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Psychological Assessment

Validity and Reliability of the Perceptions of Academic Stress Scale

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Abstract

Higher education is replete with considerable changes, challenges, and novel situations for many Brazilian youths entering college. This study's objective was to translate, adapt, and verify the content validity and internal consistency of the Perceptions of Academic Stress Scale to measure university students' perceptions regarding academic stress and its sources. The study was performed in two stages. The first comprised the instrument's translation, adaptation, and content validity, and the second consisted of an assessment of its internal consistency. Both stages presented satisfactory results, with a strong inter-rater agreement and acceptable internal consistency measures. The verification of the content validity and the reliability of the PAS Scale for the Brazilian context resulted in an instrument with appropriate and relevant psychometric parameters.

Keywords: stress; university students; higher education; content validity; reliability.

EVIDÊNCIAS DE VALIDADE E CONFIABILIDADE DA PERCEPTIONS OF ACADEMIC STRESS SCALE

Resumo

Para muitos jovens brasileiros que ingressam na graduação, o ensino superior é um momento de enormes mudanças, desafios e novidades. Este estudo teve como objetivo traduzir, adaptar, verificar a validade de conteúdo e consistência interna da *Perceptions of Academic Stress Scale*, que avalia a percepção dos estudantes universitários a respeito do estresse acadêmico e suas fontes. O estudo foi desenvolvido em duas fases: na primeira, foi realizada a tradução, adaptação e validação de conteúdo da escala; na segunda, a avaliação da consistência interna. As duas fases do estudo geraram resultados satisfatórios, por meio de concordância forte entre os especialistas e medidas de consistência interna aceitáveis. O processo de verificação da validade de conteúdo e confiabilidade do *PAS Scale* para o Brasil disponibilizou um instrumento com parâmetros psicométricos adequados e pertinentes.

Palavras-chave: estresse; estudantes universitários; ensino superior; validade de conteúdo; confiabilidade.

EVIDENCIAS DE VALIDEZ Y CONFIABILIDAD DEL PERCEPTIONS OF ACADEMIC STRESS SCALE

Resumen

Para muchos jóvenes brasileños que ingresan en una carrera universitaria, la enseñanza académica es un momento de enormes cambios, desafíos y novedades. Este

estudio tuvo como objetivo traducir, adaptar, verificar la validad de contenido y consistencia interna del *Perceptions of Academic Stress Scale*, que evalúa la percepción de los estudiantes universitarios respecto al estrés académico y sus orígenes. El estudio fue desarrollado en dos etapas: en la primera fue realizada la traducción, adaptación y validación del contenido de la escala; en la segunda, la evaluación de la consistencia interna. Ambas fases del estudio generaron resultados satisfactorios, con un fuerte acuerdo entre los expertos y evidencia de confiabilidad través de una consistencia interna aceptable. El proceso de verificación de la validez de contenido y confiabilidad del *PAS Scale* para Brasil hizo disponible un instrumento con parámetros psicométricos adecuados y pertinentes.
Palabras clave: estrés; estudiantes universitarios; enseñanza superior; validad de contenido; confiabilidad.

1. Introduction

College education in Brazil has considerably expanded in recent decades. As shown by the census conducted by the National Institute for Educational Studies and Research Anísio Teixeira (INEP), there were 2,407 higher education institutions in 2006, compared to 2,364 in the previous year, showing a considerable increase in the period (INEP, 2016; 2017). Additionally, the census reveals that the enrollment of students in undergraduate programs increased from 8,027,297 in 2015 to 8,048,701 in 2016 (INEP, 2016; 2017).

With the increasing number of slots and students entering public and private universities in Brazil, certain phenomena have emerged in this population. For many Brazilian youths entering undergraduate programs, college represents a time of many changes, challenges, and novelties. However, for a considerable number of these individuals, instead of pleasant and rewarding experiences, the transition from high school to college and the search for training that will prepare them for a stable career in the future represent sources of stress (Pascoe, Hetrick, & Parker, 2020).

