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Psychological Evaluation

Self-Generated Stress Scale: Adaptation and validity evidence for the Brazilian context

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Abstract: Self-generated stress has been defined as stress generated by an individual on themselves, adding tension to an already existing situation. This research comprised two studies: the first one aimed at adapting the instrument to the Brazilian context, and the second one sought to investigate validity evidence for the Self-Generated Stress Scale (SGSS), based on its internal structure and its relationship with external variables. A total of 205 graduate students (*Stricto Sensu*) from Brazilian educational institutions took part in the study. The results obtained through Confirmatory Factor Analysis revealed a structure identical to the original one-factor, seven-item model. The reliability coefficients were satisfactory (alpha and omega = .90) and the SGSS model fit indices were adequate (χ^2/114, *df* = 14, $p < .001$; CFI = .95; TLI = .92; RMSEA = .09). Therefore, it can be concluded that the scale possesses sufficient psychometric properties to assess self-generated stress.

Keywords: stress, psychological assessment, factor analysis

Escala de Estresse Autogerado: adaptação e evidências de validade no contexto brasileiro

Resumo: O estresse autogerado tem sido definido como o estresse gerado pela própria pessoa, o qual acrescenta tensão à situação pré-existente. A pesquisa possui dois estudos, o primeiro objetivou adaptar o instrumento para o contexto brasileiro e o segundo investigar evidências de validade da Escala de Estresse Autogerado (EEAG) baseadas na estrutura interna e na relação com variáveis externas. Participaram do estudo 205 estudantes de Pós-graduação *Stricto Sensu* de instituições de ensino brasileiras. Os resultados, obtidos mediante Análise Fatorial Confirmatória, revelaram estrutura igual ao modelo original de um fator e sete itens. Os coeficientes de fidedignidade foram satisfatórios (alfa e ômega = ,90) e adequados índices de ajuste da EEAG (χ^2/114, *gl* = 14, $p <$,001; CFI = ,95; TLI = ,92; RMSEA = ,09). Assim, pode-se afirmar que a escala possui propriedades psicométricas adequadas para a avaliação do estresse autogerado.

Palavras-chave: estresse, avaliação psicológica, análise fatorial

Escala de Estrés Autogenerado: Adaptación y evidencia de validez en el contexto brasileño

Resumen: El estrés autogenerado se ha definido como estrés generado por una persona sobre sí misma, el cual añade tensión a la situación preexistente. Esta investigación cuenta con dos estudios, el primero tuvo como objetivo adaptar el instrumento al contexto brasileño y el segundo, investigar evidencias de validez de la Escala de Estrés Autogenerado (EEAG) sobre la base de su estructura interna y de su relación con variables externas. En el estudio participaron 205 estudiantes de posgrado *Stricto Sensu* de instituciones educativas brasileñas. Obtenidos mediante análisis factorial confirmatorio, los resultados revelaron una estructura idéntica al modelo original con un factor y siete ítems. Los coeficientes de confiabilidad fueron satisfactorios (alfa y omega = ,90) y los índices de ajuste EEAG resultaron adecuados (χ^2/114, *gl* = 14, $p <$,001; CFI = ,95; TLI = ,92; RMSEA = ,09). Por lo tanto, se puede afirmar que la escala tiene propiedades psicométricas adecuadas para evaluar el estrés autogenerado.

Palabras clave: estrés, evaluación psicológica, análisis factorial

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In the early 1980s, research on stress began to encompass a wide range of approaches. Within Psychology, academic exploration regarding stress was incorporated into almost every subdiscipline, and a number of psychologists further differentiated various types of psychological stressors, including mental disorders (Robinson, 2018). Stress may be defined as a state of worry or mental tension resulting from a challenging situation (World Health Organization [WHO], 2023). It represents a specific connection between an individual and the surrounding environment, one that the person assesses as exhausting or exceeding personal resources, thereby jeopardizing well-being (Raja & Vijayakumar, 2017).

