



Construction and Validation of Academic Stress Scale for 18-35-year-old Sri Lankan University Students

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ABSTRACT

This article describes the development and initial validation of a new instrument to measure the academic stress of university students in Sri Lanka. A 16-item scale was developed by reviewing the literature and conducting interviews. Surveys were conducted with 726 Sri Lankan undergraduate students, and Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were used to analyse the data. The Principal Component Analysis (PCA) with Oblimin rotation produced a two-component model of the Academic Stress Scale: (1) Stress due to lack of sufficient knowledge and (2) stress due to interpersonal relationships, which together explains 59% of the total item variance. The ASS is a reliable and valid instrument for measuring academic stress. A CFA suggested that the proposed factor model fits moderately well. Therefore, for researchers who have a particular interest in academic stress among Sri Lankan students, the ASS promises to be a helpful tool.

1. INTRODUCTION

According to the Transactional Model of stress developed by Lazarus and Folkman (1984), stress is when an individual perceives a threat that exceeds the perceived available resources to cope cognitively and behaviorally with a stressful situation. According to Karyotaki et al. (2020), university students experience stress due to various factors, including family pressures, financial concerns, and more, highlighting the multifactorial nature of stress. However, there is increasing evidence indicating that academic-related stress plays a significant role in contributing to students' overall stress levels. Further, academic stress can reduce motivation, impacting academic achievements (Pascoe et al., 2020). Academic stress is a specific type of stress. It is defined as psychological and physiological responses to stress that arise due to associated challenges such as substantial studying and extensive academic course load experienced in an academic environment (Yusoff et al., 2017). Therefore, the challenges faced within the educational context, such as academic workload and performance expectations, subject students to immense pressure, impacting their overall well-being. Academic stress is distinct from exam stress or examination anxiety: It is essential to understand that academic stress is not limited to exam stress and anxiety that a student could experience because of having to face an upcoming exam. Hence, academic stress is not a consequence of a stimulus (Putwain, 2007). On one hand, Stress that arises when education is viewed as a challenge could lead to a sense of competence and an enhanced learning ability. On the other hand, perceiving education as a threat can induce stress, resulting in hopelessness and a sense of impending loss (Lazarus, 1966).

The Academic Stress Scale (Kohn & Frazer, 1986), the Lakaev Academic Stress Response Scale (Lakaev, 2009), and the Student-Life Stress Inventory (Gadzella, 2001) are the most widely

used scales with good psychometric properties that are available to measure academic stress among undergraduate students. These scales were developed and validated in Western countries, and these scales were not designed to tap into expectations of self, parents, and teachers, which were reviewed to be powerful, meaningful, and salient in the lives of Asian students (Ang & Huan, 2006a). However, in the recent past, scales to measure academic stress have been developed by several researchers to match their cultural context. To name a few, the Scale for Assessing Academic Stress (Sinha et al., 2001) was developed in Nepal. The Perception of Academic Stress Scale (Dalia Bedewy & Adel Gabriel, 2015) in Egypt, the Academic Stress Scale (Rajendran & Kaliappan, 1991) in India, and the Student Stress Inventory (Mohamed Arip, M. A. S., 2015) in Malaysia. However, the problem is the inadequate use of appropriate statistical procedures to develop and validate these questionnaires. Although the scales have good reliability and factor structure, there is no evidence for Confirmatory Factor Analysis, and the scales were developed using considerably small sample sizes. Therefore, although not exclusive to academic stress, the Perceived Stress Scale (PSS) (Cohen et al., 1983) is a popular tool for assessing general stress perception. It is often used in academic settings due to the lack of a highly validated specific scale.

