

Psychometric Evidence for the Lipp' Adult Stress Symptoms Inventory

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Abstract: Although stress assessment is important in different health areas, there are few instruments with adequate psychometric evidence to assess it. The study aimed to present new validity evidence of Lipp's Inventory of Stress Symptoms for Adults (LSSI), describe and discuss clinical characteristics of the LSSI with data obtained from patients seen in a hospital outpatient clinic and a Psychosocial Care Center (*Centro de Atenção Psicossocial - CAPS*). Sampling was based on post-stratification via the Raking method. In total, 4,500 participants from all over Brazil of both sexes, different age groups and academic levels composed the study. The results via Item Response Theory indicated a structure with high internal consistency. Symptoms of apathy, depression or prolonged anger were the most associated with stress and women scored higher. There was a significant correlation between the LSSI-R and another mental health measure (DASS-21) in the clinical group.

Keywords: psychological stress, self-evaluation, psychometrics

Evidências psicométricas do Inventário de Sintomas de Stress para adultos de Lipp

Resumo: Apesar da avaliação do estresse ser importante em diferentes áreas da saúde, há um escasso número de instrumentos com adequadas evidências psicométricas para avaliá-lo. O estudo teve como objetivo apresentar novas evidências de validade do Inventário de Sintomas de Stress para Adultos de Lipp (ISSL), descrever e discutir características clínicas do ISSL com dados obtidos por pacientes atendidos em um ambulatório hospitalar e um Centro de Atenção Psicossocial (CAPS). A amostragem baseou-se em pós-estratificação via método Raking. No total, 4.500 participantes de todo o Brasil de ambos os sexos, diferentes faixas etárias e níveis acadêmicos compuseram o estudo. Os resultados via Teoria de Resposta ao Item indicaram uma estrutura com alta consistência interna. Sintomas de apatia, depressão ou raiva prolongada foram os mais associados ao estresse e mulheres tiveram resultados mais altos. Houve uma correlação significativa entre o ISSL-R e outra medida de saúde mental (DASS-21) no grupo clínico.

Palavras-chave: stress psicológico, autoavaliação, psicometria

Evidencia psicométrica del Inventario de Síntomas de Estrés en Adultos de Lipp

Resumen: A pesar de la evaluación del estrés es importante en diferentes áreas de la salud, existe un número reducido de instrumentos con evidencia psicométrica adecuada para evaluarlo. El estudio tuvo como objetivo presentar nuevas evidencias de la validez del Inventario de Síntomas de Estrés de Lipp para Adultos (ISSL) describir y discutir las características clínicas del ISSL con datos obtenidos de pacientes atendidos en un Centro de Atención Psicossocial (CAPS). El muestreo se basó en la estratificación posterior mediante el método Raking. 4500 participantes de todo Brasil de ambos sexos, diferentes grupos de edad y niveles académicos integraron el estudio. La Teoría de Respuesta al Ítem indicaron una estructura con alta consistencia interna. Los síntomas de apatía, depresión ira prolongada fueron los más asociados con el estrés y las mujeres puntuaron más alto. Hubo una correlación significativa entre el ISSL-R y otra medida (DASS-21) en el grupo clínico.

Palabras clave: estrés psicológico, autoevaluación, psicometría

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There are a variety of typical situations in people's lives that can be perceived as challenging, harmful, or that provoke the need for major or intense changes in the way they behave and make decisions (Barrington et al., 2012). However, on some occasions, additional efforts are required to adapt to the demands and conditions of one's environment, cope with aversive

or conflicting events, or move away from them when they prove uncomfortable or dangerous.

In situations like these, there is the possibility of people experiencing unpleasant or uncomfortable physical and emotional sensations, typically related to the fight or flight system, which reflect malaise and difficulty in adequately coping with stressors (Cohen et al., 2007; Viertiö et al., 2021; Whiting et al., 2021). This scenario describes the manifestation of the phenomenon called stress or distress (Roozendaal et al., 2009). In turn, stress is understood as a reaction of the organism facing environmental changes or challenging or threatening situations, which require a repertoire of physical, emotional and cognitive responses, aiming to adjust to these changes or situations or to withdraw from them (Godoy et al., 2018).