Definitions of stress differ in focus, ranging from threatening features inherent in the environment (stressful life events) and subjective appraisals of threat by individuals (psychological stress) to activation of the physiological systems that sustain behaviors necessary to respond to such threats (Cohen et al., 2016). These diverse definitions have been regarded as reflecting different stages within a model in which stressful life events, evaluated by the individual as hazardous, trigger behavioral and physiological reactions with possible implications for overall health (Cohen et al., 2016, 2019), mental health (Metreveli & Japaridze, 2022; O'Connor et al., 2021) and sociopsychological functions (Metreveli & Japaridze, 2022).

Modern society presents several stressors that permeate all areas of human activity, turning stress into an unavoidable phenomenon in daily life (Metreveli & Japaridze, 2022). Stressful situations may cause or aggravate mental health conditions, most frequently anxiety and depression. When persistent, these conditions can affect daily functioning in multiple life contexts (WHO, 2023), in addition to requiring access to specialized health care.

Self-Generated Stress (SGS)

SGS is defined as stress generated by an individual, adding tension to a pre-existing situation. It consists of perceiving a task as more difficult and unattainable than it actually is. By thinking and behaving this way, people create more stress for themselves and prolong the stress experience (Flett et al., 2020). SGS is part of a stress chain (dependent stress) in which, when facing a stressful situation, the person's own actions contribute to intensifying it (Fassett-Carman et al., 2023; Flett et al., 2020).

According to Hammen (1991), certain individuals may indeed be responsible for part or most of the stress in their lives by engaging in behaviors and making decisions that render life increasingly stressful. In other words, these people are the source of their own stress. This perspective considers stress as dependent on the actions and tendencies of the person experiencing it. Some people may be attuned to their role in generating stress, whereas others may be unaware of the ways in which they contribute to causing it (Flett et al., 2020).

Most of the stress experienced by people is self-generated. SGS is somewhat paradoxical because many individuals attribute the causes of feeling threatened, encouraged, discouraged, happy or sad to external factors; yet, most everyday disorders are created by responding to events in a negative way, which may take place due to unawareness or to inability to perceive things more objectively (Raja & Vijayakumar, 2017).

The studies on SGS have demonstrated associations with lower psychological well-being (Yazıcı-Kabadayı & Öztemel, 2024), as well as increased Burnout syndrome (Alberdi-Páramo et al., 2023), anxiety (Alberdi-Páramo et al., 2023; Fassett-Carman et al., 2020) and depression (Alberdi-Páramo et al., 2023; Fassett-Carman et al., 2020; Flett et al., 2020) levels. The presence of higher dependent stress may have significant implications for maintaining or worsening symptoms, eventually resulting in a vicious cycle of increasing stress and in the development of psychopathologies (Harkness & Washburn, 2016; Liu et al., 2024). Currently, SGS is understood as a transdiagnostic phenomenon; in other words, a psychological, behavioral, emotional or biological process present in multiple mental disorders rather than a single diagnostic category (Liu et al., 2024; Rnic et al., 2023).

Self-Generated Stress assessment

Researchers have employed three methods to measure episodic life stress from the stress generation perspective: interviews, checklists and hybrid approaches. The interviews assess contextual threats to determine the emergence and objective severity of stressful life events, whether stressors are truly episodic, whether they are dependent or independent and the objective threat level associated with each stressor. The self-report checklists require participants to review a predetermined set of negative life events and indicate which ones they experienced during a specified period; some checklists also ask people to indicate the frequency or severity of each event they have experienced. The hybrid approach involves applying a life events checklist, followed by an interview to probe further details regarding endorsed events, for example, to confirm that the events actually took place and were independent from each other or to obtain contextual information that eases coding their severity (Santee et al., 2023).

The way in which these stress generation assessments are conducted does not allow assuming that the person interviewed, or the one who reported stressful events on a checklist, is necessarily cognizant of their role in generating stress (Flett et al., 2020). Furthermore, according to the authors, some people may be highly attuned to their role in producing stress, whereas others may be unaware of how they have generated stress for themselves. Although there is some evidence indicating that individuals can identify stressors dependent on their own actions (Scallion & Cummings, 2018), no specific measure has been identified for such assessment (Flett et al., 2020). According to these authors, such assessment may be a useful tool for clinical and counseling contexts to determine whether a person that is a stress generator truly has a sense of contributing to life problems and other stressors. The specific emphasis lies in being aware about one's own personal tendency to intensify stressors and life problems in a way that the stress experience is prolonged and made more burdensome.