1.1 Sri Lanka on Academic Stress

Much explanatory research has been conducted using non-standardized scales to identify the nature of academic stress experienced by undergraduate university students in Sri Lanka. Different factors influencing stress among undergraduates have been identified, such as academic, environmental, family-related, and personal factors. Among them, academic factors are the leading cause of increasing stress among undergraduates of Sri Lankan universities (Amarasinghe, 2013; Damayanthi, 2014). In the study conducted by

Peiris et al. (2021), using a stratified random sample of 343 first-year and final-year students from the Faculty of Allied Health Sciences of the University of Ruhuna in Sri Lanka revealed that 35.6% (n=122) of students reported feeling often stressed. The major prevailing academic-related activities are academic curriculum, difficulty understanding lecture content and lecturers, exams, and presentations. In this study, data was collected by drafting a questionnaire with a rating scale to assess the stress level and type of stressors. Similar studies conducted by Weerasighe et al. (2012) and Senerath (2020) identified heavy academic workload, large amount of content to be learned, and facing examinations as the top three academic-related stresses among state university students in Sri Lanka. These studies have aided in identifying key factors that students consider the most stress-inducing academic activities in Sri Lanka.

Based on the research conducted by Peiris et al. (2021) with a sample of 343 undergraduate students in Sri Lanka, 51.9% (n=178) of students use maladaptive coping strategies such as using alcohol and smoking to manage academic stress. Research conducted in other countries also has evidence for using smoking and alcohol to cope with academic stress, specifically among undergraduate medical students (Deressa & Azazh, 2011; Gignon et al., 2015). According to Senerath (2020), to combat stress, students in Sri Lanka tend to get involved in religious activities such as 'bodhi pooja,' 'chanting sutra,' and praying based on religious beliefs and faith. Further in his research, parental influence on studies is identified as a stress-related trigger factor.

Based on past research conducted in Sri Lanka, it is evident that academic stress has been a topic of concern in recent years. There is a requirement for a standardised assessment tool because of the absence of an academic stress scale specific to Sri Lanka despite the growing body of research indicating that stress negatively affects students.

Therefore, the purpose/aim of this study is to create a valid and reliable scale for assessing the stressors that students encounter within the academic environment among undergraduates in Sri Lanka. The construction of the scale attempts to fit the research gap by incorporating a more comprehensive range of stress factors experienced by undergraduate university students in Sri Lanka and would be helpful to gauge the level of academic stress for professional intervention, such as developing preventive measures and supporting coping skills.

1.2 Objectives:

1. To conduct a focus group discussion to identify the underlying factors contributing to academic stress.
2. To employ Principal Component Analysis (PCA) for dimension reduction and to assess the initial structure of the questionnaire items.
3. To evaluate the model fit and measurement structure using Confirmatory Factor Analysis (CFA).

2. METHODS

Focus group discussions were conducted with 5 undergraduate students to construct a scale to assess academic stress. During the discussion, students gave feedback and reported on the stress factors that frustrate them in the university environment relating to academics. Further, they elaborated on the facts that prevent them from developing their full potential. After the content analysis and extensive literature review, which guided item construction, 16 items were constructed by the authors to develop the scale. Then, the items were examined by an expert in the psychology field, and after agreeing to the overall scale structure, the scale was pilot tested with 15 students, and the feedback received was

positive, which meant students could understand the questions clearly. Therefore, no changes were made.

At first, to conduct an EFA, the final 16-item scale was physically distributed among 150 undergraduate students using a convenient sampling method. Of the 150 participants, 95(63%) were from state universities and 55(36%) were from non-state universities. Secondly, Further data was collected from a sample of 726 undergraduate students studying at the Sri Lanka Institute of Information and Technology (SLIIT) campus, using online data collection methods, to conduct a CFA. All participants were within the age range of 18-35 years.

Students were asked to rate each item on a 5-point Likert-type scale (from 1 = always, 2 = very frequently, 3=occasionally, 4= rarely and 5 = Never) on their perceptions and experiences about each item as a source of academic stress. Afterwards, students were asked to provide demographics such as gender, age, and whether they studied at a state or a non-state university.

Data analysis tools used to demonstrate the reliability and validity of the scale were SPSS 26 and software R. The collected data was processed and analysed for internal reliability, and a PCA was used to explore the underlying structure of the newly developed questionnaire. Following PCA, CFA was conducted with an independent sample, to test the fit of a hypothesised model based on the results of the PCA.

