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Reliability and Validity Analysis of the Academic Stress Inventory in University Students

Abstract

Currently, the International Health Organizations consider stress a morbidity and should be treated as a public health issue, even more so as a result of the health pandemic experienced. The university student was no stranger to this, suffering the so-called academic stress due to both academic and social factors. To determine the level of this, the SISCO university stress inventory was used, whose purpose was to identify attributes of stress that usually follow undergraduate and graduate students in the course of their university education. It consists of 30 items divided into three dimensions: stressful situations, symptoms (physical, psychological and behavioral reactions) and coping strategies. The results indicated that this inventory has good internal consistency in the total scale and in its dimensions. In terms of validity, the AFE and AFC proved that there are three factors considered in the theoretical model: symptoms, stressors and coping strategies, and the confirmatory analysis indicates an adequate fit for the academic stress model.

Keywords: Stress, Behavior, Psychological Effects, Mental Health.

Introduction

The university institution has introduced potentially stress-provoking effects, with competitiveness being one of the most relevant factors (Polo, Hernández & Pozo, 1996). In the university, there are many students; however, there are few opportunities in the job market, that makes them aim to "be the best"; from another angle, to the extent of academic life, students are almost always imposed to university

demands, excessive responsibility, continuous exams and practices, expositions and jobs that unwittingly generate stress, which is generally expressed as a result of frustrations caused by unmet needs (Huaquín & Loaiza, 2004; Barraza, 2004).

The tension caused by stress is, to a certain extent, necessary for the development of the student's character; however, when stress exceeds ideal levels, it depletes the subject's energy, impairs performance and can damage

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their health (Gorzo, Racz & Darvas, 2007). In the same way, what is considered stressful for some is not for others, leading them to try to adapt to these situations to put in motion a range of coping maneuvers to overcome with victory the demands that are required of them, trying to calm their state of pressure or nervousness; while many university students do not have strategies or adopt inadequate tactics (Benavente, Quispe & Callata, 2010).

Stress is a concept that most people can relate to, yet if asked to define it, people might indicate that it is synonymous with feeling overwhelmed, anxious, or under intense pressure; that is, from the perspective of what causes it. However, what it is for one subject is different for another (Conrad, 2011). Stress is also often referred to as the agent, incentive, stimulating component, or stressor. Also to the physiological response to the incentive or to manifest the psychological response to the stressor. On the other hand, the stressor is the incentive that stimulates the physiological and psychological response to both normal stress and disorders that become ailments (Orlandini, 2012).

"Stress is an adaptive reaction of the organism to the demands of its environment" (Selye, 1956); when these arise in the environment of an educational process, it is usual to refer to the adaptation mechanisms of the subject in terms of academic stress. For a higher educational center it is significant to know the degrees of academic stress in their students, as it has been related to depression (González, Delgado, Escobar & Cárdenas, 2014), chronic diseases (Gálvez 2005; Cohen, Tyrell and Smith, 1993), heart disease (Lowe, Urquhart, Greenman and Lowe, 2000) and failures in the immune system (Sánchez, González, Cos and Macías, 2007; Verdhara and Nott, 1996), in addition to school failure (McDonald, 2001) and low academic performance (Del Toro, Gorgueti, Pérez and Ramos, 2011; Zeidner, 1998).

Methodology

A quantitative approach of transectional cut was used to a sample of probabilistic type conformed by 316 university students from the third cycle to the tenth cycle of the Faculty of Mathematical Sciences of a public university. The instrument was the SISCO university stress inventory; this instrument is composed of 30 items divided into three dimensions: stressful situations, symptoms (physical, psychological and behavioral reactions) and coping strategies. Each of these components has indicators: the first dimension has 8 indicators; the second dimension, 15 indicators and the third dimension, 6 indicators. The SISCO inventory was proposed and validated by Barraza in the city of Durango

(Mexico) to know the stress variables that follow the students. The scale is a Likert-type scale, consisting of five categories, "never", "rarely", "sometimes", "almost always" and "always". It consists of three dimensions: "stressors", "symptoms or reactions" (physical, psychological, behavioral) and "coping strategies". A non-random sample of 239 higher education and postgraduate students was used. They obtained a split-half reliability of 0.87 and a Cronbach's alpha coefficient of 0.90, which are considered acceptable.

Results

Reliability Analysis

To determine the measure of internal consistency of the inventory, the split-half reliability and Cronbach's alpha were used.

Table 1.

Cronbach's alpha reliability results of the scores obtained with the academic stress inventory

"Reliability	Cronbach's Alpha value
Full scale	0,89
Stressors Dimension	0,79
Dimension Symptoms	0,91
Coping Strategies Dimension	0,67

At the level of the whole scale, the instrument obtained a reliability of 0.89, when evaluating the three dimensions separately, the highest reliability was presented in symptoms (0.91) followed by stressors (0.79) and coping strategies (0.67), these results were slightly higher than the method of the two halves.