To address the identified gap for a specific self-generated stress assessment measure, Flett et al. (2020) developed an instrument called Self-generated Stress Scale (SGSS). It was designed based on literature (Hammen, 1991, 2006, 2020; Liu & Alloy, 2010) which argues that certain individuals may be responsible for part or most of the stress in their lives. The scale developed was applied to 228 Canadian university students and assessed a person's tendency to generate and contribute to personal stress by worsening a challenging situation or transforming a life problem into a greater one.

Initially, the instrument contained a set of 15 items, which were reduced to seven items after the Confirmatory Factor Analysis results. The analysis identified acceptable fit to the data: $\chi^2(14) = 44.06$, $p < .001$, Comparative Fit Index (CFI) = .93, Tucker–Lewis Index (TLI) = .90, Standardized Root Mean Square Residual (SRMR) = .05 and Root Mean Square Error of Approximation (RMSEA) = .09.

Subsequently, SGSS was adapted for Turkey by Yazıcı-Kabadayı e Öztemel (2024) and for Portugal by Brito et al. (2022), who confirmed its one-factor structure and identified good model fit indices and reliability coefficients above 0.80. In order to provide the Brazilian scientific community and practitioners working on this subject matter with a scale to assess self-generated stress, the current research comprises two studies. The first one aimed at adapting the instrument to the Brazilian context, and the second one sought to investigate validity evidence for the Self-generated Stress Scale (SGSS) based on its internal structure and on relationships with external variables.

Study 1 – Translation, back-translation and content-based validity evidence

Method

Participants

Stage 1 – Translation and back-translation. The translation process was carried out by three translators fluent in both languages. Two of them performed the English–Portuguese translation and the other one was in charge of the back-translation.

Stage 2 – Evaluation by judges. Three expert judges took part in this stage, all PhDs with experience in psychological assessments, two in studies regarding general stress and one in occupational stress. Five undergraduate students, five graduate students and five university professors participated as l ay judges.

Instruments

Translation and back-translation protocol: Original instrument (Self-Generated Stress Scale) with completion guidelines, allowing the inclusion of adaptations to make sense within the Brazilian context.

Evaluation protocol for expert judges: Self-Generated Stress Scale with items to be assessed for language comprehensibility, practical relevance and theoretical pertinence, through a five-point interval scale (1 = Minimally adequate, 5 = Highly adequate). It also contained an optional field for comments.

Self-Generated Stress Scale (SGSS) items: SGS1 (I have a habit of putting myself in situations that are more stressful than they need to be), SGS2 (The ways I have dealt with stress in my life have often resulted in extra stress for me), SGS3 (I seem to create many problems for myself), SGS4 (Much of the stress I feel is due to the choices I make), SGS5 (I seem to have a special talent for making a stressful situation much worse), SGS6 (Part of my stress reflects my decision to be associated with certain people), SGS7 (My mistakes tend to make things much more stressful for me).

Procedures

Data collection. The procedures were implemented in accordance with International Test Commission (2017) guidelines, which indicate that it is necessary to obtain permission from the copyright holder of the instrument. Furthermore, they stress the importance of ensuring that translation and adaptation processes consider linguistic, psychological and cultural differences in the target populations, by selecting experts with due knowledge about the instrument's subject matter. Finally, it is essential to provide evidence that the test instructions and item content have similar meaning for all intended populations.

Accordingly, the original scale authors were contacted and gave their consent to adapt the instrument to the Brazilian context. Subsequently, two translators were contacted by email and sent a Word file containing a table with two columns. The first column had the original English scale, and the second one included a blank space for each independent translator to produce their translation. After unifying both Portuguese versions, the unified version was sent to another translator for him to back-translate into the original language.

