



## ORIGINAL ARTICLES

### Reliability and construct validity of the Perceived Stress Scale in medical students

### Fiabilidad y validez de constructo de la Escala de Estrés Percibido en estudiantes de Medicina

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### ABSTRACT

**Introduction:** stress is a contemporary phenomenon that affects students of Higher Education. There are no validated instruments in the Cuban context for its correct assessment.

**Objective:** to establish the psychometric properties as a function of the reliability and construct validity of the Perceived Stress Scale in medical students of Pinar del Rio province in 2017.

**Methods:** descriptive, cross-sectional, technological evaluation study carried out with medical students from Pinar del Rio University of Medical Sciences during 2017. A sample of 400 students from the sixth academic year of medicine studies was chosen. The application of the Perceived Stress Scale allowed obtaining information for subsequent validation in the Cuban context.



**Results:** high values (0.84) of Cronbach's Alpha were obtained, which demonstrated reliability regarding the application of the test. Factor analysis obtained two dimensions or factors, achieving adequate correlations between the items belonging to each factor.

**Conclusions:** the Perceived Stress Scale presented adequate metric qualities when validated in the Cuban context, proving to be reliable and with a bi-factor structure in correspondence with what was stated by its original authors. Using this instrument it is possible to determine the influence of stress in the teaching process, and the academic results of the students; as well as how the teaching staff can be linked to the perception of stress by the students.

**MeSH:** STRESS; VALIDITY; VALIDATION STUDIES; STUDENTS, MEDICAL; STRESS, PSYCHOLOGICAL.

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## RESUMEN

**Introducción:** el estrés es un fenómeno contemporáneo que afecta a estudiantes de la Educación Superior, en Cuba no se encuentran instrumentos validados en el contexto nacional para su correcta evaluación.

**Objetivo:** establecer las propiedades psicométricas en función de la fiabilidad y la validez de constructo de la Escala de Estrés Percibido en estudiantes de la carrera de Medicina de la provincia de Pinar del Río en el 2017.

**Métodos:** estudio descriptivo, transversal, de evaluación tecnológica, realizado con estudiantes de Medicina de la Universidad de Ciencias Médicas de Pinar del Río durante el año 2017. Se trabajó con una muestra de 400 estudiantes de los seis años de la carrera. La aplicación de la Escala de Estrés Percibido permitió la obtención de información para la posterior validación en el contexto cubano.

**Resultados:** se obtuvieron valores elevados (0,84) de Alfa de Cronbach, lo que demostró fiabilidad en el test. El análisis factorial obtuvo dos dimensiones o factores, obteniéndose correlaciones adecuadas entre los ítems pertenecientes a cada factor.

**Conclusiones:** la Escala de Estrés Percibido presentó cualidades métricas adecuadas al ser validado en el contexto cubano demostrando ser fiable y con una estructura bifactorial en correspondencia con lo planteado por sus autores originales. Contar con este instrumento permite tener una herramienta para determinar la influencia del estrés en el proceso docente, los resultados académicos de los estudiantes e incluso cómo el claustro profesoral puede estar vinculado con la percepción de estrés por parte de los estudiantes.

**DeCS:** ESTRÉS; VALIDEZ; ESTUDIOS DE VALIDACIÓN; ESTUDIANTES DE MEDICINA; ESTRÉS PSICOLÓGICO.

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## INTRODUCTION

Stress has been defined in several ways: as a response to challenging events, as an experience that imposes demands on the individual, as an environmental characteristic that presupposes a threat, and as something to be done by the individual and who is unable to do it adequately when facing up the experiences he/she have to deal with .

These approaches can be summarized in the following definition: "an adaptive physical and psychological response to the demands and threatening situations of the environment. This response is related to individual, social and cultural aspects that give a particular characteristic to the way each person perceives this experience. <sup>(1)</sup>

Stress is a problem for individuals, as it can have a domino effect, making it a determining factor in their overall quality of life, including family life.

