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Psychometric evaluation of the Arabic version of the Perceived Stress Scale in clinical practicum: Validity and reliability in the Moroccan nursing students

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Abstract:

BACKGROUND: During clinical practicum, nursing students are subjected to stressors that can affect their well-being, academic performance, and technical skills. The purpose of this study was to evaluate the psychometric properties of the Arabic version of the Perceived Stress Scale of Clinical Practicum (PSS-CP) in a sample of Moroccan nursing students.

MATERIALS AND METHODS: In this study, a translation and back-translation method and comparisons were made with the original version. The study population consisted of 215 nursing students. The construct validity of PSS-CP was measured using exploratory (EFA) and confirmatory factor analysis (CFA). Convergent validity was demonstrated by correlation with the Arabic version of the Depression, Anxiety, and Stress Scale (DASS-21). For reliability, Cronbach's alpha and test-re-test reliability (with a 10-day interval) were used. Data were analyzed using IBM SPSS Statistics V. 23.0 (SPSS) and AMOS V.21.0 (SPSS) software.

RESULTS: The results showed that the PSS-CP is a reliable and valid scale with good internal consistency and test-re-test reliability. In terms of convergent validity, the PSS-CP showed a positive and significant correlation with the DASS-21 scale items. The results of this study led to a two-factor model consisting of 29 items.

CONCLUSION: The PSS-CP is a valid and reliable instrument for assessing clinical stressors among nursing students in Morocco.

Keywords:

Nursing student, reliability, stress in clinical practicum, validity

Introduction

Clinical practice is a fundamental component of all higher-education nursing programs.^[1] These have a significant influence on the process of professional skill development and inter-personal relationships that are critical to the success of nursing students' education and achievement.^[2]

In addition, the clinical practicum is also a prime opportunity for nursing students

to encounter real-world situations to guide their nursing approach and clinical reasoning independently.^[3,4] Indeed, when the clinical setting experiences lead to positive outcomes, it creates a sense of satisfaction and sparks motivation for students to improve their technical and cognitive skills as well as foster their socialization and confidence.^[5]

However, bad experiences during clinical practicums are likely to have a

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negative impact on the student's well-being, academic performance, and willingness to pursue nursing education.^[5] In this sense, clinical practicums can be perceived as a real stressor by students despite their importance in nursing education.^[6]

Studies have identified several stress factors related to clinical education among nursing students.^[7-12] The most common are as follows:

High workload, knowledge and skill deficit, fear of making mistakes and harming patients, fear of failure or poor grades, lack of direction, competitiveness with peers, and strained relationships with caregivers. It is worth noting that nursing students experience more stress because of their inability to translate theoretical learning into the clinical setting at the bedside.^[13-15]

From then on, there is a need to effectively explore and control the various clinical stress factors and help students develop stress management skills so that they can improve their quality of life and prevent burnout and educational overload.^[16]

Today, several instruments have been developed to assess the level of stress experienced by nursing students, the most common of which is the Perceived Stress Scale in clinical practicum (PSS-CP).^[11]

It is a tool characterized by its ability to capture various aspects of stress factors related to the clinical practice of nursing students. It contains 29 items grouped into six domains, such as stress related to patient care, teachers and caregivers, assignments and workload, peers and daily life, lack of professional knowledge and skills, and environmental factors.^[11]

This scale has been translated and used in different cultures and countries, including Taiwan,^[11] Spain,^[17] Turkey,^[18] China,^[19] and Jordan.^[20] Although the latter shares the same classical Arabic language with Morocco, the Jordanian Arabic version of the PSS-CP cannot be applied in our Moroccan context because of the variation in levels and stressors as well as the peculiarity of the socio-cultural and linguistic universe in our country. Furthermore, the psychometric properties of the PSS-CP have not been subjected to a robust psychometric evaluation of the scale translated into Jordan, such as confirmatory factor analysis (CFA), convergent validity, and test-re-test reliability.^[20]

The lack of a validated instrument adapted to the Moroccan culture and context to evaluate clinical stress in nursing students is a real concern. Therefore, the purpose of this study was to evaluate the validity and

reliability of the Arabic version of the PSS-CP among nursing students in Morocco.