Originally defined in 1926 by Hans Selye (Fernandes & Barbosa, 2017), stress is recognized as a complex and important phenomenon in basic and clinical research (Roozendaal et al., 2009), especially in areas of health and education (Rudland et al., 2020). The intense and voluminous research on stress in the specialized literature indicates that, besides being considered a fundamental biopsychological phenomenon for survival, it can also be strongly related to the manifestation of several mental health problems, especially mood and anxiety disorders and post-traumatic stress disorder (Lipp & Lipp, 2020).

Quite often, such a psychological condition is assessed by the use of instruments such as tests, inventories, and scales. Such instruments aim to generate numerical coefficients that summarize the amount of stress that a respondent is momentarily experiencing. However, there is still a scarce number of tests with adequate psychometric characteristics to assess stress symptoms (Fernandes & Barbosa, 2017). The public consultation list of the *Sistema de Avaliação de Testes Psicológicos (SATEPSI)*, lists only two instruments favorable for use, which are the *Escala de Stress para Adolescentes (ESA)* and the *Escala de Vulnerabilidade ao Estresse no Trabalho (EVENT)*.

The low number of favorable instruments for use has also occurred in other areas, especially neuropsychology (Guerra et al., 2022). This situation is aggravated when one considers the multiple areas in which psychology professionals work, as well as the heterogeneous characteristics of the Brazilian population.

That said, the study aimed to present new validity evidence of Lipp's Inventory of Stress Symptoms for Adults (LSSI), describe and discuss clinical characteristics of the LSSI with data obtained by patients seen in a hospital outpatient clinic and a *Centro de Atenção Psicossocial (CAPS)*. This study provides initial results to allow changes in structural characteristics of the scale later.

Method

Originally, 37,454 participants responded to the LSSI. The data collection process was online and by self-selection.

Situations like this tend to generate distorted sample data in relation to the population of interest and, consequently, decrease the accuracy of inferential processes.

The variables education, age group and for sex had strong distortion and interpretive biases (0.72, 0.46 and 0.24, respectively). The Raking Method (iterative proportional fitting) was used with the sex and age parameters defined by the *Instituto Brasileiro de Geografia e Estatística (IBGE, 2020)*. The correction initially relied on stratification using the stratified function of the R *splitstackshape* package, with random seed set to 123. Three steps were performed: the first adjusted the sex, the second the education and the last the age group.

An iteration process was defined so that the final base of participants (weighted base) would approximate the population characteristics. The results indicated that a sample of 4,500 participants would meet such established specifications. The comparison was made by the discrepancies between the original data the weighted base (Δ) as well as the design effects (DEFF). In the latter metric, low values close to 1 are considered optimal.

Participants

Two sample groups were used in this research. For psychometric analyses, the sample consisted of 4,500 participants. The proportion of men (56%) was higher than that of women, people with up to elementary school education were the most prevalent (43.3%), and age ranged from 15 to 74 years, with a mean of 39.8 and a standard deviation of 13.4. Approximately 25% or 904 of the participants did not identify their place of birth. The reason for such missing values was due to the fact that the answers were voluntary. Among the valid cases, 1928 (50%) participants were located in the Southeast, especially in São Paulo ($n = 778$) and Rio de Janeiro ($n = 606$). Of the participants, 616 (20%) were located in the South, with 222 in Rio Grande do Sul, 208 in Paraná, and 186 in Santa Catarina. In the Northeast region, there were 658 (20%) participants, Bahia ($n = 178$) and Pernambuco ($n = 173$) were the states with the most respondents. In the North region, 272 people (10%) participated in the sample and Amapá had the most participants ($n = 89$). Finally, the Midwest region had 122 participants (<1%), mostly in Goiás ($n = 51$), followed by Mato Grosso do Sul ($n = 41$) and Distrito Federal ($n = 30$). Table 1 presents these characteristics.