The unified version was then emailed to three expert judges, who evaluated it based on a protocol including the following analysis categories, in accordance with Cassepp-Borges et al. (2010): language comprehensibility, practical relevance and theoretical pertinence.

The lay judges were only asked to assess comprehensibility of each item. The objectives were semantic validation to determine whether instructions were clear, whether items and the answer scale were comprehensible, and to evaluate item intelligibility. The participants answered the items by means of a three-point scale, with 0 meaning 'I did not understand the item', 1 meaning 'I partially understood the item' and 2 meaning 'I fully understood the item'. At the end of each item there was an optional field for comments in cases of answers 1 and 3.

Data analysis. The analysis of translated items was compared across judges, and content validity was calculated through the Content Validity Coefficient (CVC) (Hernández-Nieto, 2002). According to the author, values above .80 are considered acceptable.

Results

After comparing the translations and the back-translation, the analyses indicated no need for changes; no divergences were either found between the versions produced by the two translators and the back-translator. The semantic equivalence assessment for the final Brazilian Portuguese version conducted by the expert judges identified language adequacy. The Content Validity Coefficient (CVC) was .96 for language, .98 for practical relevance and .97 for theoretical pertinence. The overall CVC of .96 was considered higher than the acceptable threshold of .90, according to Yusoff (2019). The lay judges considered the items clear and did not suggest any changes. The same applied to the answer scale. After compiling all the procedures undertaken in the instrument adaptation stage, a final consistent version was obtained to conduct the analysis regarding evidence on the instrument's internal structure.

Study 2 – Validity evidence based on internal structure and relationship with external variables

Method

Participants

The non-probability sample consisted of 205 *Stricto Sensu* graduate students from Brazilian higher education institutions. Most of the participants declared themselves as female (n = 122; 59.5%), heterosexual (n = 146; 71.6%), white-skinned (n = 148; 72.2%), in a stable union (n = 126; 61.5%) and having no children (n = 156; 76.1%). The respondents' age ranged from 21 to 64 years old (M = 33; SD = 9; M_o = 27).

Most of them were enrolled in academic or professional MSc programs (n = 120; 58.6%), at public universities (n = 134; 65.4%), attended first or second year (n = 131; 63.9%) and studied and worked at the same time (n = 130; 63.4%). The distribution of the participants according to the eight areas in the Knowledge Tree proposed by the National Council for Scientific and Technological Development (*Conselho Nacional de Desenvolvimento Científico e Tecnológico*, CNPq) – Brazil (http://lattes.cnpq.br/web/dgp/arvore-do-conhecimento) was as follows: Human Sciences (n = 46; 23.1%); Health Sciences (n = 33; 16.1%); Biological Sciences (n = 24; 11.7%); Social and Applied Sciences (n = 27; 13.6%); Linguistics, Literature and Arts (n = 26; 13.1%); Exact and Earth Sciences (n = 20; 9.8%); Agricultural Sciences (n = 17; 8.5%); and Engineering (n= 6; 3.0%). Most of the participants studied at universities in the South region (n = 114; 55.6%), followed by the Southeast (n = 25; 12.2%), Northeast (n = 25; 12.2%), Midwest (n = 22; 10.7%) and North (n = 19; 9.3%).

Instruments

Self-Generated Stress Scale (SGSS): Developed by Flett et al. (2020), it is a one-factor scale comprising seven items (example item: "I have a habit of putting myself in situations that are more stressful than they need to be"). The original scale presented adequate model fit: $\chi^2(14) = 44.06$, $p < .001$, CFI = .93, TLI = .90 and RMSEA = .09. The Cronbach's alpha coefficients for the original scale ranged from .79 to .85 across three different datasets. Each item is rated on a five-point Likert scale (1 = I strongly disagree, 5 = I strongly agree). The version tested in this study was the one resulting from Study 1, already adapted to the Brazilian context. (The scale in the Portuguese version can be found at the end of the paper).