Materials and Methods

Study design and setting

The present study is a cross-sectional study conducted on Moroccan nursing students in a higher institute of nursing and health techniques in 2021 to evaluate the psychometric properties of the translated Arabic version of the PSS-CP by Scheu *et al.*^[11]

Study participants and sampling

Initially, all under-graduate nursing students who met the selection criteria were asked to complete a self-administered questionnaire (N = 300). Inclusion criteria consisted of being an under-graduate student, enrolled in their second or third year, with Arabic as their first language. First-year students were excluded from the study because they did not have clinical experience. Finally, 215 students were included in the study as the minimum sample size for a CFA was 200.^[21] To evaluate test-re-test reliability, participants completed the PSS-CP questionnaire twice, at an interval of 10 days.

Data collection tool and technique PSS-CP

PSS-CP consists of 29 items scored on a 5-point Likert scale, ranging from 0 (never) to 4 (very often), with a total score ranging from 0 to 116. A higher score indicates a greater degree of stress. Items were grouped into six factors related to sources of stress as follows: patient care stress, teacher and nurse stress, task and workload stress, peer and life stress, lack of professional expertise stress, and clinical environment stress. The original study of Sheu *et al.*^[11] reported a good internal consistency reliability of 0.89, whereas the 1-week test-re-test stability reliability coefficient was $r = 0.60$. The content validity index (CVI) was 0.94, demonstrating excellent levels.

In this study, we adopted the Brislin method adapted for cross-cultural translation, which included translation, back-translation, comparison, language adaptation, and pilot testing.^[22] First, two bilingual nursing research professors separately translated the 29-item PSS-CP from English into Arabic and combined the two versions. One of the professors specialized in nursing education, and the other specialized in psychiatry. Then, a third bilingual researcher translated the Arabic version back into English. Later, a fourth researcher compared the back-translated English version with the original English scale to transfer semantic equivalence and conformity of each item with the Moroccan culture and society. This revision made appropriate changes to some of the synonyms, such as replacing the term "the teachers"

with “the professors”. This process resulted in Arabic version 1 of the PSS-CP. The face validity of the questions was verified by pilot testing with a group of 20 nursing students across the three specialities. The students reported no changes. This process produced Arabic version 2 of PSS-CP for validation.

Depression, anxiety, and stress scale (DASS21 = 21-item)

To assess the convergent validity of the Arabic version of the PSS-CP, we used the Arabic version of Depression, Anxiety, and Stress Scale 21.^[23] This scale contains 21 items divided into three factors, which assess symptoms of depression, anxiety, and stress. Respondents rate the level of symptoms they have responded to in the past week on a scale from 0 (does not apply to me at all) to 3 (applies to me often or most of the time). Higher scores reflect higher levels of symptom confirmation. The reliability of the DASS-21 is excellent ($\alpha = 0.95, .96$, and $.94$, respectively).^[23]

Student demographics, including age, gender, education level, option/speciality, and clinical practicum settings, were also collected.

Ethical consideration

The direction of studies and research of the Higher Institute of Nursing Professions and Health Techniques approved the study protocol, where this study was conducted (456/2022). In addition, the students completed the questionnaires, anonymously.

Statistical analysis

Participant responses were coded and analyzed using Statistical Package for the Social Sciences (SPSS) version 25 and Amos (version 23.0). Demographic data were analyzed using descriptive statistics including frequencies, mean, and variances. To determine whether the data were suitable for factor analysis, the Kaiser–Mayer–Olkin (KMO) measure of sample adequacy and the Bartlett test were used. An exploratory factor analysis (EFA) was performed, and subsequent estimation was based on the maximum likelihood extraction method and a varimax rotation. Factors with a factor loading of 0.3 or greater were selected as items for the final version.^[24]

Next, CFA was performed using maximum likelihood estimation to confirm the structure of the EFA and to investigate the goodness-of-fit indices of the resulting model. Several fit indices were measured: Normed fit index (NFI) acceptable value = ≥ 0.90 ,^[25] Comparative fit index (CFI) acceptable value = ≥ 0.95 ,^[26] Goodness-of-fit index (GFI) acceptable value = $\geq .90$,^[27] Tucker Lewis’s index (TLI) acceptable value = $\geq .90$,^[27] Incremental fit index (IFI) acceptable value = $\geq .90$,^[28] and root mean square error of approximation (RMSEA) acceptable value = $\leq .08$.^[29]

Pearson correlation coefficients were calculated to explore the inter-relationships of each extracted factor with the total instrument score.

Convergent validity was assessed by Spearman’s correlation coefficients between the PSS-CP and DASS-21 factors.

The reliability of the questionnaire was analyzed with Cronbach’s alpha using the internal consistency method. Internal consistency can be said to be excellent if Cronbach’s alpha is ≥ 0.9 and acceptable if the values are >0.7 and <0.8 .^[30]

Test–re-test reliability was used to assess the stability of the questionnaire. When the acceptable range of the test–re-test reliability correlation coefficient was greater than 0.7 it was considered good.^[31]

Results

The socio-demographic characteristics of the student survey are presented in [Table 1].