The systematized study of the concept of stress in the scientific field dates back to 1865, with the French physiologist Claude Bernard's observations. He believed that all living organisms, regardless of their differences and variations, had only one objective: preserving the constancy of their internal environment (Lyon, 2012). For Bernard, the challenges imposed to the integrity of an organism elicit responses intended to neutralize threats and stabilize its "internal environment"

(*milieu intérieur*), a condition necessary to achieve a free and independent life (Lovallo, 2016)

Since then, stress has been addressed from three distinct perspectives with specific concepts and definitions. One of which is the transactional model, and the primary defender is Richard Lazarus. He defines stress as a relationship between an individual and an environment considered strenuous or exceeding an individual's resources. Thus, it poses a threat to this individual's wellbeing (Lyon, 2012). According to Weglicki and Awad (2012), the way an individual perceives stress directly affects his/her values and, consequently, indirectly influences how s/he will cope with stressful situations, eliciting positive or negative health outcomes.

Studies show that certain events trigger stress among college students, mainly: inappropriate studying habits, time management problems, time spent in public transportation to commute to college (Hill, Goicochea, & Merlo, 2018), academic assignments, conflict situations faced with professors or peers, the feeling of not belonging, and lack of emotional support (Pascoe et al., 2020).

One way to investigate a phenomenon, such as the perception of stress, is by developing instruments to measure it. Measurement is an essential activity in science because it allows researchers to better understand people, objects, events, and processes (Morgado, Meireles, Neves, Amaral, & Ferreira, 2017). Thus, scales are developed with this purpose. A scale is an instrument composed of items on which scores are used to rate theoretical variables that cannot be directly observed (DeVellis, 2016). Additionally, the use of various items to measure a construct facilitates the identification and isolation of measurement errors of a specific item, leading to more accurate results (Boateng, Neilands, Frongillo, Melgar-Quiñonez, & Young, 2018).

Scales available in Portuguese and directed to the Brazilian context in which one wants to measure a given phenomenon are not always available. However, instead of developing an instrument from scratch, perhaps the most beneficial strategy is to translate and adapt an existing scale. As shown by Maltoni, Lisboa, Matos, Teodoro, and Neufeld (2019), translating and adapting an existing instrument is more convenient and interesting than developing a new one because it saves time and resources. Additionally, researchers can also access validity and reliability evidence concerning the original instrument, and, possibly, evidence concerning adaptations of the instrument conducted in other countries. For an

instrument to be considered valid, however, its translation and adaptation process should be performed with seriousness, always ensuring the quality of the translation of the original items by performing content validation of the instrument to the target context and assessing the reliability of the construct under study (Pasquali, 2010).

An instrument that proved to be appropriate for measuring stress perceptions among college students is the Perceptions of Academic Stress (PAS) Scale, developed by Bedewy and Gabriel (2015). It was applied to 100 students between 19 and 26 years old at the University of Tanta, Egypt. The scale is composed of 18 items distributed into four factors according to exploratory factor analysis, with the purpose to measure the perception of college students concerning academic stress and its sources. Students rate each statement on a scale ranging from 1 (Totally disagree) to 5 (Totally agree).

Bedewy and Gabriel (2015) report that the scale's development and validation process included students from an Egyptian university. However, the study does not provide information regarding the original language in which it was written, whether it was originally written in English or modern Arabic. Note that this scale has already been used in studies addressing students from other countries, like the United States (James, 2017), Australia (Fisher & Pidgeon, 2018), and India (Sharma, 2018), based on the publication in English. The same criterion was adopted in this study, which means that psychometric procedures were based on the scale written in English.

Given the previous discussion concerning the concepts and aspects of stress and college environment, this study's objective was to translate and adapt the PAS Scale for the context of Brazilian college students and verify its content validity and internal consistency.

2. Method

The study was developed in two stages. The first stage consisted of the translation and adaptation process along with content validation of the Brazilian version of the PAS Scale, according to the guidelines proposed by Pasquali (2010), consisting of four steps: A) translation; B) back-translation; C) expert panel assessment; and D) semantic analysis. The second stage refers to the verification of the internal consistency of the Brazilian scale and the final version called *Escala*

de Percepções de Estresse Acadêmico (EPEA), in a sample of Brazilian students attending different Engineering programs offered by the Federal University of Mato Grosso, Brazil.