Stress Subscale from the DASS-21 scale: Developed by Lovibond and Lovibond (1995) and adapted to the Brazilian context by Vignola and Tucci (2014). It consists of seven items (alpha = .86; example item: "I tended to over-react to situations"), assessed on a five-point Likert scale (1 = I strongly disagree, 5 = I strongly agree).

Emotional and Physical Exhaustion subscale from the Burnout Syndrome Assessment Scale for University Students (*Escala de Avaliação da Síndrome de Burnout em Estudantes Universitários*, ESB-eu), developed by Carlotto and Câmara (2020). This subscale has six items (*alpha* = .83; example item: "I feel I have little energy for other activities after my classes"). Its items are rated on a five-point frequency scale (0 = Never, 4 = Every day).

A sociodemographic questionnaire covered gender, race, sexual orientation, age, marital status, children and income; as well as academic variables including program type (MSc, PhD), year of enrollment, study dedication (part-time, full-time), CNPq knowledge area and region where the institution was located.

Procedures

Data collection. The research was presented to the participants through an electronic form, distributed via social media and through emails sent by the study authors to graduate program coordinators in all Brazilian regions. Data collection took place in July 2024 through a virtual platform. Participation was voluntary and anonymous, and the interested respondents expressed their agreement by completing an Informed Consent Form prior to starting the questionnaire.

Data analysis. The data were inspected for evidence of normality assumption violations regarding error distribution (Razali & Wah, 2011). A Confirmatory Factor Analysis (CFA) was conducted with the instrument's seven items. Model fit was evaluated using χ^2/df, Root Mean Squared Error of Approximation (RMSEA), Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI). Fit indices were considered adequate when RMSEA < .08 (preferably < .06) and CFI/TLI > .90 (preferably > .95) (Hu & Bentler, 1999). The analyses were performed in the JAMOVI software, using the robust Weighted Least Square Mean and Variance Adjusted (WLSMV) estimator (Han, 2022). Internal consistency for the instrument's factors was calculated with Cronbach's α and McDonald's ω, with values above .70 deemed adequate (Dunn et al., 2014). Pearson's correlation analysis was performed between the SGSS factors and the Stress dimension in

DASS-21, as well as the Emotional and Physical Exhaustion dimension in ESB-eu.

Results

The values obtained for skewness indicated data adequacy, ranging from -0.15 to 0.39, with literature indicating that acceptable skewness values are within ±1. As for kurtosis, the values ranged from -0.52 to -1.20, which is within the expected ±1.5 range, allowing concluding that the model has a normal distribution (Miles & Shevlin, 2001). The Cronbach's alpha and omega values were satisfactory (Tabachnick & Fidell, 2012), and semantic coherence of the items supports the conclusion that all of them contribute to the SGSS construct assessment. Cronbach's α and McDonald's ω were both .90 for the total scale (Table 1).

The fit indices obtained through the Confirmatory Factor Analysis indicated adequacy for the SGSS one-factor model of (χ^2/114, df = 14, p < .001; Comparative Fit Index (CFI) = .95; Tucker–Lewis Index (TLI) = .92; Root Mean Squared Error of Approximation (RMSEA); 90% Confidence Interval = .09 [.007 – .156]). The CFA results reveal that the items presented adequate loadings for the factors, meaning that all items had loadings above .70. The factor loadings and precision indices for the SGSS items are presented in Table 2.

Convergent validity was evidenced through the positive correlation between the SGSS total dimension and the Stress dimension in DASS-21 (Table 3).

In relation to convergent validity evidence, the polychoric correlation results indicated a strong and statistically significant positive association between SGS and the Stress dimension (r = .60; p < .01) and between SGS and the Emotional and Physical Exhaustion dimension (r = .50; p < .01) (Table 3).

Discussion

This study aimed at adapting the Self-Generated Stress Scale (SGSS) for the Brazilian context and to investigate its validity evidence in terms of internal structure and relationship with external variables. Regarding content validity evidence, the results showed high CVC indices, and the instrument was considered easy to understand. The semantic coherence within the set of items allows considering that all items contribute to establishing the construct regarding the self-generated stress assessment. Significant item correlations were above 0.30, indicating adequacy and that they therefore measure the same construct (Streiner & Norman, 2008).

