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Research Article

Translation and Psychometrics of Persian Version of the Stress Index in Nursing Students

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Abstract

Background and Purpose: Stress can be caused by the nature of nursing education and is a psychological factor that affects the academic performance and well-being of students. Since clinical education is the integration factor between theory and practice. It also strengthens critical thinking and decision-making skills. This study was conducted to determine the psychometric characteristics of the Persian version of the Nursing Student Stress Index (SNSI).

Methodology: The SNSI questionnaire was translated into Persian using the standard method of translation and re-translation. It was then administered in a cross-sectional study to 408 nursing students of different levels using the available sampling method. Reliability was determined by Cronbach's alpha coefficient and test-retest repeatability. Construct validity was determined by exploratory (n=208) and confirmatory (n=200) factor analyses.

Findings: The Persian version of this questionnaire has 19 items and three factors: 'expectations, communication and health', 'factors related to university' and 'leisure'. The total score of the content validity index (S-CVI) was 0.88. The fit indices of this three-factor questionnaire were in the order: RMSEA=0.11, CMIN/DF =3.7, CFI=0.93, GFI=0.79, AGFI=0.73. The intra-cluster correlation index (ICC) was 0.881 and Cronbach's alpha was 0.863.

Conclusion: The SNSI has good validity and reliability in nursing students in Iran and this version can be used in future researches in the field of stress measurement of nursing students.

Keywords: education; nursing; psychometrics; student; stress; stress index of nursing students

Introduction

The University provides countless new experiences, and many of which are stressful. At the same time, students face educational challenges, family or social crises [1, 2]. Time pressure, workload, decision-making, continuous change [3], being away from parents for the first time, housing, achieving personal goals and being pressured by problems are some of the most common stressful factors for students [4, 5]. The Association of National College Health Assessment) ACHA (showed that more than one third of all students ranked stress as the highest obstacle to their health, followed by sleep problems, depression and anxiety [6]. Encountering stressful situations in nursing education also exists, and students cannot avoid it [7, 8]. In addition to the stressors that other students face, nursing students have stressors that are unique to their circumstances [9], and in addition to academic stress, they worry about the possibility of harming patients as a result of clinical procedures during clinical placements [10]. They believe that they are responsible for the life and health of other people. Therefore, they have the fear of making a mistake, harming the patient and facing negative reactions at the beginning of the bedside work [11]; and studies conducted on first-year nursing students show that they often experience a high level of stress, which leads to low self-confidence, low self-esteem, inadequacy, irritability, and depression [12-15]. High volume of tasks and workload, factors related to patient care and factors related to instructors, clinical environment [16], Patient companions, healthcare professionals and clinical activities are known sources of stress for nursing students [17]. In addition, Deary et al. reported that nursing students experience stress in four areas: academic, clinical, personal and financial [18]. Stress is a result of the nature of nursing education and a psychological factor affecting the academic performance and well-being of students [19]. The negative effects of stress on a person include physical, mental and behavioural disorders [3].

Some of the physical symptoms associated with stress include: shivering, sweating, physical weakness, back pain, changes in immunoglobulin levels, increased secretion of cortisol, decreased immunity to disease, and psychological symptoms including: panic, anxiety, loneliness, sadness, exhaustion and helplessness. Of course, anxiety is the most important symptom reported by students among all the manifestations of stress [20].

Coping behaviour is a continuous effort required to maintain a state of equilibrium, and high levels of stress reduce effective coping mechanisms. When students enter new learning situations, they face multiple stressors and their stress levels increase [21]. An inverse relationship between stress and learning has been reported. A number of studies suggest that moderate levels of stress or psychological pressure are healthy and create a positive learning environment. However, excessive stress or distress negatively affects students' physical and mental health, self-efficacy and academic success, and feelings of hopelessness, possibility of failure and lack of self-confidence weaken the academic performance of nursing students [7, 13]. In addition, research in this area has shown that stress affects memory, concentration and problem-solving skills, and causes a decline in learning, coping, academic performance and retention of skills [22].

Since clinical education is a necessary part of nursing students' education and its purpose is to create integration between theory and practice and to enhance critical thinking and decision making skills, nursing students' awareness of stress levels, their sources and how to respond to them is an important factor in identifying and planning effective interventions and strategies to reduce or prevent stress in nursing education and learning facilitation both in the university and at the bedside [23, 24]. It is very important to identify students' stress conditions and the factors that cause them, and to help them develop stress management skills to improve their quality of life and prevent burnout [24]. So it is necessary to measure these burdens first [25].