To evaluate clinical characteristics, a screening study of stress symptoms was conducted with 96 patients diagnosed with mental disorders (depression, anxiety disorders, and adaptive disorders), seen at a hospital outpatient clinic and a *Centro de Atenção Psicossocial* in Santa Catarina. In this sample, 71 participants were female (74%), most had high school education (56.3%), 12.6% had completed elementary school, and 31.3% had completed college education. The mean age was 36.3 ($SD = 13.3$), with a minimum age of 18 years and a maximum of 71 years. The occupations of the participants were varied, including students, public servants, self-employed, liberal professionals, domestic workers, retirees, etc.

Table 1
Results of the post-stratification calibration process (Raking Method)

	Brazil		Sample (n = 37,454)		Weighted dataframe (n = 4,500)		
	%	n	%	Δ	N	%	Δ
Education							
Elementary	40%	2740	7%	-33%	1950	43%	3%
High school	32%	12625	34%	2%	1550	34%	3%
Higher education	21%	22089	59%	38%	1000	22%	1%
Sex							
Male	49%	22898	61%	12%	2518	56%	7%
Female	51%	14556	39%	-12%	1982	44%	-7%
Age group							
15-19	7%	1327	4%	-4%	213	5%	-3%
20-24	8%	3844	10%	2%	384	9%	0%
25-29	8%	5591	15%	7%	500	11%	3%
30-34	8%	6088	16%	8%	621	14%	6%
35-39	8%	5658	15%	7%	607	14%	5%
40-44	7%	4696	13%	5%	568	13%	5%
45-49	6%	3987	11%	4%	501	11%	5%
50-54	6%	2981	8%	2%	396	9%	3%
55-59	5%	1525	4%	-1%	285	6%	1%
60-64	4%	693	2%	-3%	165	4%	-1%
65-69	3%	313	1%	-3%	102	2%	-1%
70-74	3%	751	2%	-1%	158	4%	1%
DEFF	2.88				1.12		

Note. DEFF = Design Effect; Δ = Difference.

Instruments

Lipp's Inventory of Stress Symptoms for Adults (LSSI): This is a tool for screening stress symptoms in youth and adults, composed of 53 items. The symptoms are organized into three tables in increasing order of time and severity based on stages of stress. The instrument helps to identify in which area (physical or psychological) the symptoms are most evident. The interpretation of its results is based on quartiles, which suggest that stress can manifest from minimal to severe. Its use involves studies with federal police officers and other public security contexts (Faiad et al., 2018).

Self-Report Scale (DASS-21), in its reduced version, adapted and with validation studies for Brazilian Portuguese. The DASS-21 is indicated to track symptoms of anxiety, depression, and stress. It is a scale composed of 21 items divided into three subscales: depression, anxiety, and stress (Martins et al., 2019). There are 3 levels of measurement for each item investigated: from 0 (zero) “does not apply at all” to 3 (three) “applies very much, or most of the time,” based on the instruction “to what extent does each statement apply to you over the course of the last week.” The depression subscale seeks to track indicators of hopelessness, self-depreciation, low positive affect, and devaluation of life; the anxiety subscale is related to physiological

hyper-stimulation, psychophysiological reactivity, and anxious affect; and the stress subscale is composed of items on relaxation difficulties, tension, impatience, irritability, and restlessness.

Procedures

Data collection. Regarding normative data, responses to the LSSI-R were collected between 2011 and 2021, by psychologists and with individual applications in different contexts, such as hospital, organizational, and clinical. The application of the instrument was done in an analogical way, in which the respondents should read the items of the instrument and then mark the presence or absence of behaviors listed by each item. The data obtained were scanned into a specific website and then tabulated into CSC format for future extraction. The survey had as exclusion criteria, responses from participants under 18 years of age.

Regarding clinical data, a screening study of stress symptoms was conducted with 96 patients, who presented diagnoses of mental disorders (depression, anxiety disorders, and adaptive disorders). The patients were seen in a hospital outpatient clinic and a *Centro de Atenção Psicossocial (CAPS)* in Santa Catarina. This study was carried out between the months of July and October 2021.