As for reliability, assessed by the Cronbach's alpha coefficient and the McDonald's omega estimator (Dunn et al., 2014), this study identified a value of .90, which is higher than

Table 1.

Descriptive statistics and internal consistency for the SGSS items

Items	*M* (*SD*)	α	ω
SGS1	3.14 (1.19)	.85	.85
SGS2	3.41 (1.19)	.86	.86
SGS3	3.04 (1.29)	.84	.85
SGS4	3.25 (1.18)	.85	.86
SGS5	2.63 (1.24)	.84	.85
SGS6	2.81 (1.21)	.88	.88
SGS7	3.23 (1.27)	.86	.86

Table 2.

Factor loadings and precision indices for the SGSS items

Items/Factors	Estimate	Standard Error	*Z*	*p*
SGS1	0.93	0.07	12.63	.001
SGS2	0.89	0.07	12.31	.001
SGS3	0.92	0.07	15.85	.001
SGS4	0.91	0.07	12.83	.001
SGS5	1.00	0.07	13.52	.001
SGS6	0.70	0.08	8.68	.001
SGS7	0.90	0.08	11.12	.001

Table 3.

Polychoric correlation between the SGSS items

Items	1	2	3	4	5	6	7	SGS-T
SGS1	1							
SGS2	.60**	1						
SGS3	.73**	.70**	1					
SGS4	.58**	.54**	.70**	1				
SGS5	.59**	.58**	.69**	.62**	1			
SGS6	.34**	.41**	.48**	.41**	.58**	1		
SGS7	.48**	.50**	.57**	.60**	.64**	.52**	1	
SGS-T	.70**	.84**	.86**	.78**	.83**	.68**	.77**	1

Note. **p < .001

that of the original scale. In the original study, values ranging from 0.79 to 0.85 were observed in two different samples (Flett et al., 2020).

The factor loadings proved adequate for all items (each one above 0.70), surpassing the original scale, which presented loadings above 0.45. Regarding model fit, the indices obtained were quite close to those of the original scale, which presented $\chi^2(14) = 44.06$, $p = .001$, CFI = .93, TLI = .90 and RMSEA = .09. In the current study, the values identified were $\chi^2/df = 52.2$, $p = .001$, CFI = .95, TLI = .92 and RMSEA = 0.09. As expected, the results indicated a one-factor model.

Convergent validity evidence revealed statistically significant positive correlations between SGS and the Stress dimension, as well as with the Emotional and Physical Exhaustion dimension, reflecting a feeling of being worn out and unable to cope with one's own student tasks (Carlotto & Câmara, 2020). Thus, it is evident that, as measured by SGSS, self-generated stress proceeds in the same direction as the Stress dimension in DASS-21 and the Emotional and Physical Exhaustion dimension in ESB-eu. Therefore, along with the results regarding validity of its internal structure, reliability and convergent validity of the scale demonstrate that SGSS has adequate psychometric properties to study self-generated stress in the Brazilian context.

As study limitations, the participants' high schooling level is noteworthy. As a second limitation, there might have been certain response bias, given that SGSS is a self-report instrument and, therefore, veracity of the information provided cannot be guaranteed. From the results obtained and the limitations identified in this study, it is recommended that new validity studies with SGSS be conducted using random samples with varied sociodemographic characteristics from the general population. It is equally important to conduct factorial invariance testing, given the potential relevance of the scale for different population groups such as men and women, and younger and older individuals.

It is important to emphasize that, although the self-generated stress phenomenon is not new, the possibility of measuring it is still relatively recent at the international level and that there is no instrument available in Brazil for its assessment. Providing an open-access scale may become a valuable resource for researchers who wish to investigate the relationship between SGS and sociodemographic characteristics, general health problems, academic variables and occupational factors. In this way, the scale can be useful in clinical, educational and organizational contexts.

Its results may support interventions aimed at developing greater awareness among individuals regarding their role in generating stress, representing an important measure to prevent health problems in different life contexts.

Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

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