

## Validity and reliability of SISCO inventory of academic stress among health students in Chile

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### Abstract

**Objective:** To evaluate the factorial structure and internal consistency of SISCO inventory of academic stress in medical students.

**Methods:** The cross-sectional study was conducted at the School of Medicine, University of Concepcion, Chile, in 2014, and comprised second and third year students. Exploratory factor analysis was carried out to determine the reliability of each of the dimensions of SISCO inventory. Descriptive and correlational analyses were also conducted.

**Results:** Of the 155 students, 121 (78.1%) were female. The overall mean age was 20.5 +/- 1.55 years (range: 18.9-32.2 years). Of the total, 61 (39.4%) students were in the nursing programme, 10 (6.5%) in speech therapy, 16 (10.3%) in kinesiology, 10 (6.5%) in medicine, 20 (12.9%) in midwifery and 38 (24.4%) in medical technology. For stressor, somatisation and coping dimensions, a factor was identified, with Cronbach's alpha values of 0.76, 0.86 and 0.52, respectively. Correlation could only be established between the first two dimensions.

**Conclusion:** Stressors and somatisation dimensions of the SISCO inventory of academic stress were found to be validity and reliable.

**Keywords:** Academic stress, SISCO inventory, Psychometrics, Somatisation, Coping. (JPMA 68: 1759; 2018)

### Introduction

The psychological, neurological, immune and endocrine systems work collectively as the control mechanism for homeostasis. 'Stress' is a neuroendocrine, immune and behavioural response of the body to any demand placed upon it, which arises as a result of an interpretation of threat or danger, enabling the adaptation and survival of the living being.<sup>1</sup> The trigger factor of this adaptive response is called a stressor.<sup>2</sup>

Stress is a complex multifactor process in pathophysiological genesis, whose somatic expression can include gastrointestinal (GI) disturbances, obesity, adjustment disorders, depression and others.<sup>3</sup> When this arises in the context of an educational process, it is referred to as academic stress (AS).<sup>4</sup>

Various studies have shown that AS occurs in elementary students and increases as the student progresses through educational levels,<sup>4</sup> reaching its highest levels in college.<sup>5</sup> Higher education is the point at which AS becomes a response to the higher workload and coincides with the process of separation from the family, joining the job

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market and adaptation to an unusual environment. The university student population is a group that is subjected to homogenous activity with particularly stressful periods, resulting in exhaustion, reduced interest in studies and difficulties in dealing with their own environmental challenges.

AS has been described as a systematic process of adaptive nature and essentially psychological, presented descriptively in three stages: (i) The student is subjected to a series of demands, which under the assessment of the student, are considered stressors. (ii) These stressors lead to a systemic imbalance (stressful situation), manifested in several symptoms (indicators of imbalance). (iii) This systemic imbalance forces the student to take action to restore the coping system balance.<sup>6</sup> The existence of three procedural systemic AS components have been recognised: (i) stressor stimuli (input), (ii) symptoms suggestive of systemic imbalance, and (iii) coping strategies (output).<sup>6</sup> Based on this theoretical model, a self-descriptive psychometric instrument of 31 items was developed called the SISCO inventory of academic stress (SISCO-AS).<sup>7</sup> It was validated in Mexico and then later in Colombia among university populations.<sup>8,9</sup>

SISCO-AS has also been used in several studies,<sup>7,10,11</sup> showing good reliability with Cronbach's alpha values between 0.861 and 0.9. However, there are few validation results using this instrument, including in Latin America. In Chile no study has been done on its

psychometric properties.

When SISCO-AS was presented as a three-dimensional construct of AS from a cognitivist systemic perspective with good psychometric properties,<sup>7</sup> it supported the idea that each dimension functioned as a factor. Thus, the current study was planned to examine each dimension separately to determine the references to each of the conceptually different variables. This is the first study in Chile to assess the validity and reliability of the construct.