2.1 Stage I

2.1.1 Participants

In this stage, three translators participated in the translation process, six judges composed the expert panel, and 35 undergraduate students attending the Civil Engineering Program at the Federal University of Mato Grosso (UFMT) took part in the semantic analysis. The following inclusion criteria were adopted to select the translators: a) being a researcher with at least a master's degree; b) being a native speaker of Portuguese; and c) to be familiar with the process of translating, adapting, and validating instruments to another language. The translators who would not be able to comply with the deadline were excluded.

The following inclusion criteria were adopted to select the judges: a) being a professor in a federal public university; b) having at least five years of experience in the study of the stress construct; and c) being familiar with the process of translating, adapting, and validating psychometric instruments. Not answering the manual of instruction (used to assess the items) correctly or not complying with the deadline resulted in being excluded from the panel.

Students attending the Civil Engineering Program at the UFMT were selected according to the following criteria: a) being enrolled in the brick-and-mortar modality of the undergraduate program; b) being enrolled in the Civil Engineering program offered by the UFMT; and c) having already attended at least one semester of the program. Those who failed to answer any of the scale's items were excluded.

2.1.2 Material

Different materials were used in this stage and are briefly described below:

a) Perceptions of Academic Stress (PAS) Scale: the translators used the original version of the scale for the translation and back-translation process.
b) Procedures Manual: to guide the expert panel in the assessment of the scale's translated version, providing instructions regarding clarity of language and practical and theoretical pertinence of the scale's items.

c) 4th version of the *Escala de Percepções de Estresse Acadêmico*: applied to the students who participated in the semantic analysis.

2.1.3 Procedures

A. Translation

A Brazilian researcher, proficient in English, was invited to translate the original instrument from English to Brazilian Portuguese. This process resulted in the first Brazilian version of the PAS Scale, named *Escala de Percepções de Estresse Acadêmico (EPEA)*.

B. Back-translation

At this point, a researcher, who is a native speaker of English and fluent in Portuguese, was invited to back-translate the first version of the *EPEA* into English. This process resulted in the scale's second version. Afterwards, a different researcher, a native Brazilian fluent in English, assessed each of this version's items. The objective was to verify whether the preliminary version was equivalent to the original scale. This assessment confirmed the translation to Portuguese, resulting in its third version.

C. Expert panel assessment

Six experts from the field of stress research analyzed the third version of the scale to verify content validity. The experts received clarification provided on a Procedures Manual that provided information regarding aspects of the structure and content of the Brazilian version of the scale.

Each item was rated regarding its Clarity of Language and Practical Pertinence on a five-point Likert scale: "(1) unclear"; "(2) slightly unclear"; "(3) moderately clear"; "(4) very clear"; and "(5) perfectly clear"; and then "(1) not very pertinent"; "(2) a little pertinent"; "(3) moderately pertinent"; "(4) very pertinent"; and "(5) very much pertinent". In terms of theoretical pertinence, the experts were asked to identify which of the four theoretical factors each item belonged to. These factors are described as follows:

(1) *Pressures to perform*. Items that concern excessive stress due to: peer competition, parents' expectation, and professors' criticism regarding the student performance;

(2) *Perceptions of workload and examinations*. Items that concern stress related to excessive workload, very demanding assignments, and concern about failing tests;
(3) *Self-perceptions*. Items that concern academic self-confidence, confidence that one will be successful in his/her future career, and confidence in making the most appropriate academic decisions;
(4) *Time restraints*. Items concerning having limited time for classes, not finishing assignments, difficulty catching up when being behind, and having limited time to relax (Bedewy & Gabriel, 2015).

The Content Validation Coefficient (CVC) was used to analyze inter-rater agreement in assessing the scale's items regarding the level of Clarity of Language and Practical Pertinence. According to Hernández-Nieto (2002), coefficients above 0.70 are considered adequate for studies with more than six judges. The Content Validation Coefficient for each item (CVCi) is defined as the ratio of the mean of the scores assigned by the experts ($\Sigma^{x}j$) to the maximum score on the Likert scale (Vmax) for a given item. The scale total CVC (CVCt) is defined as the ratio of judges' CVC for the whole scale (CVCj) to the Standard Error of the divergences between the judges (Pej). The CVCj is defined by the ratio of the scores total mean (assigned to all the scale's items) to the maximum score of the Likert scale. The Pej, in turn, is the reciprocal of the total number of judges (Nj) to the power of the total number of judges. These calculations were performed using Microsoft Office Excel, version 2019.