3. RESULTS

3.1 Exploratory Factor Analysis (EFA)

The 16 items of the Academic Stress Scale (ASS) were subjected to principal components analysis (PCA) using SPSS version 26 to check construct validity. Prior to performing PCA, the suitability of data for factor analysis was assessed.

Inspection of the correlation matrix revealed the presence of many coefficients of 0.3 and above. The Kaiser-Meyer-Olkin (KMO) value was 0.90, exceeding the recommended value of 0.6 (Kaiser 1974), and Bartlett's Test of Sphericity reached statistical significance ($p < 0.05$), supporting the factorability of the correlation matrix.

Principal components analysis revealed the presence of three components with eigenvalues exceeding 1, explaining 42.6%,9.2%, and 7.6% of the variance, respectively. Inspecting the scree plot revealed a clear break after the second component. Using Catell's (1966) scree test, it was decided to retain two components for further investigation.

The two-component solution explained a total of 51.8% of the variance, with component 1 contributing 42.6% and component 2 contributing 9.2%. To aid in interpreting these two components, oblique rotation (direct oblimin option) was performed. The rotation solution revealed the presence of a simple structure, with both components showing many strong loadings and all variables loading substantially on only one component. The two factors had a moderate positive correlation ($r = 0.47$). The analysis results support the use of oblique rotation and that factors can be correlated.

Table 1: Structure Matrix for PCA with Oblimin Rotation of Two Factor Solution of Academic Stress Scale items.

Academic stresses	1	2
I have encountered difficulties when completing the assignments.	.822	.381
I feel that most of my study materials are incomplete and difficult to comprehend.	.811	.357
I feel my existing academic skills are not up to the standard of the degree.	.780	
I feel that the syllabus is heavy for me regarding some subjects.	.763	.334

I feel unprepared for the exam even though I have studied appropriate lessons.	.729	.371
I have difficulty in remembering all what I studied.	.723	.342
I feel my lecturers are fast, and it is difficult to grasp what they say.	.686	.424
I worry about the results after the exams.	.646	.434
I feel less interested in studying some subjects.	.619	.440
I find it difficult to deliver a speech or a presentation in front of my colleagues and the academic staff.	.568	
When exams and other evaluations are getting closer, I am engaging with superstitious activities than usual.	.428	.788
It is hard for me to focus on studying with family and working commitments.	.548	.759
I have a conflicting relationship with colleagues/staff authority.	.484	.703
I have experienced that when exams and other evaluations are getting closer, my consumption of alcohol/nicotine has increased.	.513	.702
I feel a lack of mutual support among colleagues when working as a group.	.400	.620
I feel lecturers/parents are having expectations on my academic performance.		.541

Extraction Method: Principal Component Analysis

Rotation Method: Oblimin with Kaiser Normalization

3.2 Reliability

The internal consistency reliability (Cronbach's alpha) was 0.9 for the 16 items of the Academic Stress scale. Factor 1 consists of 10 items with an internal consistency of alpha= 0.89, and factor 2

consists of 6 items with an internal consistency of alpha=0.79.

3.3 Confirmatory factor analysis (CFA)

Using the statistical analysis software R, a CFA was conducted to assess the fit of the exploratory model to the data from the sample (N =726). A set of goodness of fit indices was calculated. The fit indices (comparative fit index (CFI)= .843; root mean square error of approximation (RMSEA) = .086; standardized root mean square residual (SRMR)= .093) suggested that the hypothesized model fits reasonably well for 2 of the good fit indicators. A value of .90 or higher for CFI, an RMSEA of .08 or lower, and an SRMR of .08 or lower served as the indicators for an adequate fit (Byrne, 1994).