Data analysis. Data analysis was performed in three stages. Initially, the LSSI items were evaluated by descriptive measures, indicating the proportions of responses regarding the presence of stress symptoms and other descriptive indicators.

Then, the factorial psychometric model was computed by the weighted least squares estimator with tetrachoric matrix as input (DiStefano et al., 2019). To further analyze the items, the two-parameter logistic (2PL) Item Response Theory (TRI) model was computed using the Metropolis-Hastings Robbins-Monro (MHRM) algorithm. This model is well fitted to dichotomous data and estimates item discrimination (slope or parameter a) as well as endorsement difficulties (location or parameter b).

After standardizing the latent trait (θ) scores with mean 0 and SD 1 discrimination and difficulty analysis were performed. Discrimination indicates how well the item differentiates individuals with different levels of latent traits. Difficulty indicates the latent trait required for an individual to have a 1/2 (50%) probability of endorsing the item. The total information from the LSSI-R sums the item parameters.

To verify the internal consistency of the data, Cronbach's Alpha Coefficient and McDonald's Omega were used, as recommended by the current literature (Hayes & Coutts, 2020). The information obtained by the parameters of the items was also analyzed as an indicator of accuracy. Model adequacy was assumed if CFI or TLI \geq 0.9, RMSEA and SRMR \leq 0.08, and internal consistency estimators \geq 0.7.

To indirectly evaluate the characteristics related to the determinants of the response process, we defined a linear model considering a possible interaction between gender and education of the participant in the response to the LSSI-R. Paired comparisons were performed relying on Tukey's Method for correction of the P value.

Finally, Pearson's correlation was used to verify the relationship between the LSSI-R and the DASS-21 with the clinical group. The analyses were done in the R language, with the packages *tidyverse*, *anesrake*, *lavaan*, and *mirt*.

Ethical Considerations

The study was approved by the Research Ethics Committee of *Instituto Nacional de Educação de Surdos*, Opinion No. 5.059.126, CAAE No. 51561521.0.0000.8137. Data collection was only carried out voluntarily and after signing the Free and Informed Consent Term (FICT).

Results

The descriptive, reliability, and multivariate modeling results are shown in Table 2. The results of the factor analyses showed a one-dimensional model with adequate psychometric indicators. The factorial findings were $X^2(1325) = 19090.703$; $p < 0.001$; Robust CFI = 0.918 (CFI = 0.945), Robust TLI = 0.915 (TLI = 0.943), Robust RMSEA = 0.077 (RMSEA = 0.064), SRMR = 0.094. The TRI

model findings were $M2 = 9421,337$, $df = 1325$, $p < 0.001$, CFI = 0.948, TLI = 0.946, RMSEA = 0.052, SRMR = 0.054.

Cronbach's Alpha Coefficient and McDonald's Omega Coefficient concluded for high internal consistency of the data. The results were 0.93 and 0.94 respectively. Table 2 describes descriptive statistics of the LSSI-R, as well as the Cronbach's Alpha if a particular item was suppressed (Alpha), the correlation of the item with the total produced by the instrument (Cor), the standardized factor load obtained by the multivariate model (λ_{std}), and the TRI parameters for each of the items (a and b).

All items were correlated to the obtained dimensional structure and were discriminative. The total information curve of the LSSI-R reached a maximum value near 0.5 SD θ . This means that the instrument is more informative to those respondents who are possibly already experiencing a stressful condition. Such values and the representation of the information curve of the test are arranged in Figure 1.

The most discriminative item for stress symptoms was the one referring to symptoms of "prolonged apathy, depression, or anger" during the past month (factor loading $\lambda = 0.851$ and discrimination $a = 3.187$). This indicates that these symptoms are intrinsically related to stress, and can differentiate it from other clinical conditions. The symptom of "wanting to run away from everything" has the second highest discrimination power to stress (factor loading $\lambda = 0.821$ and discrimination $a = 2.619$).

Conversely, experiencing a "heart attack" in the last month was the item with the lowest discrimination to stress (factor loading $\lambda = 0.205$ and discrimination $a = 0.567$). This result indicates that "heart attack" relates to stress, but also to different other conditions. Thus, if someone has had a heart attack in the last month, this may indicate a stress condition, but also heart, metabolic, or other analogous problems. Therefore it is suggested that the item in the revised version be either reworded or removed.