Factorial structure

The KMO index of 0.974 can be qualified as excellent. This shows that the correlations between the items are of good quality. Second, the result of Bartlett’s sphericity test $P = 0.000$ is significant (as < 0.0005). We can therefore reject the null hypothesis that our data come from a population for which the matrix would be an identity matrix. Thus, not all correlations are equal to zero. We can therefore continue the analysis.

Content validation

The content validity index (CVI) of the Arabic version of the PSS-CP was assessed. Four expert professors in

Table 1: Socio-demographic characteristics of participants in the study of the psychometric properties related to the Arabic version of the PSS-CP

Demographics	n	%
Age (M=20,02, ET=1,12)		
Gender		
Male	47	21,9%
Female	168	78,1%
Level of education		
2 nd year	109	50,7%
3 rd year	106	49,3%
Option/specialty		
MPNs	160	74,4%
IMHNS	29	13,5%
FCHNs	26	12,1%
Clinical practice setting		
Hospital	155	72,10%
Health Center	60	27,90%

Multi-purpose Nursing Students, Mental Health Nursing Students (MHNS), Family and Community Health Nursing Students (FCHNs)

clinical psychology, experienced in the translation and validation of measurement tests, evaluated the Arabic version of the PSS-CP. The experts were asked to rate each item of the instrument on a 4-point Likert scale ranging from 1 = “not relevant” to 4 = “very relevant”. To calculate the CVI for each item and the overall scale, expert responses to each item were examined and divided by the number of raters.^[32] Thus, the CVI for PSS-CP items in our study was 0.92.

Structural validity

The characteristics of the factors extracted from the questionnaire are presented in [Table 2]. The results of the EFA technique showed that the structure of the 29-item PSS-CP scale was composed of two factors and that the total variance explained was 76.948%. In addition, all items were greater than 0.3, indicating good factor loading of these items on their current factors and that there is no need to remove them from the scale. Thus, the first factor consisted of 14 items and was named «Interpersonal and workload stress»; the second factor consisted of 15 items and was named «Lack of nursing skills stress».

Table 2: EFA of the Arabic version of the PSS-CP

Items	Factor loadings	
	Factor 1	Factor 2
14	0.852	
13	0.840	
16	0.837	
15	0.822	
18	0.814	
19	0.806	
12	0.800	
17	0.775	
22	0.751	
21	0.743	
27	0.727	
20	0.702	
23	0.652	
9	0.632	
25		0.825
26		0.823
6		0.820
1		0.819
24		0.819
2		0.810
4		0.800
10		0.749
8		0.729
7		0.706
11	0.607	0.651
28		0.651
5		0.650
3		0.630
29		0.535
Percentage of variance	39,452	37,497
Cumulative of variances	39,452	76,949

Confirmatory factor analysis

As shown in [Table 3 and Figure 1], the CFA was conducted on the two-factor model of the PPS-CP to investigate its construct validity. From the results, it can be said that the two-factor model of the PSS-CP scale is a good fit.

Correlations

The Pearson correlation coefficient of each extracted factor with the total instrument score was significant [Table 4].

Convergent validity

Correlation analysis was performed to compare the PSS-CP with the three factors of DASS = 21 to confirm its convergent validity [Table 5]. The results indicate that the calculated correlation coefficients confirm the good convergent validity of the PSS-CP with DASS = 21 ($r = 0.732-0.873, P < 0.01$).

Reliability and test-re-test

The reliability of the PSS-CP in its Arabic version in the Moroccan context was measured by Cronbach’s alpha and test-re-test reliability.

The total Cronbach’s alpha for the scale was 0.986, and the Cronbach’s alpha coefficients for the two factors were 0.973 and 0.963, respectively.

For test-re-test reliability, Pearson’s correlation coefficient was used. The total test-re-test reliability of the questionnaire and that of the two factors were 0.904, 0.886, and 0.942, respectively ($p < 0.01$).

Discussion

The purpose of this study was to evaluate the psychometric properties of the Arabic version of the PSS-CP in order to demonstrate the reliability and validity of this measure that can be used to assess the level of clinical stress among nursing students in Morocco. The results showed that the PSS-CP has good internal consistency, good concurrent validity, and satisfactory construct validity.