Esfandiari reported that in Iran the highest stress score is related to nursing students, so these students experience more stress and have an unfavorable situation in terms of general health [26]. To measure nurses' stress there is the Nurses' Stress Tool by Gary Tafat and Anderson. But to measure the stress of nursing students, there is only the Nursing Student Stress Index Tool. However, the literature review showed that there is no specific tool in this field in Iran. Concepts such as tolerance, understanding, respect for other cultures, helping, not harming and compassion are primary values in the Islamic value system [27], and considering the cultural differences of Iran as a Muslim majority country, the localisation of tools is essential. In 1991, Beck and Srivastava developed a 35-item stress inventory to assess sources of stress reported by nursing students [28]. The Nursing Student Stress Index (SNSI) was developed by Jones and Johnston in 1999 and consists of 22 items [25]. This tool has already been translated and psychometrically evaluated in Turkey, Brazil and China. [27, 29, 30]. In Iran, there is no instrument such as the SNSI to assess this situation in general. Therefore, this study was conducted with the aim of cultural compatibility and validity and reliability of Persian version of SNSI for Iranian nursing students.

Materials and Methods

Ethical Considerations

In order to comply with the ethical points of the research, at the time of implementation, full explanations were given to the students about the purpose of the research and in addition to using anonymous questionnaires; they were also assured of the confidentiality of the information. Finally, the questionnaire was provided to the students who were willing to participate in the study. The present study was approved by the Ethical Committee of Isfahan University of Medical Sciences (Ethical code: (IR.MUI.MED.REC.1400.809).

Participants

The statistical population included all nursing students at all levels of education. Inclusion criteria included: [1] participants were over 18 years of age; [2] At that time, they were undergraduate nursing students [3] had experienced clinical practice time ≥1 month. Exclusion criteria included students who were absent during the survey period. The samples of this study were undergraduate, graduate and postgraduate nursing students who were selected using the available sampling method from Iran University of Medical Sciences, Kurdistan University of Medical Sciences, Tehran Islamic Azad University of Medical Sciences and Islamic Azad University of Urmia. The sample size was determined according to the number of items, usually between 10 and 20 samples are selected for each item [31], the required number of samples was determined to be 408 people who were selected using available sampling in two separate stages for exploratory factor analysis (n = 208) and confirmatory factor analysis (n = 200). The questionnaire was administered to participants in person and electronically.

Instruments

The SNSI consists of 22 items grouped into four factors: "academic load", "clinical concerns", "personal problems" and "interface concerns".

The four factors and their items are listed in order: "Academic Load" includes items Nos. 1, 2, 3, 8, 14, 18 and 20, and its score range is from 7 to 35; "Clinical Concerns" includes items Nos. 13, 14, 16, 17, 18, 19 and 20, and its score range is from 7 to 35. "Personal problems' includes items 9, 10, 11 and 12 and its score range is between 4 and 20, and 'Interface concerns' includes items 4, 5, 6, 7, 15, 21 and 22 and its score range is between 7 and 35. In all cases, a Likert scale was used, ranging from 1 (no stress) to 5 (very stressful). The total score ranges from 22 to 110 and higher scores indicate higher levels of perceived demands or sources of stress (25).

Research Design

This study is methodological research with a cross-sectional descriptive design that was conducted in 2021-2022 to locate the stress index of nursing students. After obtaining permission from the manufacturer of the instrument, the original English version was translated into Persian using the forward backward translation method by two people who were fluent in English and medical translation and had experience in translating the questionnaire. The translations were then compared and the questions were compared in terms of meaning and concept. Finally, by selecting the best options, a Persian version of this instrument was prepared. The original Persian version was then translated into English by two English translators who had sufficient knowledge and experience in translating Persian texts into English and who were also not familiar with the SNSI questionnaire (back translation). The instrument was then sent to the principal investigator for final approval. The English version sent by him was compared with the original English version in terms of the same concept and approved, and the final English version of the instrument was prepared in Persian.

Reliability and validity of the instrument

Face and Content Validity

The cognitive interview method was used to determine face validity. At this stage, 5 undergraduate nursing students were asked to check each of the items for clarity, simplicity and comprehensibility and to inform the researcher of the items or words that had problems. After explaining the

concept of the problematic items, simpler words were substituted based on their suggestions.

Content Validity Index (CVI) is used to determine the content validity. In this research, 10 expert nursing professors in the clinical and theoretical fields were asked to determine the content validity ratio of each questionnaire item in terms of cultural relevance in a range of four options (completely relevant, relevant, somewhat relevant and not relevant).