The item that had the least difficulty for there to be a 50% probability of endorsement was the one indicating having experienced "excessive emotional sensitivity (being very nervous)" in the past week. This indicator suggests that for people with a standardized value (θ) of stress of 0.251, this symptom may or may not be present. In turn, having experienced a "heart attack" in the past month was the item with the lowest probability of endorsement. For there to be a 50% probability to flag such a symptom, one would need to have $\theta \approx 10$.

Comparison of results with respect to the participant's education and gender indicated a significant interaction effect ($F(2, 4494) = 18.617$, $p < 0.001$), which is visually presented in Figure 2. Men show greater stability in results regardless of the academic level they possess. In contrast, women's scores are significantly higher than men's when they have elementary school ($\Delta = 9.375$, $p < 0.001$), high school ($\Delta = 6.721$, $p < 0.001$), and college education ($\Delta = 5.249$, $p < 0.001$). In addition, women with elementary school education show higher scores than women with high school ($\Delta = 2.34$, $p < 0.001$) and higher education ($\Delta = 2.680$, $p < 0.001$).

Table 2
Descriptive data of the LSSI-R

Items	Descriptive		Reliability	Factor Analysis and IRT		
	<i>M</i>	<i>SD</i>	<i>Corr.</i>	λ_{std}	<i>a</i>	<i>b</i>
Item 1	0.16	0.37	0.36	0.491	1.075	1.795
Item 2	0.25	0.43	0.45	0.558	1.163	1.141
Item 3	0.16	0.37	0.47	0.636	1.592	1.475
Item 4	0.17	0.37	0.35	0.461	0.997	1.864
Item 5	0.39	0.49	0.48	0.608	1.310	0.467
Item 6	0.16	0.36	0.38	0.506	1.122	1.820
Item 7	0.09	0.29	0.27	0.397	0.853	2.859
Item 8	0.29	0.46	0.46	0.591	1.169	0.941
Item 9	0.12	0.32	0.47	0.653	1.744	1.616
Item 10	0.13	0.33	0.47	0.652	1.724	1.613
Item 11	0.09	0.29	0.27	0.482	0.668	3.658
Item 12	0.24	0.43	0.48	0.676	1.422	1.100
Item 13	0.20	0.40	0.31	0.395	0.766	1.984
Item 14	0.18	0.38	0.31	0.422	0.861	1.998
Item 15	0.33	0.47	0.24	0.318	0.569	1.418
Item 16	0.36	0.48	0.49	0.625	1.406	0.564
Item 17	0.25	0.43	0.61	0.754	2.154	0.886
Item 18	0.18	0.38	0.39	0.490	1.054	1.792
Item 19	0.42	0.49	0.59	0.770	2.029	0.251
Item 20	0.25	0.43	0.51	0.717	1.553	0.999
Item 21	0.14	0.35	0.32	0.449	0.828	2.458
Item 22	0.11	0.31	0.27	0.525	0.647	3.300
Item 23	0.36	0.48	0.57	0.786	2.001	0.498
Item 24	0.03	0.18	0.26	0.583	1.527	2.926
Item 25	0.21	0.40	0.57	0.752	2.028	1.080
Item 26	0.36	0.48	0.63	0.806	2.426	0.447
Item 27	0.24	0.42	0.58	0.738	2.033	0.938
Item 28	0.43	0.49	0.46	0.628	1.343	0.366
Item 29	0.30	0.46	0.61	0.807	2.479	0.620
Item 30	0.22	0.41	0.52	0.715	1.795	1.050
Item 31	0.07	0.25	0.28	0.452	1.111	2.823
Item 32	0.15	0.36	0.48	0.684	1.695	1.461
Item 33	0.34	0.48	0.52	0.659	1.406	0.646
Item 34	0.14	0.35	0.48	0.658	1.720	1.480
Item 35	0.11	0.31	0.39	0.532	1.283	2.017
Item 36	0.10	0.30	0.25	0.439	0.592	3.831
Item 37	0.14	0.34	0.28	0.437	0.821	2.582
Item 38	0.17	0.38	0.51	0.700	1.717	1.274
Item 39	0.24	0.43	0.40	0.506	1.044	1.285
Item 40	0.13	0.34	0.51	0.735	2.061	1.465
Item 41	0.03	0.17	0.26	0.575	1.494	3.002
Item 42	0.01	0.07	0.11	0.205	0.567	10.211
Item 43	0.11	0.31	0.42	0.631	1.619	1.745
Item 44	0.17	0.38	0.44	0.584	1.397	1.477
Item 45	0.17	0.37	0.57	0.781	2.465	1.185
Item 46	0.30	0.46	0.63	0.821	2.619	0.653
Item 47	0.21	0.41	0.65	0.851	3.187	0.910
Item 48	0.35	0.48	0.60	0.798	2.136	0.509
Item 49	0.28	0.45	0.50	0.664	1.539	0.859
Item 50	0.25	0.43	0.57	0.743	2.069	0.870
Item 51	0.36	0.48	0.64	0.808	2.484	0.441
Item 52	0.25	0.43	0.61	0.796	2.451	0.830
Item 53	0.25	0.44	0.54	0.720	1.953	0.880