The analysis to verify Theoretical Pertinence was performed using the Kappa coefficient, which enabled verifying the inter-rater agreement regarding whether the items belonged to their respective theoretical factors. The most common form of this coefficient, proposed by Cohen, is the ratio of the proportion of times the experts reach an agreement to the maximum proportion of times they might agree on, both corrected for random agreement (Alexandre & Coluci, 2011). However, Cohen's Kappa coefficient is restricted to the analysis of cases that include only two judges. Consequently, in 1981, Fleiss developed an extension of the Kappa statistic, enabling the inclusion of multiple judges, which became known as Fleiss' Kappa (Matos, 2014). Because, in this study, six judges assessed the items, Fleiss' Kappa and its respective criteria were used, namely: "<0 = poor"; "0-0.20 = slight";

"0.21-0.40 = fair"; "0.41-0.60 = moderate"; "0.61-0.80 = substantial"; and "0.81-1 = almost perfect" (Landis & Koch, 1977). The Statistical Package for the Social Sciences (SPSS) version 2015, IBM, was used to calculate Fleiss' Kappa.

Additionally, at the end of the assessment of each item, there was a blank space called "Observations," where the experts could make notes and give their opinions and suggestions regarding the items. The experts' suggestions were taken into account to improve the content, language, and interpretation of the items in the Brazilian version of the scale. Thus, changes were implemented considering the experts' suggestions, resulting in the 4th version of the scale.

D. Semantic Analysis

In this step of the PAS Scale's adaptation process into the Brazilian context, 4th version of the scale, *Escala de Percepções de Estresse Acadêmico (EPEA)*, was applied to a convenience sample of 35 undergraduate students from the Civil Engineering Program at the Federal University of Mato Grosso. The participants received clarification regarding the study's objectives and critically analyzed each of the items. They were encouraged to express doubts or difficulty understanding any terms or items and concepts or regarding the instrument format.

The participants were instructed to report items they deemed difficult to understand, justify what was unclear in these items, and make suggestions to support researchers making changes in the future. The objective of this stage was to identify potential problems in interpreting items regarding their operational, conceptual, semantic, or idiomatic equivalence. This procedure resulted in the final version of the *EPEA*.

The participants signed free and informed consent forms, and the study project was approved by the Institutional Ethics Board (CAEE 03817118.0.0000.5690).

2.2 Stage 2

2.2.1 Participants

In this stage, the final version of the scale was applied to 296 students from the undergraduate Engineering programs offered by the Federal University of Mato Grosso: Civil Engineering, Computer Engineering, Control and Automation Engineering, Mining Engineering, Transport Engineering, and Chemical Engineering.

The Campus in the city of Cuiabá, MT, Brazil, offers only the Civil Engineering program; the remaining programs are offered by the campus in Várzea Grande, MT.

In Stage 2, the participants were selected according to the following inclusion criteria: a) being a student enrolled in the brick-and-mortar undergraduate programs offered by the Federal University of Mato Grosso (UFMT); b) being enrolled in one of the six Engineering programs offered by the UFMT; and c) having concluded at least one semester of the program. The exclusion criterion was being enrolled in an Engineering program offered by UFMT on other campuses.

2.2.2 Instrument

The final version of the Brazilian scale, called *Escala de Percepções de Estresse Acadêmico (EPEA)*, was used. This version has 18 items presenting potentially stressful situations to undergraduate students. The respondents should rate each of the 18 statements on a five-point Likert scale, ranging from 1 (Totally disagree) to 5 (Totally agree).

2.2.3 Procedures

After the coordinators of the programs provided their permission, the students' emails were disclosed. Afterward, an email was sent to the students with a message briefly explaining the study project and inviting them to take part in the study. A link was provided to access a Google form containing a free and informed consent form. The students confirmed their consent by clicking "YES," after which, access was granted to a sociodemographic questionnaire and the Brazilian version of the scale, *Escala de Percepções de Estresse Acadêmico (EPEA)*.