If an item scored higher than 0.79, it remained in the questionnaire. If the CVI score was between 0.70-0.79, the sentence was considered questionable and had to be revised, and if it was less than 0.70, the sentence was unacceptable and had to be removed [32]. The formula used for CVI at this stage was:

CVI= (Number of experts who have scored 3 or 4 related questions)/ Total number of experts

Construct Validity

Exploratory Factor Analysis

To check the construct validity, exploratory factor analysis and confirmatory factor analysis were carried out to extract latent factors with the participation of 408 undergraduate nursing students. In this initial stage, latent factors were extracted using exploratory factor analysis on the sample size of 208 people and Kaiser-Meyer-Olkin (KMO) and Bartlett's test were calculated. The KMO criterion close to 1 indicates a sufficient sample size for factor analysis[33]. In this study, the existing correlations were considered suitable for factor analysis if their values were greater than 0.70. Bartlett's test is also used to confirm the adequacy of the samples [33]. Maximum likelihood and promax rotation were used to extract the factors according to the normality of the variables. Maximum likelihood estimation (MLE) is an estimation method that allows us to use a sample to estimate the parameters of the probability distribution that generated the sample. Data analysis was carried out using SPSS software - version 22.

Confirmatory Factor Analysis

The structural validity of the questionnaire was assessed using the confirmatory factor analysis method to determine how accurately the items considered for the dimensions of the questionnaire represent them. For the confirmatory factor analysis, 200 participating nursing students were studied using the available sampling method. The fit indices and their acceptable values used in this analysis are shown in Table 1. The statistical software Lisrel version 8.8 was used to analyse the data.

Convergent and discriminant validity

Convergent and discriminant validity of the instrument were evaluated using the average variance extracted (AVE), maximum shared squared variance (MSV), and CR. The convergent validity is confirmed if the items of the intended scale show strong correlations. In addition, discriminant validity is supported when the extracted factors are distinct from each other. To confirm convergent validity, AVE should be greater than 0.5 and the CR should be greater than the AVE. However, discriminant validity is maintained if AVE is greater than the MSV[34].

Reliability

To determine reliability, internal consistency was checked using the Cronbach's alpha coefficient method, and temporal stability or repeatability was checked using the test-retest method. For this part, questionnaires were administered to 30 nursing students and then, two weeks later, the same samples were asked to complete the questionnaires again. The correlation between the scores obtained from the two examinations was determined using the intraclass correlation coefficient (ICC) test, which is the most acceptable test of test stability[33].

To determine the reliability and internal consistency of the instrument, Cronbach's alpha coefficient was used for the whole questionnaire and for each factor separately. An instrument has adequate reliability if the Cronbach's alpha coefficient is greater than or equal to 0.7 [33].

Results

Face and Content Validity

The results showed that the validity ratio scores were higher than 0.79 and were considered adequate. The total content validity index was equal to 0.88, which indicates the acceptable content validity of the Stress Index of Nursing Students Questionnaire.

Construct Validity

Exploratory Factor Analysis

In this study, based on the results of the exploratory factor analysis of the KMO test regarding the adequacy of the sample size, it was 0.899, which was sufficiently desirable, and the result of Bartlett's test was statistically significant ($p < 0.01$) and the results included three factors. The first factor measured "expectations, communication and health" with eleven questions, the second factor measured "university related factors" with six questions and the third factor measured "free time" with two questions. Finally, three questions in this questionnaire, including 6, 12 and 14, were removed due to factor loading less than 0.3 or cross loading (Table No. dia).

Confirmatory Factor Analysis

Table 2 shows the cut-off point and the obtained values of the model fitness indices in this study. The results show that they had a relatively favorable fitness. Convergent and discriminant validity shows in table No. 3

Reliability

The correlation coefficient of the whole instrument was 0.881, which was sufficiently desirable. In this study, the Cronbach's alpha for the factor "Expectations, communication and health" (factor 1) was 0.783, for the "University related factors" (factor 2) it was 0.755 and for the "Free time" factor (factor 3) it was 0.717 and for the whole instrument it was 0.863 (Table No. 4) (Diagram No. 1).

Discussion

The present study investigated the validity and reliability of the Persian version of the Stress Index Questionnaire in nursing students. Previously, the SNSI questionnaire has been standardised in several different languages[27, 29, 30]. The results showed that the SNSI questionnaire can be used as a valid and reliable tool to diagnose stress in nursing students. This questionnaire can measure the stress of nursing students in three areas: expectations, communication and health, factors related to university and leisure.