Overall, our results were similar to those of previous research using the PSS-CP in nursing students. The translation from English to Arabic language proves successful. Indeed, this result is supported by an excellent CVI (0.92) versus 0.94 in the original version,^[11] the Spanish version,^[17] and the Jordanian version^[20] as well as by the panel’s confirmation that the PSS-CP items in Arabic correctly measure sources of stress among nursing students in Morocco.

According to the analyses, no items were deleted and removed from the test; all items showed a factor load

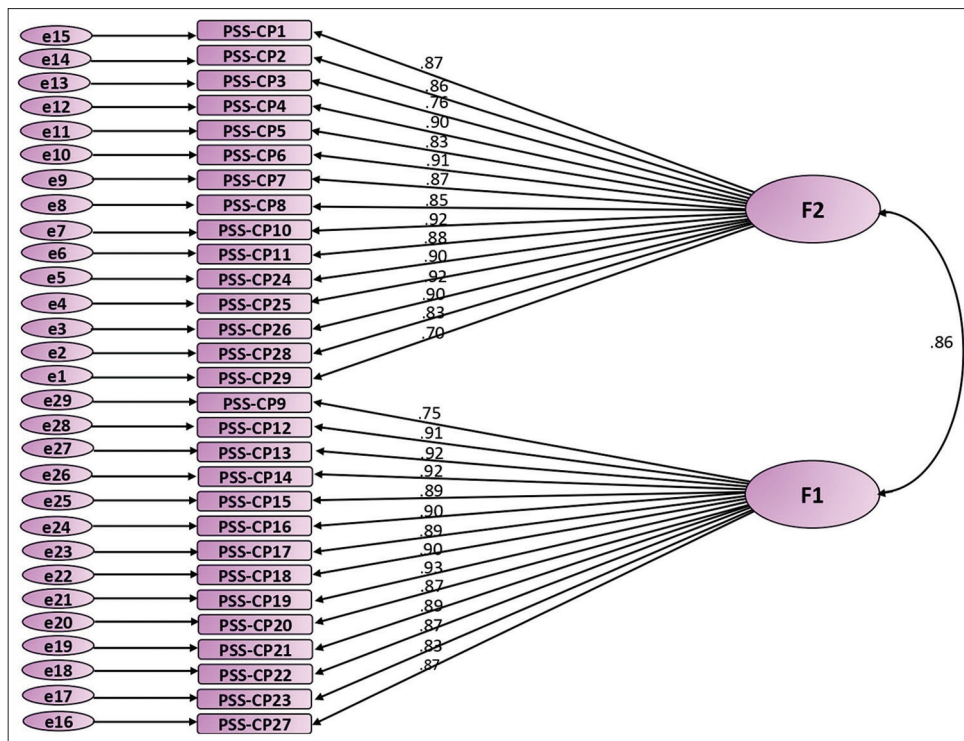


Figure 1: CFA model of the PSS-CP Arabic version

Table 3: Goodness-of-fit scores for the two-factor model of the PPS-CP

	χ^2/df	NFI	CFI	GFI	TLI	IFI	RMSEA
Index values	2.235	0.926	0.989	0.930	0.905	0.910	0.070
Acceptable values	≤ 3	$\geq .90$	$\geq .95$	$\geq .90$	$\geq .90$	$\geq .90$	$\leq .08$

NFI (Normed Fit Index), CFI (Comparative Fit Index), GFI (Goodness-of-Fit Index), TLI (Tucker Lewis's index), IFI (Incremental Fit Index), RMSEA (Root Mean Square Error of Approximation)

Table 4: Matrix of correlation coefficients between the factors of the Arabic version of the PSS-CP

Factors	1	2	Total score
Inter-personal and workload stress	1	0.841**	0.934**
Lack of nursing skills stress	0.841**	1	0.956**
Total score	0.934**	0.956**	1

*Correlation is significant at the 0.01 level (2-tailed)

Table 5: Convergent validity of the Arabic version of the PSS-CP with the DASS21

Factors	Depression-DASS	Anxiety-DASS	Stress-DASS
1	0.675*	0.782*	0.745*
2	0.667*	0.723*	0.759*
Total PSS-CP (29 items)	0.732*	0.768*	0.873*

* $P < 0.01$. PSSCP: Perceived Stress Scale in clinical practicum, DASS-21=21-item Depression, Anxiety, and Stress Scale.

above 0.30. As a result, 29 items, reflecting the different stressors perceived in the clinical setting, were refined in the EFA similar to the original version. However, in the Jordanian version, only one item was removed (23) from the analysis.^[20]