2.2.4 Data Analysis

One of the measures used to assess the scale's internal consistency was Cronbach's alpha (α). Regarding the coefficient interpretation, some studies recommend a coefficient above 0.70 to be ideal (Nunnally & Bernstein, 1994), though other studies consider that coefficients above 0.60 are satisfactory for academic studies (Streiner & Kottner, 2014).

In addition to Cronbach's alpha (α), the McDonald's omega (ω) was used to estimate the scale's reliability. Even though there are controversies regarding

specific cut off points to interpret the McDonald's omega (ω) (Revelle & Zinbarg, 2008), we opted for the parameters recommended by Campo-Arias and Oviedo (2008), in which ω_t (total omega) values between 0.70 and 0.90 are considered acceptable in the assessment of an instrument's reliability.

R, a free software environment for statistical computing and graphics, version 3.6.1, was used to calculate alpha (ω) and omega (ω) using the psych package[2] and the programing code commands suggested by Revelle (2019).

3. Results

3.1 Stage 1

Translator 1, responsible for translating the original scale in English into Brazilian Portuguese, highlighted two aspects: a) regarding item 3 (***I can make*** *academic decisions easily*), he provided two alternatives with similar, though not exact meanings, to adapt the item (***Eu posso/consigo*** *tomar decisões acadêmicas facilmente*), letting at the discretion of the primary author to chose the most appropriate; and b) regarding item 7 (*I fear failing* ***courses*** *this year*), he highlighted that a literal translation of the word *courses* in Portuguese is *cursos*, but the term used in the Brazilian context is *disciplinas* (*Eu receio falhar nas* ***disciplinas*** *este ano*), considering what the item is intended to communicate.

After considering these suggestions, the first version of the scale was submitted to the back-translation. Translator 2, responsible for back-translating the Brazilian version into English, did not make any significant changes, and the second version was obtained. This version was compared, item-by-item, with the original version of the scale. Translator 3 reconciled both versions without making any substantial changes, obtaining the scale's third version, which was later sent to the expert panel for assessment.

Figure 3.1.1 presents the overall results concerning agreement obtained by the six experts in assessing each item in the *Escala de Percepções de Estresse Acadêmico (EPEA)*. All the scale's items obtained a Content Validation Coefficient (CVC) above 0.70, considered adequate according to the parameters established by Hernández-

2 *Psych*: procedures for psychological, psychometric and personality research. Retrieved from http://cran.r-project.org/web/packages/psych/index.html

Nieto (2002). Similar results, CVC higher than 0.70, were also obtained for practical pertinence. Additionally, the total CVC of the *Escala de Percepções de Estresse Acadêmico (EPEA)* for the aspects previously mentioned was 0.92.

Figure 3.1.1. Results concerning the expert panel (n = 6) in the assessment of content validation of the *Escala de percepções de Estresse Acadêmico (EPEA).*

ITEMS	Clarity of Language (CVC)	Practical Pertinence (CVC)	Theoretical (Fleiss' Kappa)			
			PP	PWE	SP	TR
1. I am confident that I will be a successful student	0.87	0.83			6	
2. I am confident that I will be successful in my future career	0.93	0.80			6	
3. I can make academic decisions easily	0.87	0.87		1	5	
4. The time allocated to classes and academic work is enough	0.90	1.00				6
5. I have enough time to relax after work	0.77	0.93				6
6. My teachers are critical of my academic performance	0.73	0.97	6			
7. I fear failing courses this year	0.97	1.00		2	4	
8. I think that my worry about examinations is a weakness of character	0.93	0.83		1	5	
9. Teachers have unrealistic expectations of me	0.90	0.90	5		1	
10. The size of the curriculum (workload) is excessive	0.87	1.00		5		1
11. I believe that the amount of work assignment is too much	0.97	1.00		5		1
12. I am unable to catch up if I am getting behind my work	0.87	1.00		1	1	4
13. The unrealistic expectations of my parents stress me out	0.87	0.97	6			
14. Competition with my peers for grades is quite intense	1.00	0.97	6			
15. The examination questions are usually difficult	0.93	1.00	1	5		
16. Examination time is short to complete the answers	0.97	1.00				6
17. Examination times are very stressful to me	0.83	1.00	1	4	1	
18. Even if I pass my exams, I am worried about not getting a job	0.90	0.87			6	

Note: PP = Pressures to perform; PWE = Perceptions of workload and examinations; SP = Self-perceptions; TR = Time restraints.