Note. Items deleted due to copyright; Alpha = 0.93.

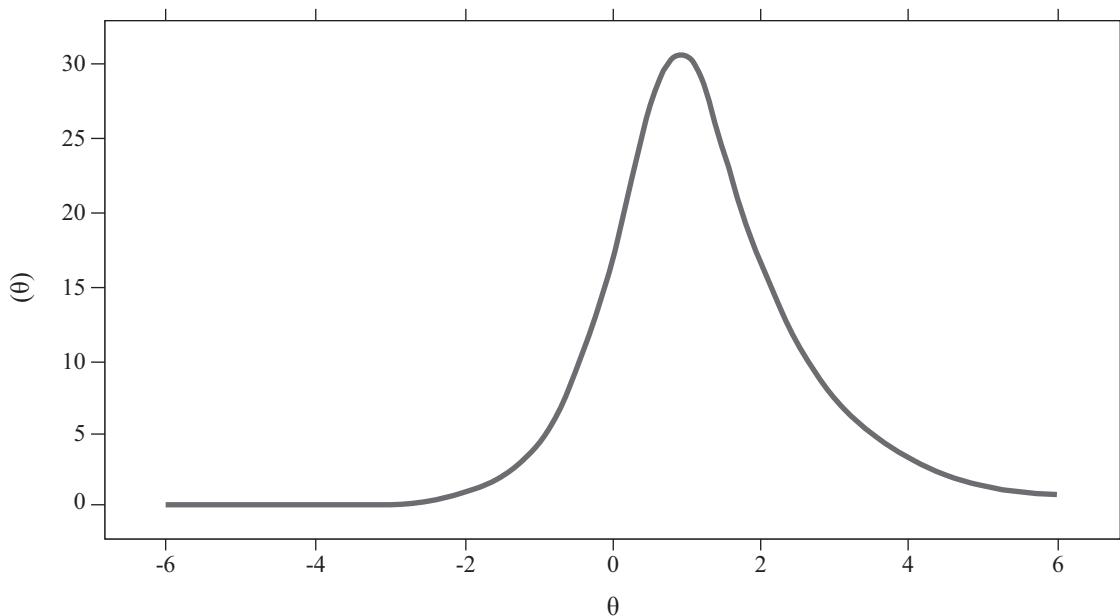


Figure 1. Information curve of the LSSI-R.