Omega Coefficient

It is an alternative method to analyze reliability, it uses the estimated factor loadings of the Confirmatory Factor Analysis model (Ventura-León and Caycho-Rodríguez, 2017). Using the factor loadings, the following results were obtained.

Table 2.

Omega Growing Results

"Reliability	Omega coefficient value
Full scale	0,94
Stressors Dimension	0,79
Dimension Symptoms	0,91
Coping Strategies Dimension	0,68

At the level of the whole scale, a level of 0.94 was obtained, as for the dimensions, the highest reliability was presented in symptoms (0.91) followed by the dimension of stressors (0.79) and coping strategies (0.68), these results

were slightly higher than the method of the two halves and Cronbach's alpha, especially in the reliability of the whole scale and in the dimension of coping strategies.

Construct Validity

For the construct validity of the instrument, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were used. EFA involves taking into account a factor structure based on a conceptual model and applying the factor analysis on a data sample to check whether the resulting structure was coincident or not with the theoretical structure (Barraza, 2007).

Using a statistical program, and applying the AFE, it was obtained that the KMO indicator (Kaiser-Meyer-Olkin) has a value of 0.891, which means that the total sample is appropriate to perform the factor analysis. Bartlett's test of Sphericity indicated that there is intercorrelation between the items ($p=0$). The method used in the PFA was the principal components method

Table 3.

Matrix of rotated components"

Item	Dimension		
	Symptoms	Stressors	Coping strategies
Competition with peers in the group.	0,377		
Overload of homework and university work		0,588	
The personality and character of the teacher.		0,612	
Teacher evaluations (exams, essays, research papers, etc.).		0,753	
The type of work the teachers ask you to do (exams, essays, etc.), research work, etc.).		0,803	
Class participation (answering questions, presentations, etc.).		0,481	
Not understanding the topics covered in class.		0,537	
Limited time to do the job		0,613	
Sleep disorders (insomnia or nightmares).	0,575		
Chronic fatigue (permanent tiredness).	0,684		
Headaches or migraines.	0,584		
Digestion problems, abdominal pain or diarrhea.	0,608		
Scratching, nail biting, rubbing, etc.	0,508		
Drowsiness or increased need for sleep.	0,643		
Restlessness (inability to relax and be calm).	0,621		
Feelings of depression and sadness (down).	0,707		
Anxiety, distress or despair.	0,709		
Concentration problems.	0,631		
Feelings of aggression or increased irritability.	0,705		
Conflicts or tendency to argue or quarrel.	0,629		
Isolation from others.	0,642		
Unwillingness to do college work.	0,662		
Increased or decreased food consumption.	0,489		
Assertive skills (defending our preferences, ideas or feelings without harming others).			0,588
Development of a plan and execution of its tasks.			0,602
Self-praise.			0,655
Religiousness (prayers or mass attendance).			0,439
Search for information about the situation.			0,700
Ventilation and confidences (verbalization of the situation of concern).			0,656
<i>Extraction method: principal component analysis.</i>			
<i>Rotation method: Varimax with Kaiser normalization.</i>			

To perform the CFA, we used the AMOS program version 23 (Uriel and Aldas, 2005; Levy and Varela, 2005) as the maximum likelihood method requires assumptions such as the assumption of multinormality, that is why we considered the method of unweighted least squares, which does not require rigorous assumptions.

with Varimax rotation. Also, the sample suitability indicator (MSA) for each item ranged from 0.595 to 0.949, indicating that the sample was adequate for each item. These values indicated that it was pertinent to make an AFE of the correlation matrix (Cuadras, 2014; Tusell, 2016). According to the rotated components matrix, it can be noted that the first factor identified with the symptoms dimension presented 15 items with correlation indexes between 0.489 and 0.707.

The second factor identified with the stressors dimension presented 7 items with saturations between 0.481 and 0.753, of which only item 1 showed ambiguous saturation. The third factor identified with the coping strategies dimension presented 6 items with saturations between 0.439 and 0.700. Correlation indices greater than 0.35 are considered acceptable (Moral, 2006). The AFE tested the three factors or dimensions considered with the theoretical model: symptoms, stressors and coping strategies.

According to the results, it was observed that items 1 to 8 present factorial saturations or loadings different from zero; each of these items are associated with the stressors dimension (values from 0.45 to 0.63). Likewise, all the items considered in the symptoms dimension are related to this dimension (items 9 to 23), values from 0.44 to 0.74 each of these items are related

to the symptoms dimension. Also, the items considered in the coping strategies dimension (items 24 to 29) obtained factor loadings values from 0.33 to 0.61, so it was inferred that each of these items are associated with this dimension.

On the other hand, the correlation between the stressor dimensions and the symptom dimension was 0.70, which means that there is a direct association between these two dimensions. The correlation index between symptoms and coping strategies dimensions was

-0.08, which means that there is a negative association between these dimensions. On the other hand, there is a low positive relationship between the stressor dimensions and coping strategies (0.15).

The goodness of fit indices are GFI=0.964, AGFI=0.958, NFI=0.946, RFI=0.942 are greater than 0.90, thus indicated an adequate fit for the academic stress model with the three dimensions of the SISCO inventory.