Stressful agents may be physical, such as noise; biochemical, for example, infections; psychosocial, related to processes of adaptation or coping and ability to control a stressful situation. <sup>(2)</sup>

The university student, from the moment of the enrolment for university to the moment of leaving it, is exposed to a number of challenges, decision-making, problems and demands inherent to the educational context, in which training, learning and academic performance are aspects that can become sources of stress. This type of stress generates a negative impact not only on health, but also on academic performance. <sup>(3)</sup>

Young people who begin higher studies face a greater responsibility, the need to maintain adequate academic performance, considered as the accomplishment of goals, achievements or objectives established in the subject they take, professors who require them and assign a variety of tasks. <sup>(2)</sup> As educators, there is a duty, to facilitate that the teaching-learning process in Higher Education increases its quality to train professionals who are gradually more competent and motivated by their work.

In the case of the students of this research, greater pressure is generated before the assumed responsibility, since Medicine studies, as the other higher studies requires not only vocation, but dedication and time, because with the emergence of new diseases and treatments, in addition to research and technological advances, it demands a continuous learning and update on the part of the student, besides the social responsibility of maintaining and preserving human health.

The academic burden, the presentation of papers, practices and exams, require a time that in most cases the student does not know how to distribute it adequately, which generates feelings of incompetence, anger and guilt, which generates higher levels of stress and anxiety. <sup>(4)</sup>

The Perceived Stress Scale (PSS-14) has proven to be understandable and easy to respond to in other contexts where it has been applied, including university. On the other hand, it has been validated in other countries; however, there are no references to its application in the Cuban context.

In the field of Cuban medical education, it is practical to have an instrument that allows knowing in a fast and accurate way, the levels of stress perceived by the students of Medicine, which would foster, in addition, the adoption of more suitable styles of confrontation on the part of the students. That is why it was decided to carry out the present research with the objective of establishing the psychometric properties of the Perceived Stress Scale in function of the reliability and validity of construct in medical students, in Pinar del Rio province during 2017.

## **METHODS**

A study was carried out with a descriptive, cross-sectional design which, according to the possibilities of application of the results, it is classified as technological evaluation.

The target group was comprised of a total of 1 846 students, who represent the totality of the students of Cuban nationality of the six academic years, of Medicine Studies at Pinar del Rio University of Medical Science. A sample of 400 students was chosen and conducting a simple random sample, based on the range of the sample calculated by the statistical program EPIDAT, in its version 4.0. The application and processing of the information was carried out during the 2017-2018 academic year.

The Perceived Stress Scale was applied to the sample in its 14-items version created by Cohen, Kamarck and Mermelstein in 1983 and adapted to the Spanish language by Dr. Eduardo Remor in 2006.

The information collected in a computerized database was processed using the statistical processor SPSS version 20.0.

For the evaluation of the reliability the Cronbach Alpha coefficient was calculated, and to determine the construct validity of the test, the factorial analysis was carried out, which was preceded by the spherical test of Bartlett and Kaiser Mayer Olkin (KMO), with the objective of determining the pertinence of carrying out the factorial analysis of the instrument.

Ethical parameters: during the implementation of the study, an informed consent was obtained from the students who participated in the study, in addition to the approval of the Scientific Committee of the institution. The information collected in the research will only be used for scientific purposes, having confidential character.

## RESULTS

In order to explore the reliability of the Perceived Stress Scale, the Cronbach Alpha coefficient was calculated, resulting in 0.846, a high reliability indicator. As part of the analysis of the internal consistency of the test, it can also be noted that the values of the Alpha coefficient in each item separately ranged between 0.828 and 0.852. The results obtained mean in practice that, due to the high internal consistency of the test among its items, results would be obtained, evidencing the reliability and stability of the results of the scale in question.

The values of KMO and Bartlett's spherical test were high, with scores of 0.896 and 1674.905. These results are indicative that the instrument is reliable for factor analysis that would confirm its validity in the Cuban context.