## Subjects and Methods

The cross-sectional study was conducted at the School of Medicine, University of Concepcion, Chile, in the first semester of 2014, and comprised second and third year students who were enrolled following short briefings during a mandatory class. Those who volunteered to participate and signed the consent form were included using convenience sampling. After approval was obtained from the institutional ethics committee, SISCO-AS was applied on the sample. SISCO-AS comprises 31 items.<sup>7</sup> The first is an initial filter, in dichotomous terms (yes-no), for determining whether the respondent will continue or not. The second item, with a single question, aims to identify the overall self-perceived level of AS. The third part has eight items to identify the frequency at which the environmental demands are valued as stressor stimuli. The fourth part consists of 15 items and identifies the frequency of symptoms or reactions to the stressor stimulus. Lastly, the fifth part has six items aiming to identify the frequency with which the individual uses coping strategies. Except the first part, all parts use a five-number value system similar to the Likert scale (1–5; 1=never; 2=very rarely; 3=sometimes; 4=almost always; 5=always).

To obtain evidence of validity associated with SISCO-AS construct, the factor structure of each part was analysed separately: stressors, somatisation and coping strategies were taken as different variables that could be used as independent instruments.

Exploratory Factor Analysis (EFA) is a statistical methodology of interdependence that aims to establish an underlying structure among the analysis variables, through correlation structures between them, defining groups of variables (factors) that are highly correlated with each other.<sup>12</sup> For EFA, the principal axis method of factor extraction recommended for this type of instrument was used.<sup>12,13</sup> The adequacy of the EFA in collecting data was analysed using the Bartlett's test sphericity for statistical significance ( $p < 0.05$ ), and the Kaiser-Meyer-Olkin (KMO) measure for sampling adequacy, which should be close to 1.0. Three

complementary criteria were used to identify the number of factors: (i) the Kaiser-Guttman criterion, or latent root, and (ii) the contrast fall criterion or Cattell (scree test), which are generally used for this purpose,<sup>12</sup> were added to the result of (iii) the Horn's Parallel Analysis (based on 5000 random samples). These are considered the most suitable tools for the purpose of a study like the current one.<sup>14</sup> Once the number of factors was established, an array configuration using the EFA with the direct Oblimin rotation method was used to determine the organisation of items, including a factor structure. A value of 0.3 was considered the minimum value to accept as an adequate load factor.<sup>12,15,16</sup>

Once the factors were identified, Cronbach's alpha coefficient reliability was calculated for each to estimate their internal consistency. Subsequently, the discriminative capacity of the items was analysed by calculating the correlation of each with the total fixed factor to which they were assigned.

Lastly, the factors were descriptively analysed, evaluating the correlation between them using the Pearson coefficient.  $P < 0.05$  was considered statistically significant. For data analysis, SPSS 22.0 was used.

## Results

Of the 166 students enrolled, 155 (93.3%) completed the instrument. Of them, 121 (78.1%) were female. The overall mean age was  $20.5 \pm 1.55$  years (range: 18.9–32.2 years). Of the total, 61 (39.4%) students were in the nursing programme, 10 (6.5%) in speech therapy, 16 (10.3%) in kinesiology, 10 (6.5%) in medicine, 20 (12.9%) in midwifery and 38 (24.4%) in medical technology. For the dimension of stressors, the KMO statistic (0.80) and the Bartlett's test ( $p < 0.001$ ) showed that EFA was pertinent. Kaiser-Guttman's criteria identified two factors with eigen values of 3.12 and 1.03, which explains 51.90% of total variance of the items. The scree test showed one factor through sedimentation graph, and the Horn's parallel analysis indicated one factor with an eigen value of 3.12 which was above the eigen values obtained by 95% (95th percentile) of the random samples. The Cronbach's alpha was  $\alpha = 0.762$ , with correlation between the items and the total corrected from  $r = 0.38$  (item 3.1) to  $r = 0.56$  (item 3.5).

For the dimension of somatisation, the KMO statistic (0.87) and the Bartlett's test ( $p < 0.001$ ) showed that the factor analysis was appropriate for the data. Kaiser-Guttman criterion identified four factors with initial eigen values greater than 1.0 (5.20, 1.32, 1.08, and 1.02) that explains 61.62% total variance of the items. The scree test identified one factor, and the Horn's parallel analysis