Regarding the theoretical pertinence of the items, according to the parameters proposed by Landis and Koch (1977), a Fleiss' Kappa equal to 0.72 indicates substantial inter-rater agreement. Figure 3.1.2. presents the Kappa coefficients for each of the *Escala de Percepções de Estresse Acadêmico (EPEA)* factors.

Figure 3.1.2. Kappa coefficients concerning inter-rater agreement for each of the Escala de Percepções de Estresse Acadêmico (EPEA) factors.

Factors	Conditional Probability	Kappa	Asymptotic Standard Error	Z	P	Asymptotic 95% Confidence Interval Lower Limit	Asymptotic 95% Confidence Interval Upper Limit
PP	0.88	0.84	0.06	13.87	< 0.001	0.72	0.96
PWE	0.62	0.51	0.06	8.33	< 0.001	0.39	0.63
SP	0.81	0.72	0.06	11.85	< 0.001	0.60	0.84
TR	0.85	0.81	0.06	13.26	< 0.001	0.69	0.93

Note: PP = Pressures to perform; PWE = Perceptions of workload and examinations; SP = Self-perceptions; TR = Time restraints.

The factor *pressures to perform* obtained Kappa equal to 0.84, indicating an almost perfect inter-rater agreement. The factor *perceptions of workload and examinations* presented Kappa equal to 0.51, which corresponds to a moderate inter-rater agreement. The factor *self-perceptions* presented Kappa equal to 0.72, suggesting substantial inter-rater agreement. Finally, the factor *time restraints* obtained Kappa equal to 0.81, which indicates an almost perfect inter-rater agreement (Landis & Koch, 1977).

Even though the Kappa coefficients and CVC indicated the validity of the items in the *Escala de Percepções de Estresse Acadêmico (EPEA)*, the experts suggested some changes to improve the scale in general. Thus, modifications were implemented in the items, as presented in Figure 3.1.3.

Figure 3.1.3. Changes implemented in the EPEA based on the experts' suggestions.

Itens analisados (terceira versão da EPEA)	Itens para a Fase Final (quarta versão da EPEA)
1. Eu estou confiante de que serei um estudante bem-sucedido.	1. **Tenho confiança de** que **sou** um estudante bem-sucedido **academicamente**.
2. Eu estou confiante de que serei bem-sucedido em minha futura carreira.	2. **Tenho confiança de** que serei um futuro profissional bem-sucedido.
3. Eu posso/consigo tomar decisões acadêmicas facilmente.	3. Eu **consigo** tomar decisões acadêmicas facilmente.
4. O tempo destinado às aulas e aos trabalhos acadêmicos é suficiente.	4. O tempo destinado às aulas e aos trabalhos acadêmicos é suficiente.
5. Eu tenho tempo suficiente para descansar depois do trabalho.	5. Tenho tempo suficiente para descansar depois **de cumprir meus compromissos acadêmicos**.
6. Meus professores são críticos do meu desempenho acadêmico.	6. Meus professores são críticos **em relação a** meu desempenho acadêmico.
7. Eu receio falhar nas disciplinas este ano.	7. **Tenho receio de fracassar** nas disciplinas este ano.
8. Eu considero que minha preocupação sobre as avaliações é uma fraqueza de caráter.	8. Considero que minha preocupação a respeito das avaliações seja uma **fraqueza**.
9. Os professores têm expectativas não realistas sobre mim.	9. Os professores têm expectativas não-realistas sobre **meu desempenho acadêmico**.
10. O tamanho do currículo (carga de trabalho) é excessivo.	10. **A grade curricular (quantidade e carga horária das disciplinas)** é excessiva.
11. Eu acredito que a quantidade de compromissos/ trabalhos é exagerada.	11. Acredito que a quantidade de **trabalhos acadêmicos** é exagerada.
12. Eu sou incapaz de recuperar o trabalho perdido se deixar algo atrasar.	12. Sou incapaz de recuperar o **tempo perdido** se **deixo** algo atrasar.
13. As expectativas não realistas dos meus pais me estressam.	13. As expectativas não-realistas **de** meus pais me estressam.
14. A competição por notas, com os meus colegas, é muito intensa.	14. A competição por notas, com meus colegas, é muito intensa.
15. As questões das avaliações geralmente são difíceis.	15. As questões das **provas e/ou avaliações** geralmente são difíceis.
16. O tempo das avaliações é curto para completar as respostas.	16. O tempo das **provas e/ou avaliações** é curto para completar as respostas.
17. Época de avaliação é muito estressante para mim/ Momentos avaliativos são muito estressantes para mim.	17. **Períodos avaliativos** são muito estressantes para mim.
18. Mesmo que eu passe nas provas, continuo preocupado(a) sobre conseguir um emprego.	18. Mesmo que eu **tire boas notas**, continuo preocupado(a) **com a possibilidade de não conseguir um emprego**.

