of view. Further, academic satisfaction should be considered in each year of the course for collecting data concerning aspects of the curriculum and teaching methods, environmental and social interactions as clearly defined by the theoretical model of Chen et al. (2012). This evaluation should allow researchers to highlight areas for future development (Altuntaş, 2014; Long et al., 1999; Story et al., 2010). Evaluating academic satisfaction would bring benefits to students and universities. As for students, their satisfaction is associated with their performance and dropout prevention (Cameron et al., 2011; Freeman et al., 2007; Suhre et al., 2007; Ramos et al., 2015). Furthermore, satisfied students have been found to progress and finish their educational path within established time periods (Liegler, 1997; Ramsden, 1992; Suhre et al., 2007); in this way universities increase the possibility of accessing funding linked to the achievement of the accreditation system criteria and reduce the dispersion of resources aimed at recovering students in difficulty.

Conclusions

Most of the validation studies of the tools to measure the academic satisfaction of nursing students are of poor quality, and the psychometric evaluations of the questionnaires rarely considered a confirmative validity structure, measurement error or criterion validity. The most used instruments were the NSSS (Chen et al., 2012) and SCLS (Franklin et al., 2014; Tosterud et al., 2014; Unver et al., 2017). In addition, only two instruments, the NSSS by Chen et al. (2012) and the UNSASS by Dennison and El-Masri (2012), specifically evaluated academic satisfaction. The NSSS (Chen et al., 2012) could be considered the best instrument because it used a theoretical model and had a rigorous development process. However, the NSSS should be evaluated in future validation studies with particular attention to the use of a large, multicentre sample; future evaluations should also consider CFA, reliability, criterion validity, hypothesis testing and measurement error.

Research funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Author contribution: All authors have accepted responsibility for the entire content of this manuscript and approved its submission.

Competing interests: Authors state no conflict of interest.

Informed consent: Not applicable.

Ethical approval: Not applicable.

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Supplementary Material: The online version of this article offers supplementary material (<https://doi.org/10.1515/ijnes-2021-0159>).