In the current study, when the construct validity of the questionnaire was examined using exploratory factor analysis, three factors of "expectations, communication and health", "university-related factors" and "free time" were obtained in total. Based on the results of the exploratory factor analysis of the KMO test regarding the adequacy of the sample size, it was 0.9, which is sufficiently favourable, and the result of Bartlett's test was statistically significant ($P<0.001$). In the study of Sarikoc et al. (2017), which was conducted with the aim of determining the validity and reliability of the

Turkish version of the SNSI instrument, the results were as follows: in this study, based on the exploratory factor analysis, four factors were obtained in the order of "personal problems", "clinical concerns", "interface concerns" and "scientific burden"[27]. In the study of Paula et al. (2020), which was conducted with the aim of determining the validity and reliability of the Brazilian version of the SNSI instrument[30], similar results were obtained, so that the results of this study are in line with that of Sarikoc et al. (2017) [27] and that of Gou et al. (2019)[29]. In the Turkish version of this questionnaire, three items 6, 7 and 20 were removed due to lower factor loadings [27], and in the present study three items were also removed, with the difference that in this study they were items 4, 16 and 17. This may be due to different academic training and different organisations. In addition, in the present study, the fitness of the model was evaluated according to the reported indicators, and the results of the confirmatory factor analysis of the items gave a suitable and good estimate based on the general indices of the model's fitness and the figures of RMSEA = 0. RMSEA = 0.11, CMIN/DF = 3.7, GFI = 0.79, AGFI = 0.90, and PNFI = 0.90. 11, CMIN/DF = 3.7, GFI = 0.79, AGFI = 0.73, NFI = 0.90, NNFI = 0.92, PNFI = 0.78, CFI = 0.93, IFI = 0.93, RFI = 0.88, RMR = 0.079 were obtained. As a result, according to the fitness indices, our model had an acceptable fitness. In the study of Sarikoc et al. (2017), the values of GFI = 0.89, IFI = 0.94, NNFI = 0.92, CFI = 0.94 and RMSEA = 0.07 were obtained, [27][29], which is consistent with the results of the present study. In the study by Gou et al. (2019), GFI = 0.95, AGFI = 0.94, RMR = 0.032, RMSEA = 0.025, NFI = 0.97, IFI = 0.99, CFI = 0.99 were obtained [29], which were much higher values than in the present study, but the fitness of both models was assessed as suitable.

The reliability of this instrument is consistent with the original version, so the reliability coefficient of the whole instrument was 0.881, which indicates the internal consistency of the Persian version of this scale. In their study, Sarikoc et al. (2017) obtained a reliability coefficient of 0.86 for the whole instrument [27], and Paula et al. (2020) obtained the reliability coefficient of the whole instrument at 0.80 in their study[30]. The present study has the same internal consistency as the Chinese version of this questionnaire (0/88)[29], which is higher than the Turkish version (0/86)[27]. The reliability and stability results obtained from two administrations of this instrument two weeks apart in the study were favorable and satisfactory, which indicates the stability of the results over time and is consistent with the study results of the original version of this instrument[25]. Therefore, the Iranian version of the instrument has relatively favorable validity and reliability in Iran and is useful for studying stress among nursing students. In addition, ICC, which is considered one of the best test-retest methods, was used for reliability. The results of the study showed that the internal consistency of each factor had acceptable values. Some other countries have also evaluated the internal consistency of the SNSI. For example, when the instrument was administered to nursing students in India, the alpha value was calculated to be 0.79 [29].

Conclusion

The SNSI is an instrument that aims to measure the intensity of stress caused by some related factors in nursing students, including academic environment, clinical practice, personal interactions in these environments and personal problems. We believe that this index helps to identify the stress levels of nursing students and the factors that influence them, so that they can be supported with the help of university counsellors. SNSI can be practical in measuring stress among nursing students in Iran. According to the results of the present research, it can be concluded that the questionnaire of stress index in nursing students had acceptable validity and reliability. Therefore, it is possible to use the Persian version of the stress index instrument of nursing students to study stress factors in the country.

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Authors' contributions

All authors contributed to the study's commencement and coordination, collected data, and drafted the manuscript. HH, AE, MM. participated in data collection, analysis, and writing of the manuscript. SA participated in the study's supervision, interpretation of data, and revising the manuscript. All authors read and approved the final manuscript.

Declarations

Approval of Ethics and Consent for Participation

The present study was approved by the Ethical Committee of Isfahan University of Medical Sciences (Ethical code: (IR.MUI.MED.REC.1400.809) and all methods were carried out in accordance with Helsinki declaration and its later amendments or comparable ethical standards. Participation was voluntary and respondents were informed about ethical considerations of confidentiality. All students and lecturers were informed about the purpose and motivation of the study prior to participating in the study. Informed consent was obtained from all participants before participating in the study.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author (MM) on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Clinical trial number

Not applicable.

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