All the experts suggested a change or made comments regarding some items. However, only some experts made suggestions in most cases. The agreement obtained regarding the observations was verified, and the items were adjusted.

As for the semantic analysis of each item in the *Escala de Percepções de Estresse Acadêmico (EPEA)*, none of the 35 students who took part in this stage

suggested any changes. Additionally, they reported the items were clear and easy to understand and had no difficulty completing the instrument.

3.2 Stage 2

Regarding the internal consistency of the final version of the scale, a Cronbach's alpha (α) equal to 0.83 was obtained for the total scale, with a confidence interval (CI95%) from 0.79 to 0.85, indicating satisfactory internal consistency (Streiner & Kottner, 2014). When calculating this measure, some of the items negatively correlated to the scale in general and, for this reason, were automatically inverted (i.e., items 1, 2, 3, 4, and 5).

Figure 3.2.1. Alpha (α) for the total scale and alpha (α) if an item was excluded (n = 296).

ITEMS	α
1. I am confident that I will be a successful student. -	0.82
2. I am confident that I will be successful in my future career. -	0.82
3. I can make academic decisions easily. -	0.81
4. The time allocated to classes and academic work is enough. -	0.82
5. I have enough time to relax after work. -	0.82
6. My teachers are critical of my academic performance.	0.83
7. I fear failing courses this year.	0.82
8. I think that my worry about examinations is a weakness of character.	0.82
9. Teachers have unrealistic expectations of me.	0.82
10. The size of the curriculum (workload) is excessive.	0.82
11. I believe that the amount of work assignment is too much.	0.81
12. I am unable to catch up if I am getting behind my work.	0.81
13. The unrealistic expectations of my parents stress me out.	0.82
14. Competition with my peers for grades is quite intense.	0.82
15. The examination questions are usually difficult.	0.82
16. Examination time is short to complete the answers.	0.82
17. Examination times are very stressful to me.	0.81
18. Even if I pass my exams, I am worried about not getting a job.	0.82
TOTAL	0.83

Note: "-" indicates the item negatively correlates with the scale in general.

The other reliability index used, that is, McDonald's omega (ω_t), was equal to 0.86, indicating acceptable reliability of the final version of the *Escala de Percepções de Estresse Acadêmico* (Campo-Arias & Oviedo, 2008).

Figure 3.2.2. Factorial loads, eigenvalues and McDonald's ω_t based on Schmid-Leiman's solution (n = 296).