Henson and Robert propose that when conducting EFA, the number of factors extracted should be determined based on several criteria, not a single standard.^[33] In our study, EFA produced a two-factor model that differed from the six-factor structure presented in the original version^[11] and the five-factor structure presented in the Jordanian version.^[20] The first factor is called “interpersonal and workload stress”. The latter provides information about stressful inter-personal relationships with faculty and caregivers in clinical settings. Indeed, a qualitative study on the clinical experiences of nursing students revealed that the severity of some professors and strained relationships with caregivers were major sources of stress.^[34] In this regard, destructive criticism, workload, unfair evaluations, and the lack of support and guidance contribute to increased stress levels or training abundance.^[35]

The second factor is called “lack of nursing skill stress”. Students identified the lack of knowledge of diagnosis, treatment, medical terms, and fear of harming patients as perceived sources of stress. According to some studies, limited knowledge and skills in the clinical setting are very common stressors for nursing students, especially in the initial practicum.^[36,37]

The different versions of the PSS-CP contained different structures across cultures and regions. Indeed, our two-factor model explained 76.948% of the variance, compared to 50.7% for the original version,^[11] 56.11%

for the Spanish version,^[17] and 54.54% for the Jordanian version.^[20]

This difference between the versions is certainly the result of the underlying cultural diversity and the diversity of the sample used as well as the difference between the programs and the methods of monitoring in the clinical setting because students in Morocco are supervised solely by professors in the nursing training institutes, in the absence of a legislation governing tutoring during the practicum. Indeed, professors are responsible for organizing the internships, planning the student's work time, evaluating the skills acquired, and welcoming the students to the practicum site. They are also responsible for teaching theoretical courses at the institute. Such a workload of professors can have a negative impact on both the quality of the student/professor relationship and the quality of mentoring. In addition, given the lack of a simulation lab, students are not well prepared for their clinical placement, which will later impact their professional skills.

In this study, the findings of the CFA showed a significant correlation between the factors and their items, which means that the translation into the Arabic version is satisfactory. Therefore, the two-factor structure was the best fit for the model derived from the EFA. In contrast, the other versions of the PSS-CP scale, especially the original version,^[11] the Spanish version,^[17] and the Jordanian version,^[20] did not use this statistical method.

The internal consistency of the Arabic PSS-CP was ($\alpha = 0.986$), which is higher than that reported by the original version ($\alpha = 0.89$),^[11] the Spanish version ($\alpha = 0.92$),^[17] and the version translated into Jordan ($\alpha = 0.90$).^[20] Convergent validity analysis showed significant and positive correlations with the depression scale anxiety and stress as assessed by DASS-21, which was also consistent with findings in the literature.^[38-40] This may be explained by the fact that a high DASS-21 score (corresponding to a high frequency of stressful events) may be associated with a high PSS-CP stress score.^[39,40] However, this convergent correlation was not examined in the original version, the Jordanian version, and the Spanish version.

In addition, the total test-re-test reliability of the PSS-CP after 10 days is very satisfactory (0.942) ($p < 0.01$). Thus, the absence of statistically significant differences between the test-re-test measures testifies to the stability of the PSS-CP scores over time and reinforces the reliability of this measurement tool. For the original version^[11] and the Spanish version, the 1-week test-re-test reliability was 0.60.^[17] However, this assessment was not examined in the Jordanian translation.^[20]

Overall and based on these results, the choice of the factorial method is good. Thus, the CFA and the EFA of the 29-item scale (Moroccan version of the PSS-CP) support its structural validity.

Limitation and recommendation

It should be noted that this study is the first to be conducted to prepare an assessment tool for perceived stress in clinical practicum among Moroccan nursing students. Furthermore, despite the application of a robust statistical analysis through exploratory and confirmatory factor analyses, some limitations of this study must be considered. Indeed, because of the containment measures imposed by the Moroccan government, prohibiting travel to other cities in the country, data collection was conducted in a single nursing and health technical training institution, which may limit the representativeness of all nursing students in Morocco. Therefore, the generalizability of the results of this study remains limited. It is therefore recommended that this study be repeated in other nursing training institutes in Morocco and include other health care specialties.

Conclusion

According to the results, the validity and reliability of the PSS-CP were confirmed. Therefore, the Arabic translated version of the PSS-CP is a valid and reliable tool for the assessment of perceived clinical practicum stress in Moroccan nursing students. Furthermore, as this study examined the psychometric properties of the Arabic translated version, further research is needed to determine the effectiveness of this tool in assessing stressors so that training managers can take effective preventive measures to improve the quality of clinical training for nursing students.

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Conflicts of interest

There are no conflicts of interest.

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