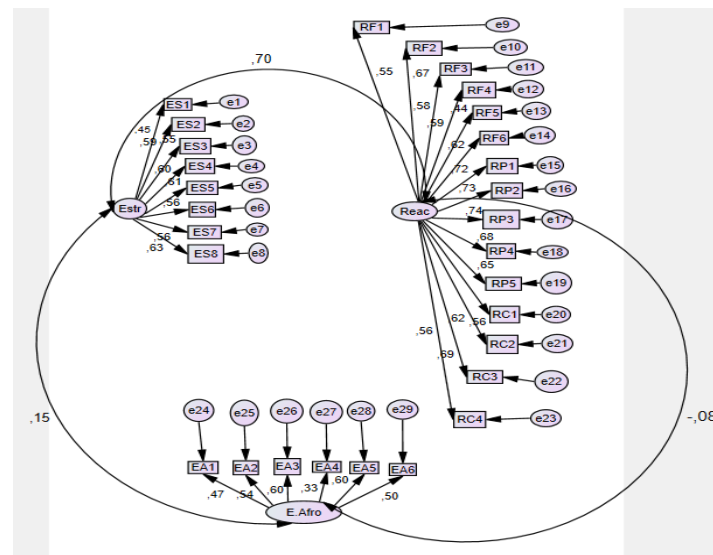


Figure 1.

Results of factor analysis - AMOS program - Unweighted least squares method

Discussion

The reliability analysis for each half of the inventory obtained a good reliability of (0.86 and 0.76); likewise, when evaluating the reliability of the scale as a whole by the method of the two halves, a good reliability of 0.85 was obtained. Using Cronbach's Alpha coefficient to the whole scale, an acceptable reliability of 0.89 was obtained; for the stressors dimension, a value of 0.79 was reached; for the symptoms or reactions to stress dimension, a value of 0.91 and for the coping strategies dimension, this value was 0.67. With the Omega coefficient, similar results to those obtained with Cronbach's Alpha were obtained, resulting in a slightly higher value of 0.94 for the entire scale. Regarding the dimensions, the symptoms dimension presented the highest reliability of 0.91; it is followed by the stressors dimension with a value of 0.79 and the lowest reliability was obtained by coping strategies with 0.68. This allows inferring that young university students have little recourse to this strategy. Similar results were obtained in the study by Barraza (2007) and Malo, Cáceres and Peña (2010).

For the construct validity of the instrument, the (AFE) and the (AFC) were used. For the

AFE, the principal components method with Varimax rotation was used. Likewise, the sample suitability indicator (MSA) for each item ranged from 0.595 to 0.949, which indicated that the sample was adequate for each item. These values indicated that it was pertinent to perform an AFE of the correlation matrix (Cuadras, 2014; Tusell, 2016); items with saturation or factor loadings equal to or greater than 0.35 were considered (Barraza, 2007). It was found that the stressors dimension presented only one item (competition with group mates) with ambiguous saturation, being at the same time significant in the symptoms dimension, the symptoms and strategies dimensions did not present novelties.

The PFA tested the three factors or dimensions considered with the theoretical model: symptoms, stressors and coping strategies; these results were in agreement with the study of Barraza (2007).

To perform the CFA, the unweighted least squares method was used, which does not require rigorous assumptions. Items 1 through 8 presented factorial saturations (values from 0.45 to 0.63); each of these items is associated with the stressors dimension. Likewise, all the items considered in the symptoms dimension are

related to this dimension (items 9 to 23), values from 0.44 to 0.74 each of these items are related to the symptoms dimension. Also, the items considered in the coping strategies dimension (items 24 to 29) obtained factor loadings values from 0.33 to 0.61.

On the other hand, the correlation between the dimensions of stressors and the dimension of symptoms was 0.70 so there was a direct association between these two dimensions, this means that students with more stressors at the university will have more reactions or symptoms to academic stress or vice versa; if students have fewer stressors they will have fewer symptoms or reactions to stress. The correlation index between the dimensions symptoms and coping strategies was -0.08, which means that there was a low negative association between these dimensions; that is, students with more symptoms to academic stress will have fewer coping strategies. On the other hand, there was a low positive relationship between the stressors and coping strategies dimensions (0.15), which means that, in the presence of stressors, the student will have coping strategies.

The goodness of fit indices were $GFI=0.964$, $AGFI=0.958$, $NFI=0.946$, $RFI=0.942$ are greater than 0.90, thus indicating an adequate fit for the academic stress model with the three dimensions of the SISCO inventory.

Conclusions

In this research, it is concluded that the academic stress inventory has an acceptable or good internal consistency in both the total scale and its dimensions. Regarding the construct validity of the instrument, the AFE and AFC proved that the three dimensions considered with the theoretical model are symptoms, stressors, and coping strategies; the confirmatory analysis indicates an adequate fit for the academic stress model. Likewise, it is recommended to use the SISCO inventory of academic stress because it is an instrument that has acceptable internal consistency and has construct validity in the context of the FCM of a public university.

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