Itens	g	F1	F2	F3	F4	h2	u2	p2
Item 1 -	0.37	-0.82				0.80	0.20	0.17
Item 2 -	0.38	-0.31		0.28	-0.25	0.42	0.58	0.34
Item 3 -	0.40	-0.46				0.44	0.56	0.36
Item 4 -	0.40	-0.26	0.41			0.40	0.60	0.39
Item 5 -	0.40		0.52			0.44	0.56	0.37
Item 6	0.23			0.26		0.14	0.86	0.37
Item 7	0.37	-0.31		0.24		0.32	0.68	0.42
Item 8	0.32			0.41		0.28	0.72	0.36
Item 9	0.39		0.26	0.26		0.28	0.72	0.54
Item 10	0.41		0.37			0.35	0.65	0.47
Item 11	0.48		0.43			0.45	0.55	0.51
Item 12	0.43	-0.39				0.38	0.62	0.47
Item 13	0.29			0.26		0.19	0.81	0.44
Item 14	0.32			0.35		0.23	0.77	0.45
Item 15	0.36				0.71	0.64	0.36	0.21
Item 16	0.35		0.33		0.38	0.42	0.58	0.29
Item 17	0.42			0.33	0.35	0.41	0.59	0.43
Item 18	0.29			0.46		0.29	0.71	0.28
Eigenvalues	**2.47**	**1.36**	**0.99**	**1.06**	**0.95**			
Total scores of ω_t	**0.86**	**0.71**	**0.72**	**0.57**	**0.64**			

Thus, both indexes (α and ω_t) were close and indicate that the instrument presents satisfactory reliability (Silva Junior, Vasconcelos, Griep, & Rotenberg, 2011). Additionally, this result is in line with the study performed by Revelle and Zinbarg (2008), which reports that the pattern presented by McDonald's omega is to exhibit higher values than Cronbach's alpha.

4. Discussion

The process of translating and adapting a scale into another language is a complex and arduous task. For achieving a useful instrument that is appropriate to the target population, not only idiomatic aspects should be taken into account. The

primary author also needs to deepen the knowledge of the construct the scale is intended to assess in order to ensure the quality of the final product.

For this reason, translators, who were also researchers in the academic milieu and had experience in the translation and adaptation of the scales, were chosen. The contribution provided by the experts after the scale was translated into Portuguese was also essential. The expert panel highlighted aspects of the instrument that could be improved, paying attention to the accuracy of the language and ensuring that the construct we intended to assess – in this case, academic stress perceptions – would clearly and objectively represent each item. Every careful and detailed step implemented during the process elicited satisfactory results. The Brazilian version of the scale presented statistically significant results in terms of clarity of language and practical and theoretical pertinence in both the statistics used (content validation coefficient (CVC_t = 0.92) and Fleiss' Kappa (Kappa = 0.72)).

The results from the analyses of the two reliability measures (Cronbach's α and McDonald's ω_t) were acceptable and sufficient. These findings corroborate studies that adopted the PAS Scale in terms of validity evidence, such as Sharma (2018) and James (2017). In the study by Fisher and Pidgeon (2018), validation was conducted in a heterogeneous group of 207 Australian students, and the PAS Scale was revised and reduced to a 15-item scale, with a three-factor model that obtained satisfactory reliability. This result provided significant advancements regarding the scale's applicability, considering that one of the main weaknesses of the original study developing the PAS Scale was the small sample used (only 100 Egyptian students from a single class). Results such as this reinforce the importance of having an instrument to identify the perceptions of college students regarding academic stress, considering that stress is an issue usually related to the program's curricular structure, the relationships established with the faculty, or the characteristic inherent to the program (Pascoe et al., 2020).

5. Conclusions

One of this study's limitations refers to the number of participants and the fact the sample was homogeneous, composed only of students enrolled in engineering programs. This weakness shows the need for future studies to adopt representative samples of college students that include different academic fields in

higher education institutions to obtain results that promote a better understanding of the academic stress phenomenon.

Additionally, a larger and more heterogeneous sample would allow for the analysis of other psychometric parameters, Confirmatory Factor Analysis (CFA) for instance, to verify the applicability of the factor model in the Brazilian population, and to verify the possibility of reducing the number of items to refine the instrument even more.

Finally, it is important to note that universities, especially public universities, provide a broad educational context, in which students receive not only technical and professional training, but also this context promotes the students' full development, ensuring they receive the support necessary to properly deal with challenges and difficulties faced during their academic experience. In this sense, the Brazilian version of the PAS Scale, called *Escala de Percepções de Estresse Acadêmico (EPEA)*, is an instrument that enables higher education institutions to identify the factors potentially affecting the mental health of college students, providing indicators that enable the development of interventions intended to improve the students' quality of life.

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