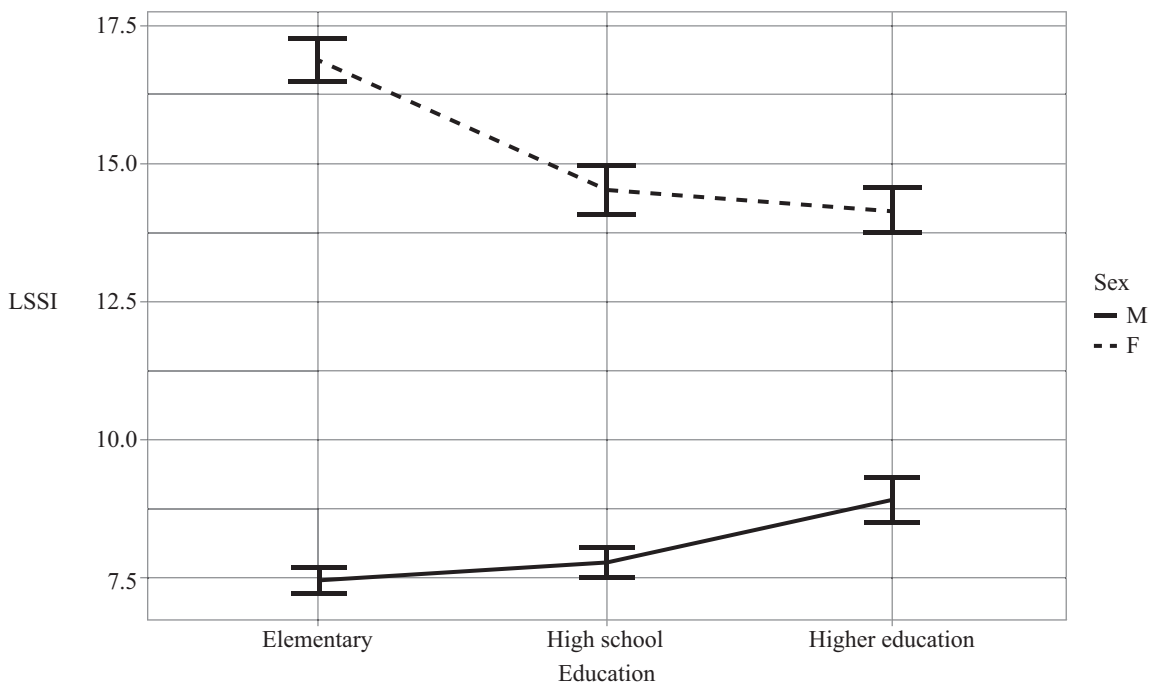


Figure 2. Comparison of results by gender and education.

Finally, to evaluate the clinical characteristics of the LSSI, a correlation was made between its results and those obtained on the DASS-21 by the clinical group. The findings indicated positive, strong, and significant correlations. Table 3 presents the coefficients achieved in detail.

The correlations between the LSSI and the DASS-21 anxiety and stress symptoms were higher than between the LSSI and the DASS-21 depression scale. This result was previously expected, offering also an evidence of convergence of findings of the LSSI-R, since both measures aim to assess also stress symptoms.

Table 3

Correlations obtained between the LSSI-R and the DASS-21

	<i>LSSI-R Total</i>	<i>DASS-21 Depression</i>	<i>DASS-21 Anxiety</i>	<i>DASS-21 Stress</i>
LSSI-R Total	1			
DASS-21 Depression	0.595*	1		
DASS-21 Anxiety	0.649*	0.701*	1	
DASS-21 Stress	0.648*	0.725*	0.783*	1

Note. *Significant correlations ($p < 0.05$).

Discussion

This paper presented psychometric characteristics of the LSSI, indicating conditions of internal structure, and possible determinants of the response process and aspects of clinical usefulness of the measure from two studies. The first study made use of a post-stratified data set to have greater convergence to Brazilian population characteristics and the second study counted on a sample of patients in clinical spaces.

The main results support a unidimensional structure of stress, in that the most discriminative items are those in which participants indicate more enduring symptoms (present for at least month) and that overall, women score higher than men and there is a moderate correlation between aspects of stress and general mental health conditions, and a strong correlation with the depression and anxiety subscales. This result is not particularly new in relation to psychometric modeling of stress (Machado et al., 2014), but only partially converges to the way in which the LSSI was theoretically designed, in which multidimensional aspects would be assessed.