4. DISCUSSION

This study aimed to develop and verify the factorial structure of a scale measuring academic stressors among undergraduate students in Sri Lanka. The Academic Stress Scale demonstrated strong psychometric properties. The exploratory factor analysis (EFA) conducted on the initial item pool revealed a clear factor structure, confirming the scale's dimensionality. Two subscales (stress related to lack of sufficient knowledge and stress related to contextual behaviour and interpersonal relationships) were identified after factor analysis was performed for all the scale items. In this study, Factor 1, "stress related to Lack of sufficient knowledge," which accounts for 42.6% of the variance, revolves on the part of students, the sense of insufficient skills and knowledge to cope with the demands of the academic workload. The items identified for this subscale (10 items) were the most common. It accounted for the most significant proportion of the scale, suggesting that incompetence in knowledge is likely the most common fact related to academic stress. Factor 2 of the scale, "stress-related to contextual behaviour and interpersonal relationships," which

accounts for 9.2% of the variance, focuses on stress, which is indicated by the engagement in coping behaviours and stressful perceptions about the current state of interpersonal relationships.

Firstly, considering the variables with high loading values in the sub-scale “stress due to lack of knowledge,” the present study found that students perceive stress during the learning process. The learning process consists of assignments, difficulty comprehending study material, giving presentations, and lack of confidence. These items were supported by the prior findings that consistently identified lack of knowledge as a significant cause of academic stress among studies conducted in Sri Lanka using non-standardized methods (Senerath, 2020; Peiris et al., 2021; Mahees, 2020). Ang & Huan (2006a) claim that Asian students suffer more academic stress than their counterparts in English-speaking countries due to low satisfaction regarding their academic performance and high expectations. After all, lack of knowledge is a known dimension of academic stress, as evident in the Academic Stressors Scale for Bulgarian undergraduate students (Babakova, 2019).

Secondly, considering the variables with high loading values in the sub-scale, “stress due to contextual behaviour and interpersonal relationships,” variables that emerged on this theme are consistent with previous findings of Peiris et al. (2021), where stress is indicated by excessive use of alcohol, and other factors such as feeling overwhelmed by lack of support and parental expectations. Furthermore, Akhtar and Kroner-Herwig (2015) indicated that difficulties in dealing with other students are very likely to cause stress, and those who fail to manage their time appropriately due to many demands of their schedules and time experience stress in academic life (Lumban Gaol, N. T., & Lin, J-S., 2017).

Additionally, the present scale’s specific factors, such as “engaging in religious rituals or superstitious

activities than usual”, offered a more granular perspective on academic stress sources, which was not observed in other measures of currently available academic stress scales. However, such factors have been identified in previous research conducted in Sri Lanka (Senerath, 2020). These factors provide a comprehensive representation of the various manifestations of stress that students encounter in an academic context, specifically in the Asian context. Therefore, this newly developed scale encompasses various academic and contextually relevant stressors to students in Sri Lanka.

4.1 Implications and Limitations

The Academic Stress Scale is a valuable tool for education and psychology professionals, enabling them to assess and quantify the levels of academic stress experienced by undergraduate students. This scale’s demonstrated reliability and validity make it well-suited for evaluating student stress, ultimately aiding in developing effective stress management strategies and counselling services and most importantly, in identifying students who need extra support, such as tutoring services, to overcome the stress induced by incompetence in the subject matter.

Despite the commendable psychometric qualities exhibited by the Academic Stress Scale and its potential advantages, it is essential to acknowledge certain limitations. The scale’s development and validation primarily occurred within a specific context and population, constraining its applicability. The CFA was performed exclusively on a sample of students from the SLIIT campus, with both EFA and CFA involving only undergraduate students. Moreover, only the EFA sample was collected in person, and all the data for CFA was collected online; as a result, it is difficult to ensure data quality.

5. CONCLUSIONS

The Academic Stress Scale has exhibited strong reliability and demonstrated a sound fit in terms of structure and validity. Consequently, this tool can effectively assess academic stress among university students in Sri Lanka. It's important to note that scale development is an ongoing process, and further research is needed to evaluate and enhance its psychometric properties thoroughly. For instance, it should be administered alongside other established academic stress scales to confirm its construct validity, specifically convergent validity. Furthermore, additional data collection efforts are in process, with the intention of gathering in-person responses from a diverse group of university students covering both state and non-state university students to enhance the model's overall fit with the scale.

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