The matrix of rotated components shows that the Perceived Stress Scale, in its 14-item variant, is composed of two defined dimensions or factors. A first factor was observed composed of items 4, 5, 6, 7, 9, 10, 13; written in the test in a positive compartment and that are related to the capacity or ability to face the stressors presented by the subjects. A second factor is composed by items 1, 2, 3, 8, 11, 12, 14, written in the test in a negative way, and that are related to the distress or perception of stress in the individuals who act in response to this scale. (Table 1)

**Table 1-** Matrix of rotated components

	Component	
	1	2
1	-,142	,697
2	-,412	,580
3	-,090	,762
4	,736	-,098
5	,725	,004
6	,668	-,319
7	,672	-,205
8	-,176	,628
9	,782	-0,81
10	,587	-,333
11	-,163	,597
12	113	,501
13	,538	-0,63
14	-345	,664

When analyzing the inter-item correlations of the test, it is possible to clearly appreciate a block structure, where the major correlations are between the items that belong to the same dimensions or factors established by the authors of the scale from the theoretical point of view.

It was also found, that the validated scale is capable of explaining 48 % of the total variance related to the construct studied, which in this case is perceived stress. Another result obtained from the correlation between the factors of the PSS-14, revealed the existing independence between them, when negative values of correlations between both factors of -0.319 were obtained.

An individual analysis was carried out for each factor or dimension of the test. In the case of the dimension dealing with stressors, which explains 48.7 % of the total variance of the test, the communal areas were also analyzed, where item 13 (In the last month, how often were you able to control the way of enjoying the free time?), turned out to be the least assessable to the dimension with a score of 0.28.

In the case of the dimension Perception of stress, this explains 44.4 % of the total variance of the test, and in terms of communalities item 12 (In the last month, how often have you thought about the things you still have to do?) is the least taxed on the dimension with a score of 0.16.

The results obtained show the validity of the test, which means that its items are designed to measure the construct that the PSS-14 intends to evaluate; in this case, the perceived stress.

## DISCUSSION

The results obtained in the Cronbach Alpha coefficient coincide with previous validation studies of the 14-item version of the Perceived Stress Scale. An example of this was the

validation studies carried out in Greece, where a value of 0.795 was obtained and in the French version the value reached was 0.81.<sup>(6)</sup>

It should be noted that these results are optimal, since according to the literature consulted, Cronbach alpha values between 0.8 and 0.9 can be considered as good.<sup>(7)</sup>

In relation to the factorial analysis, it was possible to verify that the results obtained coincide with those obtained by Cohen, Kamarck and Mermelstein when creating the instrument and are also similar to those reached in studies of scale validation, carried out in the university population both in Colombia and Mexico.<sup>(8, 9)</sup>

The factorial load in the majority of the items is strong, superior to 0, 50 this confirms the practical definition of each factor. Another element that was interesting in the results obtained was the percentage of variance explained by the test in relation to the construct to be explained.

The value obtained, although not very significant, is in correspondence with what was found in validation studies of the instrument in samples of university students and also in other contexts where the PSS-14 has been validated. An example of this is the study carried out by Campo-Arias, Bustos-Leiton and Romero Chaparro<sup>(8)</sup> in 2009, in a sample of university women in Bogotá, Colombia, where this instrument explained 49.6 % of the variance.

Similar results in university students of Psychology studies, found González Ramírez and Landero Hernández,<sup>(9)</sup> in 2007, where the instrument was able to explain 48.02 % of the variance, values that are close to those obtained in the sample analyzed in this research.

If the independence of the two factors that make up the validated instrument is taken into account and its poor interrelationship, it can be argued that although in previous studies the PSS-14 showed strong correlations between distress and coping styles in young populations,<sup>(10)</sup> in this research the two factors that make up this instrument showed weak correlations between both, which is in accordance with what was obtained by the authors González Ramírez and Landero Hernández<sup>(9)</sup> where it was also found that both factors of this instrument correlated negatively in the sample studied by these authors.

### **Conflict of interest**

The authors state that there is no conflict of interest.

### **Authors' contribution**

The authors contributed equally to the design of the study.

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