Recent studies have indicated that one-dimensional structures are shown to be well matched to mental health conditions. Work on possible anxiety disorders (Garcia et al., 2021) and, to a lesser extent, also burnout and exhaustion (Walters et al., 2018). In this sense, the unidimensional structure obtained by analyzing the LSSI data indicates that stress can be responsible for a wide variety of symptoms, including from more transient conditions (e.g., dry mouth or knot in the stomach) to symptoms with a greater degree of chronicity (e.g., inability to work).

It is noteworthy that, although the statistical solution is one-dimensional, this does not mean to indicate that the stress phenomenon has only one dimension. As exposed in the literature, the relationship between psychological phenomena and psychometric models, by definition, is an approximation relationship. Psychometric or statistical models are (abstract) representations of a particular phenomenon that can be analytically useful, even with small distortions in the representation of the phenomenon of interest (Anuniação et al., 2022).

It is also important to consider that the chronicity of stress seems to have special importance in relation to discrimination on the LSSI-R. Items in which participants charged that they had experienced “prolonged apathy, depression, or anger,” “urge to run away from everything,” and “daily distress”

in the past month, were those that showed the greatest discriminative power. Conversely, experiencing “changes in appetite” or “sudden urge to start new projects” during the past 24 hours, although belonging to the stress conditions, proved to be less discriminative. Although in the TRI model such items, in isolation, present low discriminative value, within the one-dimensional model and theoretical aspects, considering stress in general, the items are relevant and therefore it is suggested that they remain in the revised version

The chronicity of stress has received special attention in the specialized literature (Godoy et al., 2018). Moreover, the relationship between stress and anger has also been found in other studies, especially in heart disease (Endrighi et al., 2019; la Rovere et al., 2022), as well as appearing associated in classification manuals, such as the Diagnostic and Statistical Manual of Mental Disorders (DSM).

Somewhat counter intuitively, indicating having experienced a heart attack has a low discrimination with stress conditions. However, this result needs to be correctly contextualized. There is common agreement in the health literature that negative contextual and social conditions are risk factors for clinical problems, including heart attack (DeVries et al., 2001; Kaur & Singh, 2016; Truelsen et al., 2003).

In addition, current evidence indicates that people who have had heart problems may experience a high level of anxiety and stress (Liu et al., 2021). In this sense, the low discrimination of having had a heart attack in the last month may suggest that heart attack is a condition with many outcomes and not just stress, as well as that the characteristics of the group surveyed are distinct from the clinical groups that often make up samples in epidemiological studies of risk factors (Kaur & Singh, 2016; Ramos et al., 2022).

The findings on significant differences in stress as a function of participant gender replicate findings in the literature (Viertö et al., 2021). Although women and men share many particularly stressful situations in everyday life (financial conditions, job security, relationship problems), stress symptoms are more prevalent and intense in women (Lipp & Lipp, 2020; Schmidt et al., 2020).

In previous research, the top five sources of stress and anxiety tend to be reported more by women than men. The systematization of these stressors includes family problems; temperature perception or its change; anxiety about future aspects; compromised health, and finally, possible uncertainty about the situation one is currently in (Kaur & Singh, 2016).

The relationship of stress symptoms to other clinical conditions also reproduces previous findings in the literature. It is now accepted that psychological symptoms and also mental disorders are correlated. Thus, developing one mental health condition tends to increase the risk of developing another (Caspi et al., 2014).

It is important to point out that this research has limitations. Initially, all data refer to the perception that the respondent presents about stress conditions. Although this phenomenon is present in self-answered scales, it is important to highlight that the measure does not refer directly to stress, but to its subjective perception. In addition, practical issues about the calculation and interpretation of results assuming a one-dimensional model were not discussed, which is scheduled for future studies.

Overall, it is verified that the LSSI-R presents an adequate set of psychometric evidence, strengthening the validity of the interpretations proposed for its results. The clinical data also allowed us to verify the strong relationship that this condition presents with other mental health conditions, which is more intense and frequent in women. New studies are in progress to verify possible capabilities for diagnostic aid of the LSSI-R, especially looking for cutoff values and normative aspects.

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